

Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

2016

16298. Yin, Z.; Tsurusaki, N. (2016): Odonate fauna in Lake Tanegaike, and two irrigation ponds in Otsuka, Tottori City, Honshu, Japan. Sanin Natural History Research 13: 25-35. (in Japanese, with English summary) ["Odonate communities were surveyed in three lakes and ponds (Lake Tanegaike near Tottori Sand Dunes, Otsuka Pond A in Otsuka, and Otsuka Pond B in Takazumi) in Tottori City, Tottori Pref., Honshu, Japan in 2014. A total of 33 species (21 from Lake Tanegaike, 28 from Otsuka Pond A (*Trigomphus melampus* is a new record), 28 from Otsuka Pond B (Of these, 11 species are new records) were found. *Shaogomphus postocularis*, which is rare in eastern part of Tottori Prefecture and listed on the red list (2012) of Tottori Prefecture, was found in Lake Tanegaike. A few individuals of *Tramea virginia*, which is considered to be an immigrated dragonfly species from breeding areas somewhere in Shikoku or Kyushu and its records are scarce in Tottori Prefecture, were found in Otsuka Pond A. Simpson's diversity indices of odonate communities (excluding Family Coenagrionidae) generally increased from spring towards summer and decreased in autumn, though fluctuation of the index was large in Otsuka Pond B due to mowing and drainage of the pond." (Authors)] Address: Tsurusaki, N., Department of Regional Environment, Faculty of Regional Sciences, Tottori University, Tottori City, 680-8551 Japan

16299. Yong, H.-S.; Song, S.-L.; Suana, I.W.; Eamsobhana, P.; Lim, P.-M. (2016): Complete mitochondrial genome of *Orthetrum* dragonflies and molecular phylogeny of Odonata. Biochemical Systematics and Ecology 69: 124-131. (in English) ["Complete mitogenome of *Orthetrum* dragonflies are determined by next generation sequencing. •Molecular phylogeny based on 13 PCGs is concordant with 15 mitochondrial genes (13 PCGs and 2 rRNA genes). •The Libellulidae (Anisoptera) is monophyletic with two lineages: (*Orthetrum*) + (*Brachythemis* + *Hydrobasileus*). •The Zygoptera is monophyletic with three lineages. •The enigmatic Epiophlebia superstes (Epiophlebiidae) forms a sister group with Zygoptera. Abstract: Dragonflies of the genus *Orthetrum* are members of the anisopteran family Libellulidae. To date,

there are no reports on the phylogeny of *Orthetrum* dragonflies based on the complete mitochondrial genome (mitogenome). There is only a single entry of a nearly complete mitogenome for *O. melania*. We report here the complete mitogenome of *O. chrysis*, *O. glaucum*, *O. sabina* and *O. testaceum* and their phylogenetic relationships with other taxa of Libellulidae as well as Epiophlebiidae, Anisoptera and Zygoptera. The whole mitogenomes of these four species possessed 37 genes (13 protein-coding genes – PCGs, 2 rRNA and 22 tRNA genes) and a non-coding region. Molecular phylogeny based on 13 PCGs was concordant with 15 mitochondrial genes (13 PCGs and 2 rRNA genes). The Libellulidae (Anisoptera) was monophyletic with two lineages: (*Orthetrum*) + (*Brachythemis* + *Hydrobasileus*). It formed a sister group with Corduliidae. The Zygoptera was monophyletic with three lineages: (Calopterygidae) + (Euphaeidae + Pseudolestidae) + (Coenagrionidae + Platynemididae). The enigmatic Epiophlebia superstes (Epiophlebiidae) forms a sister group with Zygoptera. The complete mitogenome is useful for determining the higher-level phylogenetic relationships of Odonata." (Authors)] Address: Song, Sze-Looi, Institute of Ocean and Earth Sciences, University of Malaya, Kuala Lumpur, Malaysia. looi511@hotmail.com

16300. Yu, X. (2016): A description of the larva of *Mesopodagrion tibetanum australe* (Odonata: "Megapodagrionidae"). International Journal of Odonatology 19(4): 275-282. (in English) ["The larva of the genus *Mesopodagrion* was identified with the help of DNA barcoding and described for the first time. The larvae have flat horizontal gills resembling those of Argiolestidae but the adults lack setae on the shaft of the genital ligula. Molecular data are shown to be useful and necessary in larval identification and should be adopted as a standard tool in future studies." (Author)] Address: Yu, X. Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, PR China. E-mail: lannysummer@163.com

16301. Zapata, A.I.; Pereyra, M.C. (2016): Odonatos asociados al curso superior y medio del río Suquía, Córdoba, Argentina. Revista de la Sociedad Entomológica Argentina 75(3/4): 135-138. (in Spanish, with English summary) ["The first list of regional odonatofauna of Córdoba is presented

with 24 species. *Acanthagrion lancea* Selys, *Telebasis willinki* Fraser (Zygoptera: Coenagrionidae), *Erythrodiplax nigricans*, *E. umbrata*, *Miathyria marcella*, *Orthemis nodiplaga*, *Pantala flavescens* and *P. hymenaea*, are new records for the province." (Authors)] Address: Zapata, Adriana, Introducción a la Biología, Diversidad Animal I y Museo de Zoología, Facultad de Ciencias Exactas, Físicas y Naturales, Univ. Nacional de Córdoba, Av. Vélez Sarsfield 299, X5000JJC, Córdoba, Argentina. E-mail: adrzapata@unc.edu.ar

16302. Zardo, E.L.; Behr, E.R. (2016): Trophic ecology of *Loricariichthys melanocheilus* Reis & Pereira, 2000 (Siluriformes: Loricariidae) in Ibicuí river, southern Brazil. *Maringá* 38(1): 67-76. (in English, with Portuguese summary) ["Aiming to characterize aspects of the trophic ecology of *Loricariichthys melanocheilus* in the Ibicuí River, bimonthly samples were taken in lotic and lentic ecosystems. Fish were caught and fixed in 10% formalin and dissected for stomach content analysis. Items were identified to the lowest taxonomic level possible. Stomach fullness (SF), repletion index (RI) and intestinal quotient (IQ) were estimated. Diet was assessed by the frequency of occurrence and the volumetric method, combined to obtain an Alimentary index. Feeding activity was analyzed with mean values of SF, RI and vacuity index (VI), which represents the percentage of empty stomachs. These parameters were compared seasonally, spatially, and according to the circadian rhythm. The main items in the trophic spectrum of *L. melanocheilus* were detritus, sediment, plant organic matter, nematodes, micro crustaceans (Copepoda, Cladocera) and insects (Diptera, Trichoptera, Ephemeroptera and Odonata). No environmental or seasonal variations were found for the consumed items. Feeding activity showed seasonal and environmental variations according to RI but did not significantly change according to SF. The IQ was 1.51, and showed seasonal variations, indicating changes in the diet." (Authors)] Address: Zardo, E.L., Faculdade de Agronomia, Universidade Federal do Rio Grande do Sul, Av. Porto Alegre, Rio Grande do Sul, Brazil. E-mail: everton_zardo@hotmail.com

16303. Zhao, Y.; Wang, D.; Tong, J.; Sun, J. (2016): Nanomechanical behaviour of the membranous wings of dragonfly *Pantala flavescens* Fabricius. *Journal of Bionic Engineering* 13(3): 388-396. (in English) ["The dragonfly has excellent flying capacity and its wings are typical 2-dimensional composite materials in micro-scale or nano-scale. The nanomechanical behavior of dragonfly membranous wings was investigated with a nanoindenter. It was shown that the maxima of the reduced modulus and nanohardness of the in-vivo and fresh dragonfly wings are about at position of 0.7L, where L is the wing length. It was found that the reduced modulus and nanohardness of radius of the wings of dragonfly are large. The reduced modulus and nanohardness of Costa, Radius and Postal veins of the in-vivo dragonfly wings are larger than those of the fresh ones. The deformation, stress and strain under the uniform load were analyzed with finite element simulation software ANSYS. The deformation is little and the distribution trend of the strain is probably in agreement with that of the stress. It is shown that the main veins have better stabilities and load-bearing capacities. The understanding of dragonfly wings'

nanomechanical properties would provide some references for improving some properties of 2-dimensional composite materials through the biomimetic designs. The realization of nanomechanical properties of dragonfly wings will provide inspirations for designing some new structures and materials of mechanical parts." (Authors)] Address: Zhao, Y., College of Mechanical and Power Engineering, Henan Polytechnic Univ., Jiaozuo 454000, China. E-mail: yanruzhaoy@163.com

16304. Zheng, D.; Wang, B.; Chang, S.-C. (2016): *Palaeodisparoneura cretacea* sp. nov., a new damselfly (Odonata: Zygoptera: Platynemididae) from mid-Cretaceous Burmese amber. *Comptes Rendus Palevol* 16(3): 235-240. (in English, with French summary) ["Abundant odonatans have been discovered from mid-Cretaceous Burmese amber, and Burma has played an important role in early damselfly diversification during the mid-Cretaceous. In this paper, a new damselfly, *Palaeodisparoneura cretacea* sp. nov., is described from Burmese amber. It is the second species of the extinct genus *Palaeodisparoneura* Poinar, Bechly et Buckley, 2010. *P. cretacea* sp. nov. differs from *P. burmanica* Poinar, Bechly et Buckley, 2010 in having more postnodal and postsubnodal cross-veins, the base of IR1 being more cells distal of the base of RP2, a hyaline pterostigma and a longer RP3/4. Our find increases the diversity of damselflies during the mid-Cretaceous." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Rd, 210008 Nanjing, China. E-mail: dranzheng@gmail.com

16305. Zheng, D.; Zhang, Q.; Nel, A.; Jarzembowski, E.A.; Zhou, Z.; Chang, S.-C.; Wang, B. (2016): New damselflies (Odonata: Zygoptera: Hemiphlebiidae, Dysagrionidae) from mid-Cretaceous Burmese amber. *Alcheringa* 41(1): 12-21. (in English) ["Two damselflies, *Burmahemiphlebia zhangi* gen. et sp. nov. and *Palaeodysagrion cretaceus* gen. et sp. nov., are described from the mid-Cretaceous Burmese amber. *Burmahemiphlebia zhangi* is the first record of Hemiphlebiidae from this amber, although the family was cosmopolitan during the Mesozoic. It can be readily distinguished from all other members of Hemiphlebiidae in having very short MP and CuA veins, and in its rectangular discoidal cell. The new fossils support the view that hemiphlebiid damselflies were one of the dominant groups of Zygoptera during the Mesozoic. *Palaeodysagrion cretaceus* is the first dysagrionid damselfly from Burmese amber and the second Mesozoic representative of this predominantly Paleogene group. It differs from other members of Dysagrionidae in having a unique elongate discoidal cell. These new finds increase the diversity of damselflies in mid-Cretaceous Burmese amber." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16306. Zheng, D.; Wang, H.; Jarzembowski, E.A.; Wang, B.; Chang, S.C.; Zhang, H. (2016): New data on Early Cretaceous odonatans (Stenophlebiidae, Aeschniidae) from northern China. *Cretaceous Research* 67: 59-65. (in English) ["*Liaostenophlebia yixianensis* gen. et sp. nov., a new stenophlebiid damselfly, is described from the Lower Cretaceous Yixian

Formation of western Liaoning, northern China. It is the third Chinese damselfly belonging to the family Stenophlebiidae to be described. *Liaostenophlebia* gen. nov. differs from the other genera of Stenophlebiidae in having Ax2 shifted just above MAb, a transverse and narrow Hal, a more curved anterior side of the hypertriangle, and a broader cubital-anal area. *Sinostenophlebia zhanjiakouensis* Hong, 1984 was previously attributed to Stenophlebiidae and hardly compares with other genera within this family. A check of the plates of the type species (*Sinostenophlebia zhanjiakouensis* Hong, 1984) suggests that *Sinostenophlebia* Hong, 1984 should be a member of the family Aeschnidiidae and it is very likely that this genus is a junior synonym of *Leptaeschnidium* Pritykina, 1977. The new data increases the diversity of both Stenophlebiidae and Aeschnidiidae in the Lower Cretaceous of China." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

16307. Zheng, D.; Wang, B.; Jarzembowski, E.A.; Chang, S.-C.; Nel, A. (2016): The first fossil Perilestidae (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 65: 199-205. (in English) ["Palaeoperilestes electronicus gen. et sp. nov. is the first perilestid damselfly described from mid-Cretaceous Burmese amber. This new damselfly can be attributed to the family Perilestidae by the mid-fork being distal of the subnodus and the base of IR2 quite near to the base of RP2, both features found in the extant genera *Perilestes* and *Perissolestes*. *Palaeoperilestes electronicus* gen. et sp. nov. has a strongly zigzagged IR1, however, differing from *Perilestes* and *Perissolestes* which have a straight IR1. The discovery not only adds to the diversity of damselflies in Burmese amber, but also puts the origin of Perilestidae back to at least the mid-Cretaceous." (Authors)] Address: Zheng, D., Dept of Earth Sciences, University of Hong Kong, Hong Kong Special Administrative Region, China. E-mail: dranzheng@gmail.com

16308. Zhao, Q.; Pan, Y.; Griffin, J.N.; Sun, J.; Sun, S. (2016): Contrasting trophic-cascade effects driven by variation in morphology of the perches used by a larval damselfly. *Freshwater Biology* 61(5): 693-701. (in English) ["(1.) The presence of habitat structures (e.g. caves, ledges, branches) has well-documented ecological effects. However, it remains largely unknown how variation in the morphology of particular habitat structures affects ecological interactions. (2.) Using an algae-cladoceran grazer-larval damselfly food chain as a model in a series of microcosm experiments, we manipulated food-chain length and the length (long versus short) and diameter (thick versus thin) of vertically orientated damselfly perches (habitat structure) and examined the density of the grazers and algae. Because the larval damselflies are usually more flexible on thinner perches and have broader foraging domains on longer perches, we predicted that when on long and thin perches they would suppress grazer density more efficiently and hence confer a more positive trophic-cascade effect on algal growth. (3.) As predicted, larval damselflies occupying long and thin perches most strongly reduced grazer

density and increased algal density, illustrating a positive trophic cascade. In all other damselfly treatments, and despite reduced grazer density, algal density declined, showing a negative trophic cascade due to an elevation in grazer foraging efficiency under predation risk. This probably resulted from the increased activity of the grazers and their spatial shift to the lower water column where algal density was higher. (4.) In conclusion, perch morphology affected the direction and strength of the trophic cascade by altering both density-mediated and behaviour-mediated indirect interactions. Considering that anthropogenic disturbance is dramatically changing the morphological diversity of habitat structures, we call for more research into the ecological consequences of such physical diversity at community and ecosystem." (Authors)] Address: Sun, S., Dept of Biology, College of Life Sciences, Nanjing University, 163 Xianlin Avenue, 210023 Nanjing, China. E-mail: shcs@nju.edu.cn

16309. Zheng, D.; Nel, A.; Wang, B.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H. (2016): A new damselfly from the Lower Jurassic of northwestern China and its paleobiogeographic significance. *Journal of Paleontology* 90(3): 485-490. (in English) ["A new species of the Lower Jurassic genus *Dorsettia* Whalley, 1985 is described from the Lower Jurassic Badaowan Formation of the Junggar Basin, northwestern China, as *Dorsettia sinica* new species. It provides additional morphological characters for this genus and is the earliest Jurassic dragonfly in China after the end-Triassic extinction. The occurrence of *Dorsettia* in England and northwestern China indicates that the end-Triassic extinction probably did not have a drastic influence on damselfly-dragonflies, or that the dispersal of damselfly-dragonflies was relatively quick during the earliest Jurassic." (Authors)] Address: Zheng, D., Dept of Earth Sciences, Univ. Hong Kong, Hong Kong Special Admin. Region, China. E-mail: dranzheng@gmail.com

16310. Zheng, D.; Jarzembowski, E.A.; Chang, S.C.; Wang, B. (2016): A new true dragonfly (Odonata, Anisoptera, Gomphaeschnaoidini) from mid-Cretaceous Burmese amber. *Proceedings of the Geologists' Association* 127(5): 629-632. (in English) ["A new dragonfly, *Cretagomphaeschnaoides jarzembowskiae* gen. et sp. nov., is described from mid-Cretaceous Burmese amber. *Cretagomphaeschnaoides* gen. nov. is of a small size, has a three-celled discoidal triangle, and more undulating vein MAb than other genera in the extinct tribe Gomphaeschnaoidini of the extant family Gomphaeschnidae. This fossil is the second record of Anisoptera in Cretaceous amber."] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Rd, Nanjing 210008, China. E-mail: dranzheng@gmail.com

16311. Zou, Y.; van Telgen, M.D.; Chen, J.; Xiao, H.; de Kraker, J.; Bianchi, F.J.; van der Werf, W. (2016): Modification and Application of a Leaf Blowvac for Field Sampling of Arthropods. *Journal of Visualized Experiments* 114, e54655, doi:10.3791/54655 (2016): 5 pp. (in English) ["Rice fields host a large diversity of arthropods, but investigating their pop-

ulation dynamics and interactions is challenging. Here we describe the modification and application of a leaf blower-vac for suction sampling of arthropod populations in rice. When used in combination with an enclosure, application of this sampling device provides absolute estimates of the populations of arthropods as numbers per standardized sampling area. The sampling efficiency depends critically on the sampling duration. In a mature rice crop, a two-minute sampling in an enclosure of 0.13 m² yields more than 90% of the arthropod population. The device also allows sampling of arthropods dwelling on the water surface or the soil in rice paddies, but it is not suitable for sampling fast flying insects, such as predatory Odonata or larger hymenopterous parasitoids. The modified blower-vac is simple to construct, and cheaper and easier to handle than traditional suction sampling devices, such as D-vac. The low cost makes the modified blower-vac also accessible to researchers in developing countries." (Authors)] Address: Zou, Yi, Centre for Crop Systems Analysis, Wageningen University, The Netherlands. E-mail: yi.zou.1@hotmail.com

2017

16312. Abdul, N.H.; Rawi Che, S. Md.; Ahmad, A.H.; Al-Shami, S.A. (2017): Effect of environmental disturbances on Odonata assemblages along a tropical polluted river. *Ekológia (Bratislava)* 36(4): 388-402. (in English) ["Odonata larvae have been intensively used as bioindicators for freshwater pollution as their community structure closely follow changes in the environment and habitat settings. In this study, 28 taxa of Odonata larvae were collected from three stations (upper, middle and lower) of a polluted river in Malaysia. The upper river basin receives effluents from an oil palm plantation. However, the middle station is presumably contaminated with anthropogenic wastes. The lower station is found to receive polluted discharges from aquaculture outlet. Several environmental parameters of water and sediment were continuously measured during the study. The water parameters showed no significant differences amongst the three stations. The species richness of Odonata was 22, 24 and 20 in the upper, middle and lower stations, respectively. The abundance of Odonata was significantly different among the studied sites. The tolerant damselfly, *Pseudagrion* sp. (41.22%), and facultative dragonflies, *Onychothemis* sp. (17.12%), were the most dominant taxa along the river stations. *Onychothemis* sp. and *Paragomphus capricornis* were equally important at the upper station [Important Species Index (ISI) 25.3 and 24.2%, respectively]. *Pseudagrion* sp. only scored an ISI value of 9.7%. *Pseudagrion* sp., *P. capricornis* and *Onychothemis* sp. were dominant in the middle station (ISI: 41.2%, 25.9% and 10.9% respectively), and *Pseudagrion* sp., *Onychothemis* sp. and *Prodasineura* sp. dominated the areas with dense growth of submerged aquatic weeds *Hydrilla* sp. in the lower station (ISI: 47.9, 24.5 and 13.8%, respectively). On the basis of the variations in larval abundance and ISI values, microhabitats differences partly in response to different types of pollutions entering the water structured the Odonata communities in this river basin." (Authors)] Address: Al-Shami, S.A., Dept Biol., Univ. College of Taymma, University of Tabuk, Taymma, P. O. Box 741, Tabuk, Saudi Arabia. E-mail: salshami@ut.edu.sa, alshami200@gmail.com

16313. Adawi, S.H.; Qasem, K.R.; Zawahra, M.M.; Handal, E.N. (2017): On some records of dragonflies (Insecta: Odonata: Anisoptera) from the West Bank (Palestine). *Jordan Journal of Biological Sciences* 10(3): 151-157. (in English) ["Three families with 13 species were collected/observed from 35 localities representing various habitats and water bodies in the West Bank (State of Palestine) over the past four years. These are *Brachythemis impartita*, *Crocothemis erythraea*, *Orthetrum brunneum*, *O. chrysostigma*, *O. taeniolatum*, *Sympetrum fonscolombii*, *S. meridionale*, *Trithemis annulata*, *T. arteriosa*, *Paragomphus genei*, *Anax imperator*, *A. parthenope*, and *A. ephippiger*. There may have been a decline in dragonfly diversity in the area due to human population growth accompanied by habitat destruction especially around springs." (Authors)] Address: Handal, E.N., Environmental Quality Authority, Palestine. E-mail: eliashandal93@gmail.com

16314. Adham, F.K.; Gabre, R.M.; Ibrahim, I.A. (2017): Effect of some chemical parameters on the abundance degrees of some aquatic insects and invertebrates in El-Zomor and El-Mariotyca canals, Giza (Egypt). *Journal of Basic and Environmental Sciences* 4: 290-297. (in English) ["The effect of some chemical changes in water quality were studied during two years (October 2001 - August 2003) and recorded at six sampling sites situated at El-Zomor and El-Mariotyca canals (branches from the River Nile). The aim of the present work is to study the effect of some chemical parameters on the abundance degrees of some aquatic insects and invertebrates in these two canals. Determination and estimation of the chemical parameters and abundance degrees are carried out in the field and laboratory of Dept of Entomology, Faculty of Science, Cairo University. Data of chemical factors and abundance degrees of collected aquatic invertebrates were analyzed by using one-way analysis of variance (ANOVA). The data obtained showed that, there is a strong correlation coefficients ($P < 0.05$ & $r = 0.634$) and ($P < 0.10$ & $r = 0.506$) between electrical conductivity values and insects (Diptera and Odonata) that distributed in these two canals. The semi-logarithmic graphs showed that the water quality of samples is changed to some extent where the chloride ions is higher than bicarbonate and; sulphate, magnesium are higher than calcium and sodium during some reported months especially at El-Zomor canal." (Authors)] Address: Adham, Fatma, K., Dept of Entomology, Faculty of Science, Cairo University, Giza12613, Egypt

16315. Afendy, A.; Dow, R.A.; Rahman, H. (2017): New records of Odonata from the Crocker Range National Park, Sabah, Malaysia. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 22: 1-7. (in English) ["We report here the results from two field trips to collect Odonata in the Crocker Range National Park in western Sabah, Borneo, Malaysia. 36 species were collected. *Telosticta fugispinosa* had not been described at the time of collection, nor had the two *Devadatta* species. There was no published record of *Protosticta* species of *kinabaluensis* before the 2012 expedition, nor of *Drepanosticta* species of *crenitis*." (Authors)] Address: Rahman, Homathevi, Institute for Tropical Biology & Conservation, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia. E-mail: homa.ums@gmail.com

- 16316.** Aguzzi, S.; Bogliani, G.; Orioli, V.; Pilon, N. (2017): *Ne-halennia speciosa* rediscovered in northwestern Italy (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(9): 337-339. (in English) ["At present only one Italian population of *N. speciosa* is known in the northeast of the country, while two populations in the northwest became extinct in the 1980s. In 2016 the authors discovered a further population of *N. speciosa* in a peat bog in north-western Italy. The implementation of a monitoring program both at the local and national scale, as well as targeted searching for other breeding sites in order to collect information to effectively protect the species in Italy is proposed." (Authors)] Address: Aguzzi, S., Associazione Naturalistica Sylvia, via I Maggio 34/62, 20090 Buccinasco (MI), Italy. E-mail: stefano.aguzzi@gmail.com
- 16317.** Ahmad, M.A. (2017): Scanning electron microscopy (SEM) study of caudal gills of *Ischnura senegalensis* (Rambur) and *Agriocnemis pygmaea* (Rambur) of Zygopteran Larvae (Odonata: Zygoptera). *International Journal of Zoology Studies* 2(6): 227-232. (in English) ["Clearly there is need for extensive studies of the gills of such ecologically diverse species of damselfly larvae. In the present study an attempt has been made to study the Scanning Electron Microscopy (SEM) study of the caudal gills of damselfly larvae. Scanning electron microscopy greatly clarifies the orientation, structures and arrangement of trachea, its ramification, tracheoles, and chloride cells apart with the arrangement of complex cuticular components because of its depth of field and high resolving power. Therefore, the objectives of the present study are to add information on the detailed fine ultrastructure of the caudal gills of these two species of Zygopteran larvae occupying different microhabitats of the inland waters." (Author)] Address: Ahmad, M.A., Guest Faculty, Department of Zoology, JRS College Jamalpur Munger, TMB Bhagalpur University, Bhagalpur, Bihar, India
- 16318.** Ahmad, A.M.; Kumari, K. (2017): Histochemistry of the respiratory surface of the caudal gills of *Ceragrion coromandelianum* (Fabricius), Zygopteran larvae (Odonata: Zygoptera). *International Journal of Zoology Studies* 2(6): 290-293. (in English) ["The present study showed that mucous cells in the gills of damselfly larvae were found mainly in the surface of the gill lamellae when employing with Schiff's reagent (PAS test), and recognized the presence of muco-polsaccharides. The present cells of the epithelium of the caudal gills have been found to contain acid muco-polysaccharide. The perusal of literature pertaining to the histochemical investigation of the different zones of the caudal gills of Zygopteran Odonate larvae revealed that practically no work has been done so far on these taxa. The aim of the present work was to study histochemical characterization of the caudal gills of damselfly larvae to investigate the deposition of chemicals in respiratory epithelium of the caudal gills of Zygopteran larvae." (Authors)] Address: Ahmad, A.M., Guest Faculty, Dept Zool., JRS College, Jamalpur, Munger, TM Bhagalpur Univ., Bhagalpur, Bihar, India
- 16319.** Ahn, S.J.; Chiluwal, K.; Choi, S.H.; Park, C.G. (2017): Diversity of insect fauna in Junam wetland of Korea. *Korean J. Appl. Entomol.* 56(2): 135-145. (in English, with Korean summary) ["A sampling survey was conducted at three reservoirs of Junam wetland (6.02 km²) in Korea to identify the wetland insect fauna along with their dominance, diversity, richness and evenness. Methods of monitoring were visual inspection and sweeping in 2010, Malaise trapping in 2011, light trapping and pitfall trapping in 2012. In total, 9,269 individuals (36.3% coleopterans, 21.3% lepidopterans and 13.9% odonates) were collected, belonging to 574 species, 141 families and 14 orders. For the number of species, lepidopterans shared the highest (31.2%), followed by coleopterans (28.0%) and hemipterans (12.9%). Dominant species were *Enochrus simulans* (Coleoptera) (7.9% of total individuals) followed by *Hydaticus grammicus* (Coleoptera) (4.3%), *Galerucella nipponensis* (Coleoptera) (4.1%), *Elophila interruptalis* (Lepidoptera) (3.1%) and *Apis mellifera* (Hymenoptera) (2.2%). Total counts of coleopterans, lepidopterans and odonates in the three reservoirs were quite high, but the counts were not significantly different among the reservoirs. Insect diversity index (H') and richness index (RI) of the Junam wetland were 5.04 and 59.10, respectively." (Authors)] Address: Park, C.G., Erang Bio-Environment Research System, Haman 52060, Republic of Korea. E-mail: parkcg@gnu.ac.kr
- 16320.** Álvarez Fidalgo, M.; Noval Fonseca, N. (2017): *Symptetrum vulgatum ibericum* Ocharan, 1985: primera cita en la provincia de Soria y este de Castilla y León, España (Odonata: Libellulidae). *BVNPC* 6(73): 32-39. (in Spanish, with English summary) ["In this note the first record of *S. vulgatum ibericum* in the province of Soria (the most eastern locality known for this Iberian subspecies in the region of Castile and León) is reported. Besides, an updated distribution map for this species on the Iberian Peninsula is presented.] Address: Álvarez Fidalgo, M., Experta del Grupo Odonata de Biodiversidad Virtual – Oviedo, Asturias, Spain. E-mail: madamcoolpix@gmail.com
- 16321.** Alvia, I.; Veliz, D.; Esquivel, C.; Vila, I. (2017): Lack of genetic structure in *Pantala flavescens* among Central and South American localities (Odonata: Libellulidae). *Odonatologica* 46(1/2): 67-82. (in English) ["*P. flavescens* is the most widespread odonate on Earth, absent only in Antarctica and parts of Europe. A recent study performed with sequences of mtDNA suggested the presence of one panmictic population of the species at a global scale. However, combining mitochondrial and nuclear markers could offer more information about the genetic variability of populations. Here, we sequenced a fragment of the COI gene and genotyped eight microsatellite loci in order to analyze the population genetic structure and diversity in individuals collected in Central America (two sites in Costa Rica, separated by 147 km) and two localities in South America (one site in Chile and one in Peru, separated by 52 km). The global FST estimated from COI and microsatellite data showed no evidence of genetic structure. Furthermore, an Analysis of Molecular Variance (AMOVA) performed with both COI and microsatellites also showed no evidence of genetic structure despite the >5 000 km of distance between both geographic regions. These results suggest an extraordinary movement of *P. flavescens* along the American continent, thus corroborating the previous study conducted on this species." (Authors)] Address: Alvia, Ingrid,

Laboratory of Ecology and Genetics, Dept of Ecological Sciences, University of Chile, Las Palmeras 3425, Ñuñoa, Santiago, Chile. E-mail: ingrid.alvial@gmail.com>

16322. Andaste, Y.S.; Nugroho, M.A.A.; Benyamin, R.S.B.; Trilaksono, B.R.; Moelyadi, A. (2017): Design and construction of flapping wing micro aerial vehicle robot platform. System Engineering and Technology (ICSET), 2017 7th IEEE International Conference on Shah Alam, Malaysia: 189-193 (in English) ["Flapping Wing Micro Aerial Vehicle (MAV) is the development of Unmanned Aerial Vehicle (UAV) which is smaller and lighter. GaneFly is a flapping wing MAV robot developed in this paper. GaneFly flying platform is designed to be able to fly with flapping mechanism that adapts the flapping wing of the dragonfly and also designed to be able to turn and pitch according to the input command. Design of the GaneFly platform includes the selection and design of mechanical, electrical components, and integration between mechanical and electrical component. Selection of components and materials primarily in the small dimensions and lightweight but still considering the performance. The design of the mechanical adapts to the existing research of the flapping wing MAV. The result of the design is integrated parts with electrical components up to be a flying platform. After going through various processes of trial and repair, the GaneFly platform can fly with its flapping mechanism and can be controlled quite well." (Authors)] Address: Moelyadi, A. Fac. Mechanical & Aerospace Engineering, Institut Teknologi Bandung, Bandung, Indonesia

16323. Ansari, M.L.; Soendjoto, M.A.; Dhamono, D. (2017): Capung di kawasan rawa Desa Sungai Lumbah, Kabupaten Barito Kuala. Prosiding Seminar Nasional Lahan Basah 2016(1). Lambung Mangkurat University Press, Banjarmasin, Indonesia: 89-95. (in English) ["The research aimed to describe species of Odonata found in the swamp area of Sungai Lumbah Village, Barito Kuala Regency. We took pictures of Odonata and caught it with insect net. Then samples were identified in biology laboratory of Lambung Mangkurat University. We found 14 species; 8 species of Libellulidae, 1 Gomphidae, and 5 Coenagrionidae." (Authors)] Address: Ansari, M.L., Program Studi Magister Pendidikan Biologi, Program Pascasarjana, Univ. Lambung Mangkurat, Jalan Brigjen H. Hasan Basry Banjarmasin 70123, Indonesia. E-mail: lutvi.ansari@gmail.com

16324. Arulprakash, R.; Chitra, N.; Gunathilagaraj, K. (2017): Biodiversity of Odonata in rice at Pattukkottai in Tamil Nadu. Indian Journal of Entomology 79(4): 498-502. (in English) ["Odonata diversity assessed in the rice fields of five major rice growing areas ... revealed the occurrence of 19 species. These belong to 16 genera under 3 families viz., Libellulidae (n=12 species), Coenagrionidae (n=6) and Lestidae (n=1). Maximum Odonata abundance, species richness, diversity and evenness was found in the ARS and only 10–15% variation in species composition was found. *Diplacodes trivialis*, *Pantala flavescens*, *Orthetrum sabina*, *Crocothemis servilia*, *Trithemis pallidinervis*, *Ischnura aurora* and *Agriocnemis pygmaea* were the abundant ones." (Authors)] Address: Arulprakash, R., Seed Centre, Tamil Nadu Agricultural University, Coimbatore, 641 003, India. E-mail: avrarulprakash@gmail.com

16325. Asma, A.; Sardar, A.M.; Waheed, A.P.; Shabir, A.; Sadia, T.; Shahjahan, R.; Muhsin, A. (2017): Collection and identification of genus *Anax* (Odonata, Aeshnidae) from district Swat. Journal of Entomology and Zoology Studies 5(2): 1440-1442. (in English) ["An extensive field survey was carried out to collect dragonflies of genus *Anax* from Swat during the year 2016-2017. A total of 251 specimens were collected and sorted out into family Aeshnidae genus *Anax* and species *A. imperator* and *A. parthenope* respectively. Additionally, morphological characters along with distributional data are provided." (Authors)] Address: Asma, A., Dept Zool., Hazara Univ. Mansehra, Khyber Pakhtunkhwa, Pakistan

16326. Ávila Junior, W.F.; Lencioni, F.A.A.; Carneiro, M.A.A. (2017): *Heteragrion cauei* sp. nov., a new damselfly from Minas Gerais, Brazil (Odonata: Heteragrionidae). Odonatologica 46(3/4): 275-286. (in English) ["*H. cauei* sp. nov. (♂ holotype and ♀ allotype: Brazil, Minas Gerais, Catarina Mendes, Ouro Preto, 18-iii-2016, 20°19'54"S, 43°30'49"W, deposited in coll. MNRJ) is described and illustrated. Based on thoracic coloration, *H. cauei* sp. nov. is part of the group of species formed by *H. gracile*, *H. luizfelipei* and *H. beschkii*; however the new species differs from these species by the morphology of the medial process of the cercus." (Authors)] Address: Ávila Junior, W.F., Univ. Federal de Ouro Preto, Lab. Entom. Ecológica DEBIO/ICEB, Campus Morro do Cruzeiro, CEP 35400-000, Ouro Preto, MG, Brazil. E-mail: walterfaj88@gmail.com

16327. Babu, R. (2017): Diversity of odonates (Insecta: Odonata) in fish farm, College of Veterinary and Animal Sciences, CSKHPKV, Palampur, Himachal Pradesh, India. Rec. zool. Surv. India 117(4): 367-375. (in English) ["Odonata diversity in fish farm of Department of Fisheries, CSKHPKV, Palampur, Kangra Valley, Himachal Pradesh were comprehensively studied and documented for the first time. A total of 27 species belonging to 19 genera and 7 families are recorded. Zygoptera were represented by 13 species and 14 species represents Anisoptera. Among the families, Libellulidae was richest family with 13 species and followed by Coenagrionidae with 9 species. The wide range of habitats including foraging and nocturnal roosting habitat at Fish Farm, CSKHPKV leads to greatest species diversity." (Authors)] Address: Babu, R., Southern Regional Centre, Zoological Survey of India, Chennai - 600 028, Tamil Nadu, India

16328. Baidya, S. (2017): Biodiversity of dragonflies and damselflies of Acharya Prafulla Chandra College campus, West Bengal in Monsoon and Winter seasons. International Journal of Experimental Research and Review 10: 27-29. (in English) ["The objective of the present study is to explore the diversity and abundance of Odonata in Acharya Prafulla Chandra College in Monsoon and Winter seasons (July, 2016 to March, 2016). They are an important part of ecosystem and an important indicator of environmental quality. As they are predator of mosquito larvae, they also act as mosquito controlling agent. Total 19 species belonging to six families of dragonflies and damselflies were recorded, in which the most abundant (10 species), 8 species from family Coenagrionidae and Gomphidae, Lestidae Aeshnidae, Platycnemididae families

were very least abundant." (Author)] Address: Baidya, S., Department of Zoology, Acharya Prafulla Chandra College, New Barrackpur, Kolkata-700131, West Bengal, India. E-mail: swarnava.bar@gmail.com

16329. Barsagade, D.D.; Thakre, R.P.; Gathalkar, G.B.; Kirsan, J.R. (2017): A comparative study of antennal microstructure in two species of damselflies *Rhodischnura nursei* and *Lestes elatus*. *Journal of Entomology and Zoology Studies* 5(2): 1550-1557. (in English) ["Scanning electron microscopic (SEM) studies of the antenna of *R. nursei* and *L. elatus* was investigated comparatively. The antenna of both the species (adult) revealed the presence of various mechano- and chemosensory sensilla. Moreover, the microstructural variations among them were compared, to know the species specificity. The antennal scape of *R. nursei* comprised of sensilla trichoidea ST-I, ST-II, sensilla trichoidea curvata (STC) and sensilla basiconica (SB). Whereas, the scape of *L. elatus* bears ST-I, ST-II, STC, SB-I and SB-II. In *R. nursei*, the pedicel comprised of ST-I, ST-II and microtrichia MT-I, MT-II, whereas, ST and MT are present in *L. elatus*. Subsequently, the flagellum of *R. nursei* comprised of MTP-I, MTP-II, MTP-III, while, MTP-I, MTP-II, MTP-III, and MTP-IV were observed in *L. elatus*. Therefore, the presence of various mechano- and chemosensilla in these damselflies may play a decisive role in olfaction, ability to perceive temperature, humidity or air speed that has been discussed." (Authors)] Address: Barsagade, D.D., Dept of Zoology, MJF Educational Campus, RTM Nagpur University, Nagpur, Maharashtra, India

16330. Bashir, I.; Bhat, F.A.; Qadri, H. (2017): Insect Community of Hirpora Wildlife Sanctuary (Shopian), Jammu and Kashmir, India. *Journal of Horticulture* 4(2): 4pp. (in English) ["Insects are known to be the most successful and diverse form of organisms on earth. Insects play an important role in running an ecosystem and help to perform various activities which are necessary for an ecological balance. The study which was carried in 2013 reports the insect diversity of Hirpora wildlife sanctuary (Shopian) and a total of 338 insect individuals of 26 species were recorded belonging to 20 families and 7 orders during the time period of June-Nov. 2013. Lepidoptera order comprise of greater number of insects followed by Hymenoptera, Diptera and Coleoptera while lesser number of insects were found in Odonata, Hemiptera and Orthoptera. The maximum number of insects were recorded in the month of July and August due to the favourable environmental conditions and least number of insects were recorded during the month of October and November at this stage their life cycle changes and their number starts to decline because of non availability of food and drastic change in the environment of which they are a part." (Authors)] Address: Bhat, F.A., Dept of Environmental Sciences, S.P. College Kashmir, Jammu and Kashmir, India. E-mail: fayazevs@gmail.com

16331. Battisti, A.; Pavesi, M. (2017): First records of breeding *Sympetma paedisca* (Brauer, 1877) (Odonata Lestidae) in Italy. *Biodiversity Journal* 8(2): 763-768. (in English) ["Oviposition in Italian populations of *S. paedisca* was observed for the first time. This species is listed as Endangered (EN) in the Mediterranean Basin and as Critically Endangered

(CR) in Italy. Several ovipositing tandems were observed for the years 2014, 2015 and 2016, from the 17th of May to the 10th of June, in the "Riserva Naturale Orientata della Baraggia di Candelo" (=Heathlands Oriented Natural Reserve) (North Piedmont), a protected area and a military zone too, in a pond at the edge of the heathland. Oviposition substrates are vertical living *Juncus effusus* L. stems, preferably the isolated ones or those on the external side of the tufts, rather than inside them; eggs are laid about 20 to 50 cm above the water level. In the heathland, around the breeding site, tens of adults were seen every autumn and winter, also in December and January sunny days. Reproductive *S. paedisca* were also occasionally observed in other two localities, namely the lake of Viverone and the "Riserva Naturale Orientata Palude di Casalbeltrame" (=Casalbeltrame Fen Oriented Natural Reserve). Notes on breeding behaviour and a description of both breeding and overwintering area of *S. paedisca* are provided, since knowledge of its breeding and overwintering sites is needed to ensure their protection and therefore the conservation of Italian populations of this damselfly." (Authors)] Address: Battisti, A., Fraz. Feilley 101, Saint Vincent, 11027, Aosta, Italy. E-mail: andre.battisti@gmail.com

16332. Batty, P. (2017): Odonata monitoring for the Scottish Beaver Trial 2009-2014 with notes on the post-trial period. *J. Br. Dragonfly Society* 33(2): 79-103. (in English) ["The British Dragonfly Society surveyed *Brachytron pratense* and *Calopteryx virgo* for Scottish Natural Heritage (SNH) as part of the monitoring for the Scottish Beaver Trial 2009-2014. The beavers drastically reduced the aquatic Vegetation in some lochs and constructed dams, increasing the size of one loch four-fold. At the end of the survey *B. pratense* was still breeding at the affected lochs. The study period was too short to evaluate the full effects on this species. Although there was a decline in the numbers of larvae and exuviae at one of the lochs where there was high beaver activity there were no obvious trends at the other three. Since the trial, beavers have moved into new lochs and built dams on one burn. In 2016 *B. pratense* was seen at all lochs and larvae found at the main lochs sampled. The Scottish Government's decision is to allow beavers to remain in Scotland and spread naturally. Results from the survey of *C. virgo* have not been included as the beavers did not use the burns during the survey period. However, these data will be important for future monitoring." (Authors)] Address: Batty, Pat, Kiman Farm, Kilmichael Gien, Lochgilphead, Argyll PA318Q, UK

16333. Benchalel, W.; Merah, S.; Bouslama, Z.; Ramdani, M.; Elmsellem, H.; Flower, R. (2017): Odonata as indicators of environmental impacts in rivers, case of wadi El-Kébir-East (northeastern Algeria). *Moroccan Journal of Chemistry* 5(4): 610-621. (in English) ["This paper presents results of two monitoring programs carried out in two decades during April 1993-May 1994, and April 2015 May 2016 in the East Wadi of El-Kébir, a protected area (PNEK) of eastern Numidia (northeastern Algeria). Monitoring was located in areas with different degrees of anthropogenic impacts. Selected environmental variables were recorded during the monitoring periods. The Odonata fauna and biological indices were used

to characterize development of the study area, after two decades and to assess the quality of the environment. The alteration of this river has resulted in a marked simplification of the original (1993-1994) odonatological fauna. Over the past two decades, odonatological species richness has decreased from 14 to 7 species inventoried during the 1993 and 2015 seasons. The phenology of adult was extended until early December 2015, possibly as a result of global warming. Odonata are identified as useful as indicators of environmental change in the monitored river systems. The majority of species such as the Gomphidae are not tolerant of increased contamination and changes in structure of the river. Only some species such as *Lestes vidis*, *Platycnemis subdilatata*, *Ischnura graellsii* and *Ceragrion tenellum*, appear to be adapted to changed conditions and became dominant in heavily disturbed sites. The species disappeared from these sites are clearly associated with good water quality and less disturbance, which highlights the importance of the conservation of the habitats of freshwater and regular monitoring." (Authors)] Address: Benchalel, W., Laboratory of Ecology of Terrestrial and Aquatic Systems. University Badji Mokhtar, Annaba, Algeria

16334. Bernal, A. (2017): Distribución actual de *Paragomphus genei* (Selys, 1841) (Odonata: Gomphidae) en la provincia de Cádiz y pautas para la localización y reconocimiento de sus larvas en sus últimos estadios. *Revista de la Sociedad Gaditana de Historia Natural* 11: 7-12. (in Spanish, with English summary) ["New records of the distribution of *P. genei* in the province of Cadiz are given between 2011 and 2016. Information about the behavior and habitat selection of larvae, as well as data that allow their location in natural habitats is provided. Finally, morphologically they described briefly the four last larval instars for this species." (Author)] Address: Email: arturo.libelula@gmail.com

16335. Biswas, G.K.; Neogi, A.K.; Pal, A. (2017): First record of *Epophthalmia vittata* Burmeister, 1839 (Insecta, Odonata, Anisoptera) from Dhaka, Bangladesh. *Check List* 13 (6): 845–847: 845-847. (in English) ["We report *E. vittata* from Bangladesh for the first time, based on a specimen collected on 27-V-2016 in the National Botanical Garden, Dhaka. This is first record of any species of the family Macromiidae from Bangladesh. This new record exemplifies gaps in sampling for dragonflies in Bangladesh and suggests that additional research on odonates in the country is needed." (Authors)] Address: Neogi, A.K., Entom. Branch, Dept Zool. Jagannath Univ., Dhaka-1100, Bangladesh. E-mail: amit_jnu52@yahoo.com

16336. Blanke, A.; Schmitz, H.; Patera, A.; Dutel, H.; Fagan, M.J. (2017): Form–function relationships in dragonfly mandibles under an evolutionary perspective. *Journal of the Royal Society Interface* 14(128): 11 pp. (in English) ["Functional requirements may constrain phenotypic diversification or foster it. For insect mouthparts, the quantification of the relationship between shape and function in an evolutionary framework remained largely unexplored. Here, the question of a functional influence on phenotypic diversification for dragonfly mandibles is assessed with a large-scale biomechanical analysis

covering nearly all anisopteran families, using finite element analysis in combination with geometric morphometrics. A constraining effect of phylogeny could be found for shape, the mandibular mechanical advantage (MA), and certain mechanical joint parameters, while stresses and strains, the majority of joint parameters and size are influenced by shared ancestry. Furthermore, joint mechanics are correlated with neither strain nor mandibular MA and size effects have virtually play no role for shape or mechanical variation. The presence of mandibular strengthening ridges shows no phylogenetic signal except for one ridge peculiar to Libelluloidea, and ridge presence is also not correlated with each other. The results suggest that functional traits are more variable at this taxonomic level and that they are not influenced by shared ancestry. At the same time, the results contradict the widespread idea that mandibular morphology mainly reflects functional demands at least at this taxonomic level. The varying functional factors rather lead to the same mandibular performance as expressed by the MA, which suggests a many-to-one mapping of the investigated parameters onto the same narrow mandibular performance space." (Authors)] Address: Blanke, A., Medical & Biological Engineering Research Group, School of Engineering, Univ. Hull, Hull HU6 7RX, UK

16337. Blanke, A.; Watson, P.J.; Holbrey, R.; Fagan, M.J. (2017): Computational biomechanics changes our view on insect head evolution. *Proceedings of the Royal Society B* 284(1848): 9 pp. (in English) ["Despite large-scale molecular attempts, the relationships of the basal winged insect lineages dragonflies, mayflies and neopterans, are still unresolved. Other data sources, such as morphology, suffer from unclear functional dependencies of the structures considered, which might mislead phylogenetic inference. Here, we assess this problem by combining for the first time biomechanics with phylogenetics using two advanced engineering techniques, multibody dynamics analysis and finite-element analysis, to objectively identify functional linkages in insect head structures which have been used traditionally to argue basal winged insect relationships. With a biomechanical model of unprecedented detail, we are able to investigate the mechanics of morphological characters under biologically realistic load, i.e. biting. We show that a range of head characters, mainly ridges, endoskeletal elements and joints, are indeed mechanically linked to each other. An analysis of character state correlation in a morphological data matrix focused on head characters shows highly significant correlation of these mechanically linked structures. Phylogenetic tree reconstruction under different data exclusion schemes based on the correlation analysis unambiguously supports a sistergroup relationship of dragonflies and mayflies. The combination of biomechanics and phylogenetics as it is proposed here could be a promising approach to assess functional dependencies in many organisms to increase our understanding of phenotypic evolution." (Authors)] Address: Blanke, A. E-mail: a.blanke@hull.ac.uk

16338. Bode-Oke, A.; Zeyghami, S.; Dong, H. (2017): Abstract: L8.00007: How insects initiate flight: Computational analysis of a damselfly in takeoff flight. *Bulletin of the American Physical Society, 70th Annual Meeting of the APS Division*

of Fluid Dynamics. Sunday–Tuesday, November 19–21, 2017; Denver, Colorado: (in English) [Verbatim: Flight initiation is essential for survival in biological fliers and can be classified into jumping and non-jumping takeoffs. During jumping takeoffs, the legs generate most of the initial impulse. Whereas the wings generate most of the forces in non-jumping takeoffs, which are usually voluntary, slow, and stable. It is of interest to understand how non-jumping takeoffs occur and what strategies insects use to generate the required forces. Using a high fidelity computational fluid dynamics simulation, we identify the flow features and compute the wing aerodynamic forces to elucidate how flight forces are generated by a damselfly performing a non-jumping takeoff. Our results show that a damselfly generates about three times its bodyweight during the first half-stroke for liftoff while flapping through a steeply inclined stroke plane and slicing the air at high angles of attack. Consequently, a Leading Edge Vortex (LEV) is formed during both the downstroke and upstroke on all the four wings. The formation of the LEV, however, is inhibited in the subsequent upstrokes following takeoff. Accordingly, we observe a drastic reduction in the magnitude of the aerodynamic force, signifying the importance of LEV in augmenting force production.] Address: Bode-Oke, A.T., Mechanical & Aerospace Engineering, University of Virginia, Charlottesville, VA 22903, USA

16339. Borisov, A.S.; Borisov, S.N. (2017): Distribution of *Orthetrum albistylum* (Selys, 1848) (Odonata, Libellulidae) in thermal springs of the Baikal rift zone, Russia. *Eurasian Entomological Journal* 16(4): 299-303. (in Russian, with English summary) ["In East Siberia the dragonfly *Orthetrum albistylum* is restricted to thermal springs due to local climatic conditions; it was recorded from 16 thermal springs of the Baikal rift zone from the south-western part (North-East Pribaikalye) to the north-eastern part (Charskaya Hollow). The northernmost isolated localities of the species are located 770 km from the main part of the areal." (Authors)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-sn@yandex.ru

16340. Borisov, A.S.; Borisov, S.N. (2017): A new record of *Lestes barbarus* (Fabricius, 1798) (Odonata, Lestidae) in the Baikal region and distribution in the eastern part of its range. *Eurasian Entomological Journal* 16(5): 416-418. (in *Lestes barbarus*, distribution, Baikal region, Mongolia, China) ["The information on the discovery of *Lestes barbarus* in the south-eastern Baikal region (51°32'37" N, 105°07'35" E) is given. Data on the distribution of the species in the eastern part of the range in the south of Central Siberia, in Mongolia and in Northern China are summarized. This species is usually resident in the western part of the areal, but occurs sporadically in the eastern part of the areal." (Authors)] Address: Borisov, A.S., Inst. of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-sn@yandex.ru

16341. Borisov, S.N.; Kazenas, V.L. (2017): First record of the dragonfly *Onychogomphus lefebvrei* (Rambur, 1842) (Odonata,

Gomphidae) for the fauna of Kazakhstan. *Eurasian Entomological Journal* 16(4): 320-324. (in Russian, with English summary) ["*O. lefebvrei* is recorded for the fauna of Kazakhstan for a first time based on photographic evidence from seven localities in Western Tien Shan on Karatau Ridge and from material collected from Ugam Ridge. These are the northernmost locations of the species in the Central Asian part of the range. A rare and locally distributed Central Asian species *O. lefebvrei* is usually resident in the south of Kazakhstan.] Address: Kazenas, V.L., Institute of Zoology of the Ministry of Education and Science of the Republic of Kazakhstan, Al-Farabi Prosp. 93, Almaty 050060 Kazakhstan

16342. Borisova, N.V.; Buczynski, P. (2017): *Aeshna mixta* Latreille, 1805 (Odonata: Anisoptera): Aeshnidae) - a new species of dragonfly for Chuvashia. *Scientific works of the state natural reserve Prisursky* 32: 94-95. (in Russian, with English summary) ["In 2017 a new species of dragonfly for Chuvashia – *A. mixta* – was found on the Yalchiksky cluster of the Nature Reserve, Prisursky Yalchiksky-steppe zone in the southeast of Chuvashia is probably located on the northern border of its range." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

16343. Borkenstein, A.; Schröter, A.; Jödicke, R. (2017): Matutinal mating in *Aeshna grandis* and *A. viridis* – a behavioural pair of twins prefers early-morning sex (Odonata: Aeshnidae). *Odonatologica* 46(3/4): 207-226. (in English) ["We investigated the hitherto unknown matutinal mating behaviour of *Aeshna grandis* and found that matings basically occurred at dawn. With the first morning light males began performing a searching flight for females that roosted deep in terrestrial vegetation characterized by reed, rush and grass. Matutinal mating in the distinctive twistedwheel position is documented. Twisted wheels are unique as they are not formed in flight but while perching on vegetation and they show no readiness to escape. The twisted position, with the male hanging upside down and his appendages being obliquely slipped across the female's head, is the result of the formation of mating wheels with the female perched. Later in the morning we observed feeding flight at suitable sites and resting in low vegetation of a wet meadow. During this resting phase some males inspected the vegetation on the wing, described here as 'mid-morning searching flight'. In this situation and also when foraging individuals aggregated, we found untwisted, upright hanging couples, which we interpret as wheels formed in flight – an indication of alternative mating tactics. *A. viridis*, also known to exhibit matutinal matings, occurred syntopically and behaved similarly. We interpret the energy-sapping searching flight at dawn as sexual selection: females select genetic quality by choosing only the fittest mates." (Authors)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

16344. Bota-Sierra, C.A.; Novelo-Gutiérrez, R.; Amaya-Vallejo, V. (2017): The rediscovery and redescription of *Epigomphus pechumani* Belle, 1970 (Odonata: Gomphidae), with a description of its female from the Western Colombian Andes.

Zootaxa 4306(3): 419-427. (in English) ["*E. pechumani* Belle, 1970, was described based upon a single male specimen in poor condition, lacking specific locality in Colombia. Here the male is redescribed and the female is described and illustrated for the first time based on a total of 18 adults collected in Tatamá National Park, Risaralda Department, and Farallones de Cali National Park, Valle del Cauca Department, Colombia. A diagnosis, notes on its biology and a distributional map are presented. All material is deposited in the Entomological collection of Universidad de Antioquia." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

16345. Brodin, T.; Piovano, S.; Fick, J.; Klaminder, J.; Heynen, M.; Jonsson, M. (2017): Ecological effects of pharmaceuticals in aquatic systems—impacts through behavioural alterations. *Phil. Trans. R. Soc. B* 369. 20130580. 10 pp. (in English) ["The study of animal behaviour is important for both ecology and ecotoxicology, yet research in these two fields is currently developing independently. Here, we synthesize the available knowledge on drug-induced behavioural alterations in fish, discuss potential ecological consequences and report results from an experiment in which we quantify both uptake and behavioural impact of a psychiatric drug on a predatory fish (*Perca fluviatilis*) and its invertebrate prey (*Coenagrion hastulatum*). We show that perch became more active while damselfly behaviour was unaffected, illustrating that behavioural effects of pharmaceuticals can differ between species. Furthermore, we demonstrate that prey consumption can be an important exposure route as on average 46% of the pharmaceutical in ingested prey accumulated in the predator. This suggests that investigations of exposure through bioconcentration, where trophic interactions and subsequent bioaccumulation of exposed individuals are ignored, underestimate exposure. Wildlife may therefore be exposed to higher levels of behaviourally altering pharmaceuticals than predictions based on commonly used exposure assays and pharmaceutical concentrations found in environmental monitoring programmes." (Authors)] Address: Brodin, B., Dept of Ecology & Environmental Science, Umeå Univ., 90187 Umeå, Sweden. E-mail: tomas.brodin@emg.umu.se

16346. Buczynski, P.; Tończyk, G.; Buczyńska, E.; Gadawski, P.; Michoński, G.; Zawal, A. (2017): On the occurrence of *Gomphus pulchellus* Selys, 1840 (Odonata: Gomphidae) on the Balkan Peninsula. *Acta zool. Bulg.* 69(1): 43-47. (in English) ["The status of a West European endemic species, *G. pulchellus*, is unclear on the Balkan Peninsula. We report *G. pulchellus* from Skadar Lake (one site in Montenegro and one in Albania), among others based on exuviae, thus proving the autochthonic occurrence of the species in the western part of the Balkan Peninsula. A strongly isolated but stable island of the geographical range probably exists here. It is the first record of *G. pulchellus* in Albania." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

16347. Buczyński, P.; Karasek, T. (2017): Dragonflies (Odonata) of Suwalski Landscape Park - occurrence, threats and perspectives. *Materiały konferencyjne. Stan i ochrona wód suwalskiego Parku Krajoznawczego. Wigry, 15-16 września 2016 roku. Tortul*: 74-79. (in Polish, with English summary) ["The Suwalski Landscape Park protects the naturally valuable areas of the Lithuanian Lake District. Park's values are comparable to those in national parks. The authors present material collected during unsystematic research in the years 2000-2013. At 64 study sites 51 dragonfly species were found (69% of the national fauna). Numerous species threatened in Europe. European Union and Poland, species under protection and occurring near the edge of their distribution ranges were recorded. The knowledge gaps and the probable number of species in the park (ca. 60, including 55 autochthonous species) were provided. The park was regarded as the hot spot of dragonfly species richness in Poland. Lakes eutrophication, tourism intensification and cattle farming were indicated as the threat to the present state of the dragonfly fauna." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

16348. Buczynski, P.; Buczyńska, E.; Tarkowski, A.; Banach-Binska, B. (2017): An interesting record of *Somatochlora arctica* (ZETTERSTEDT, 1840) (Odonata: Corduliidae) in the Polesie (middle-eastern Poland). *Odonatrix* 111 (2017): 8pp. (in Polish, with English summary) ["*S. arctica* was recorded in 2017 in the nature reserve "Magazyn" in the Sobiborskie Forests (51°27'06"N, 23°37'35"E, UTM: FC80). On a small (1.2 ha), transitional peat bog one imago (18.05.) was observed and one larval exuvium (26.09) was collected. The exuvium was obtained from bare patch overgrown with *Sphagnum* sp. caused by uprooted *Betula pubescens*, the only place that did not dry in the summer. A peat bog in the reserve "Magazyn" is the first site of *S. arctica* found in Polish part of the Polesie. The closest sites of the occurrence of this species has been reported in: south-eastern Poland – about 100 km from the described location, in north-eastern Poland – about 140 km, in the central part of the Polesie on Ukraine and Belarus – almost 400 km. For the time being it is difficult to say whether this population is completely isolated and may be ephemeral or it is a discrete subpopulation within a metapopulation that also inhabits some other peat bogs in this region. Peatlands of the Polish part of the Western Polesie have been intensively investigated since the early 1990s, therefore this species is very rare; otherwise it must have been found earlier. However, its ability to colonize small isolated sites, often clearly astatic may cause that it can be easier to overlook than other tyrphobionts. Taking this into consideration the further studies on optimal habitats of *S. arctica* are needed in the Western Polesie in Poland as well as the adjacent areas in Ukraine and Belarus." (Authors)] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

16349. Büsse, S.; Heckmann, S.; Hörschemeyer, T.; Bybee, S. (2017): The phylogenetic relevance of thoracic musculature: a case study including a description of the thorax

anatomy of Zygoptera (Insecta: Odonata) larvae. Systematic Entomology 43(1): 31-42. (in English) ["New morphological techniques allow for the evaluation of novel character systems that are potentially important for phylogenetic analysis. Only a few studies so far have used character systems from the insect thorax for phylogenetics; the reasons for this might include a lack of common terminology or established homology for pterygote insect thorax musculature. Still, recent studies have proposed common terminology and hypotheses of homology, now allowing for an evaluation of thoracic morphological character systems among the groups of winged insects. Using X-ray microtomography (μ CT) we present a detailed study of the thorax musculature of Odonata as an important phylogenetic character system, with a matrix of 298 characters with 697 character states, including novel data from the thoracic anatomy of eight damselfly larvae. We also included additional Odonata, Ephemeroptera and Neoptera taxa from the literature and demonstrate the phylogenetic relevance of this character system by reproducing phylogenetic topologies of established relationships. We also compared high-resolution data from Odonata larvae from our study and from recent literature with data from older literature in the adult Odonata. All major clades were successfully recovered, (e.g. Odonata, Epiprocta, Anisoptera and Zygoptera) with high node support, but obtained higher phylogenetic resolution with the larval data. The best phylogenetic resolution was achieved by combining the adult and larval characters. The taxon sampling and character matrix is the largest to date and underlines the potential relevance of the thorax musculature as an important phylogenetic character system." (Authors)] Eight Zygoptera larvae (intermediate to late instars) were examined from Coenagrionidae: *Ischnura elegans* (Vander Linden), *Ceriagrion tenellum* (De Villers), *Coenagrion puella* (L.), *Enallagma cyathigerum* (Charpentier), Calopterygidae (*Calopteryx haemorrhoidalis* Vander Linden, *Calopteryx splendens* (Harris) and Platycnemididae (*Platycnemis pennipes* (Pallas), *Platycnemis latipes* Rambur (see Table S1 for more detail). All applicable regulations for the protection of wildlife species have been followed in each case. The responsible authorities, when necessary have approved the collection of Odonata. The immature stage in Odonata, Ephemeroptera and Plecoptera is referred to as 'naiad', following the terminology suggestions in Bybee et al. (2015). However, for Odonata, the more commonly used term is larva, and thus we have decided to be consistent within the community and use the more general term (cf. Sahlén et al., 2016; Büsse & Bybee, 2017] Address: Büsse, S., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrechts-University, Am Botanischen Garten 9, D-24118 Kiel, Germany. E-mail: sbuesse@zoologie.uni-kiel.de

16350. Büsse, S.; Hörschemeyer, T.; Gorb, S.N. (2017): The head morphology of *Pyrhosoma nymphula* larvae (Odonata: Zygoptera) focusing on functional aspects of the mouthparts. *Frontiers in Zoology* 14:25: 13 pp. (in English) ["Background: The understanding of concerted movements and its underlying biomechanics is often complex and elusive.

Functional principles and hypothetical functions of these complex movements can provide a solid basis for biomechanical experiments and modelling. Here a description of the cephalic anatomy of *P. nymphula* focusing on functional aspects of the mouthparts using micro computed tomography (μ CT) is presented. Results: We compared six different instars of the damselfly *P. nymphula* as well as one instar of *Aeshna cyanea* and *Epiophlebia superstes* each. In total 42 head muscles were described with only minor differences of the attachment points between the examined species and the absence of antennal muscle *M. scapopedicellaris medialis* (0an7) in *Epiophlebia* as a probable apomorphy of this group. Furthermore, the ontogenetic differences between the six larval instars are minor; the only considerable finding is the change of *M. submentopraementalis* (0la8), which is dichotomous in the early instars (I1, I2 and I3) with a second point of origin at the postero-lateral base of the submentum. This dichotomy is not present in any of the older instars studied (I6, middle-late and pen-ultimate). Conclusion: However, the main focus of the study herein, is to use these detailed morphological descriptions as basis for hypothetical functional models of the odonatan mouthparts. We present blueprint like description of the mouthparts and their musculature, highlighting the caused direction of motion for every single muscle. This data will help to elucidate the complex concerted movements of the mouthparts and will contribute to the understanding of its biomechanics not in Odonata only." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

16351. Buskirk, J. van (2017): Spatially heterogeneous selection in nature favors phenotypic plasticity in anuran larvae. *Evolution* 71(6): 1670-1685. (in English) ["Theory holds that adaptive phenotypic plasticity evolves under spatial or temporal variation in natural selection. I tested this prediction in a classic system of predator-induced plasticity: frog tadpoles (*Rana temporaria*) reacting to predaceous aquatic insects. An outdoor mesocosm experiment manipulating exposure to *Aeshna* dragonfly larvae revealed plasticity in most characters: growth, development, behavior, and external morphology. I measured selection by placing 1927 tadpoles into enclosures within natural ponds; photographs permitted identification of the survivors 6–9 days later. Fitness was defined as a linear combination of growth, development, and survival that correlates with survival to age 2 in another anuran species. In enclosures with many predators, selection favored character values similar to those induced by exposure to *Aeshna* in mesocosms. The shift in selection along the predation gradient was strongest for characters that exhibited high predator-induced plasticity. A field survey of 50 ponds revealed that predator density changes over a spatial scale relevant for movement of individual adults and larvae: 17% of variation in predation risk was among ponds separated by tens to thousands of meters and 81% was among sites =10m apart within ponds. These results on heterogeneity in the selection regime confirm a key tenant of the standard model for the evolution of plasticity." (Author)] Address: Buskirk, J. van, Inst. Zool., Univ. Zürich, 8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

16352. Campbell, O. (2017): A record of the Bladetail *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata: Anisoptera: Gomphidae) from Abu Dhabi, United Arab Emirates. *Tribulus*: 81-82. (in English) [21st April 2017, eastern edge of Lulu Island, an artificial, largely sandy island built just off the Corniche of the island of Abu Dhabi, capital of the United Arab Emirates.] Address: Campbell, O., c/o British School Al Khubairat, PO Box 4001, Abu Dhabi, UAE. E-mail: ojcampbell25@yahoo.com

16353. Cannings, R.A.; Pym, R.V. (2017): *Archilestes californicus* McLachlan (Odonata: Zygoptera: Lestidae): a damselfly new to Canada. *J. entomol. soc. Brit. Columbia* 114: 77-82. (in English) ["Russell Pym saw several males and females at a small, shallow, artificial pond at the end of an artificial stream near the entrance to the Liquidity Winery at 4720 Allendale Road, Okanagan Falls, BC (49.32553°N, 119.54993°W). He observed them from 13:00 to 14:00 PDT on 26-IX-2016; one male was photographed. From 16:30 to 17:00 PDT the same day, he recorded a female in knee-high grass, three to four metres from the shore of a dugout pond across the road from Walnut Beach Resort, 4200 Lakeshore Drive, Osoyoos, BC (49.01825°N, 119.43580°W). Cattail (*Typha latifolia*) and willows (*Salix* spp.) lined the pond margins. At the north end of Vaseux Lake the next day, 27-IX-2016, Russell photographed a lone male perched on cattails in a mixed willow swamp and cattail marsh (13:00 to 14:30 PDT). The site was along the boardwalk to the bird blind at 49.30348°N, 119.53696°W."] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, BC, Canada V8W 9W2. E-mail: rcannings@royalbcmuseum.bc.ca

16354. Casanueva, P.; Hernández, A.; Campos, F.; Santa-maría, T. (2017): *Boyeria irene* (Fonscolombe, 1838) y *Cordulegaster boltonii* (Donovan, 1807) (Odonata): Dos estrategias en cuanto a sustratos de emergencia de larvas en un mismo hábitat. *Graellsia* 73(2): e059: 6 pp. (in Spanish, with English summary) ["*B. irene* and *C. boltonii*: two strategies of substrates for emergence in the same habitat: Data on the emergence of coexisting *C. boltonii* and *B. irene* in a mountain stream in the center of Spain (altitude 1200 m a.s.l.) are presented in the study, based on the weekly collection of exuviae. *B. irene* began to emerge 28 days later than *C. boltonii*. Larvae of both species overlapped extensively in their selection of substrates for emergence, although a significantly higher use of trees was found in *C. boltonii*. In comparison to other geographical areas, both species have modified their strategy, delaying the onset of the emergence period. The importance of environmental conditions (especially temperature) is discussed." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Univ. Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, E-47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

16355. Casanueva, P.; Sanz Requena, J.-F.; Angeles Hernández, M. (2017): Altitudinal variation of wing length and wing area in *Libellula quadrimaculata* (Odonata: Libellulidae). *Odonatologica* 46(3/4): 227-240. (in English) ["The area and length of the right fore and hind wings and the abdomen length were

analysed in specimens from two Iberian populations of *L. quadrimaculata* Linnaeus, 1758, one on a plateau (782 m a.s.l.) and another in the mountains (1 909 m a.s.l.), with a view to ascertaining whether their morphometric characteristics vary with altitude. Allometric relationships in terms of length and area of the fore and hind wings of both populations were found. The wings are longer and have a greater area in plateau specimens whereas the length of the abdomen did not vary between populations. Between the populations there was an overlap in the wing length measurements. The significance of these parameters in aiding the dragonflies' flight capacity and hence the effects on their lifestyle under different environmental conditions is discussed." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Univ. Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

16356. Casanueva, P.; Hernández, M.A.; Campos, F. (2017): ¿Varía el tamaño de las exuvias de *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegastridae) durante el periodo de emergencia en ríos de montaña? *Boletín de la Sociedad Entomológica Aragonesa* 61: 271-272. (in Spanish, with English summary) ["Does the size of the exuviae of *C. boltonii* fluctuate during the emergence period in mountain rivers? It is known that in some species of odonates body size decreases as the emergence is delayed. In this paper we analyse whether this is true in *C. boltonii*. Values of head width, tibia length, and length and width of prementum from 165 exuviae from the Eresma river (central Spain, at 1200 m. a.s.l.) showed that females were bigger than males, but no interaction between date of emergence and gender was found. These data suggest that in this river there is no significant change in body size along the emergence period." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

16357. Ceder, P.; Jönsson, C. (2017): Tillväxttakt hos sydsvenska populationer av trollsländor (Odonata) i ett varmare klimat - en pilotstudie. B.Sc. thesis, School of Business, Engineering and Science, Halmstad University: 16 pp. (in Swedish, with English summary) ["In order to gain better understanding of climate change effects on ecosystems, it is necessary to study the response of different species to predicted climate change. Dragonflies are, due to their ecology, a suitable organism group for conducting such studies. In this pilot study we examined the response in growth- and mortality rate to increased ambient temperatures in an experimental set-up of three temperature levels (20°C, 22°C and 24°C) in larvae of three species from the Aeshnidae family (*Aeshna grandis*, *A. cyanea* and *Anax imperator*). *A. imperator* were, due to insufficient number of collected specimens, excluded in the 22°C temperature regime. The studied species are reproducing in Sweden, but *A. grandis* and *A. cyanea* are native, whereas *A. imperator* is considered newly established since it was first discovered in Sweden in the early 2000's. Our results show that *A. grandis* and *A. cyanea* reacted positively to an increased ambient temperature, in terms of

growth rates. However, the response to increased temperatures differed between the two species as *A. grandis* showed both higher growth- and mortality rate, compared to *A. cyanea*. Thus, we assume that both species are likely to benefit from the ongoing climate change, but that interactions between them may change. Further studies are required to elucidate how the two species will be affected in presence of newly established species, such as *A. imperator*. Although, based on our results, the competitiveness of both native species might increase with rising temperatures - which should be considered in future conservation planning." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, 752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

16358. Chee, A. (2017): Electromagnetic Actuation for a Dragonfly Inspired Flapping-Wing Micro Aerial Vehicle. MSc. thesis, Graduate Department of the Institute for Aerospace Studies, University of Toronto: II + 99 pp-["Insect-scale microaerial vehicles is an area within microaerial vehicles which has seen recent growth due to new understandings of insect flight and the availability of new actuation technologies. Prominent flapping wing MAVs were surveyed and relevant observations taken to help guide the project. Alternative actuation technologies for the UTIAS Robotic Dragonfly project were assessed and an electromagnetic actuator was selected. A new design incorporating this actuator was fabricated was fabricated and tested. The platform features a sub-gram at-scale prototype with independently driven wings, a mass of 222 mg and a wingspan of 75 mm. Experiments demonstrated that the prototype was capable of generating up to 1.34 mN of lift." (Author)] Address: not stated

16359. Chelmick, D (2017): *Zygonyx torridus* (Kirby 1889) in Almeria Province. Boletín Rola 9: 5-14. (in English, with Spanish summary) ["In 2016, *Z. torridus* was recorded for the first time in the Province of Almeria. This population, which was thriving, is almost 80 km east of the nearest sighting which is in Malaga Province." (Author)] Address: Chelmick, D., FRES, Macromia Scientific, UK. E-mail: david.chelmick@gmail.com

16360. Choong, C.Y.; Dow, R.A.; Ng, Y.F. (2017): New records of Odonata from Kelantan, Malaysia, with a checklist of species recorded from the state. Faunistic Studies in South-east Asian and Pacific Island Odonata 21: 1-22. (in English, with summary in Bahasa Melayu) ["We report here the results from field trips to collect Odonata in the central and north-eastern parts of Kelantan state, Peninsular Malaysia. Sixty eight species were collected, and 15 of these are new records for the state. Interesting species collected include *Euphaea masoni* Selys, 1879 and *Leptogomphus tioman* Choong, 2016. A checklist of the Odonata recorded from Kelantan with a total 131 confirmed species is given in an appendix." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

16361. Choong, C.Y.; Alwen, B.M.; Izzat Husna, M.; Amirudin, B.A. (2017): Odonata fauna of Tioman Island, Pahang,

peninsular Malaysia. Journal of Wildlife and Parks 32: 31-40. (in English) ["Records of Odonata observed and collected at sites in Tioman Island, Pahang on four occasions (18-23 – VII-2013, 23-26-III-2014, 16-19-V-2014 and 14-22-IV-2016) are presented. Adult insects were observed and collected during the field surveys. A total of 40 species from 12 families were recorded. Of these, 23 species were new records for Tioman Island and one species (*Leptogomphus tioman*) is a newly described species. Interesting species recorded from the field surveys were *Devadatta argyroides tiomanensis*, *Mortonagrion arthuri*, *Chlorogomphus arooni*, *Macromia* cf. *westwoodi* and *Raphismia bispina*. ... *Mortonagrion arthuri* is a rare and local species found at coastal area where sea water meets fresh water." (Authors) Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

16362. Choubey, V.; Shukla, A.; Rai, S. (2017): Study of ecological markers in Narmada Valley of Jabalpur Region: A case study. International Journal of Recent Research and Applied Studies 4 (2 / 13): 58-64. (in English) ["The Smart City mission of Jabalpur intends to promote adoption with basic infrastructure to give a decent quality of life, a clean and sustainable environment through application of smart solutions where environment disturbed through anthropogenic activities. This smart city mission with "Clean Narmada, Green Jabalpur" intends to promote adoption in environment with basic infrastructure to give a decent quality of life. Biodiversity encompasses the variety of all life on earth. Jabalpur is major city of Madhya Pradesh in India which is rich in biodiversity. The present study was carried out from January 2014 to December 2016. The whole Narmada valley of Jabalpur region including river, forest, grassland and urban area were selected as study site for the collection of sample. In the study total 101 Bioindicator species of various classes were recorded viz., Odonata 37 species (7 Families), Lepidoptera 25 Species (5 Families), Spiders 26 Species (10 Families) and Mollusca 13 Species (2 Class). This study aimed in contributing to plane of biodiversity restoration in studied region and development of management strategies so as to ensure sustenance of all the recorded species and ecosystem services derived from them. The content of this paper will be useful step for future studies." (Authors)] Address: Choubey, V., Dept of Zoology, Govt. Arts College, Panagar Jabalpur (M.P.), India

16363. Chovanec, A. (2017): Die Libellenfauna (Odonata) eines Überlauf- und Versickerungsbeckens: Artenspektrum und phänologische Aspekte. Libellula 36(1/2): 23-44. (in German, with English summary) ["Odonata of an overflow and seepage reservoir: species inventory and phenological aspects – The dragonfly fauna of a small wetland situated in an overflow and seepage reservoir in Maria Enzersdorf, Austria, was investigated in 2016. In total 27 species were recorded, of which seven were autochthonous and 15 probably or possibly autochthonous. In terms of species associations the odonate community was dominated by pioneer species and species typical of reed and submerged macrophytes. *Ischnura pumilio*, *I. elegans*, *Coenagrion puella* and

Sympetrum striolatum showed the highest numbers of individuals. Two species, *C. scitulum* and *S. meridionale*, are "critically endangered" according to the Austrian Red List. Based on a high number of field trips (46) comparative phenological features were documented in detail." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

16364. Chovanec, A. (2017): Interspezifische Paarungsversuche unterschiedlicher Libellenarten (Odonata). Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 69: 91-94. (in German, with English summary) ["Heterospecific pairing attempts in different dragonfly species (Odonata). – In this paper examples of heterospecific pairing attempts of dragonflies including a triple tandem are presented. Observations were made during odonatological investigations of a small wetland in Maria Enzersdorf, Lower Austria, in 2016." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

16365. Chovanec, A. (2017): Naturnahe Retentionsräume im niederösterreichischen Flachland als Lebensraum einer flusstypspezifischen Libellenfauna (Odonata). Entomologica Austriaca 24: 27-48. (in German, with English summary) ["Near-natural retention areas in the Lower Austrian lowland as habitat of a rivertype-specific dragonfly fauna (Odonata). In the lowlands of Eastern Austria the morphology of three running waters situated in four near-natural retention areas was evaluated by dragonfly surveys. In line with the requirements of the EU Water Framework Directive, the Dragonfly Association Index was applied to assess the differences between the current odonate fauna and the rivertype-specific reference conditions. The ecological status of the four river sections was classified as "high" and "good" respectively, due to the increased sinuosity of the rivers, the in-stream habitat heterogeneity and the pronounced lateral connectivity by creating backwaters. These measures provided a mosaic of different habitats for both, rheophilic and limnophilic dragonfly species. A total of 38 species were recorded in the four retention areas, which correspond to 49 % of the Austrian dragonfly inventory of 78 species; 33 species were classified as autochthonous in at least one of the investigation areas. The necessity of management measures for the dragonfly fauna, such as preventing tree canopy cover or mowing of reed, is pointed out." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlfuw.gv.at

16366. Chovanec, A. (2017): Beobachtungen zur Unterbrechung der Eiablage bei *Orthetrum brunneum* (Odonata: Libellulidae). Libellula 36(3/4): 139-144. (in German, with English summary) ["Interrupted oviposition in *O. brunneum* – In the case of temporarily high male density and intensive mating activities females of *O. brunneum* interrupted oviposition and perched on algal mats or emergent plant substrates at the oviposition site and thus were no longer recognised by conspecific males. Observations were made at a shallow secondary water body in Lower Austria near Vienna during the flight period between May and September 2016." (Author)]

Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

16367. Ciach, M.; Maslanka, B.; Krzus, A.; Wojas, T. (2017): Watch your step: insect mortality on hiking trails. Insect Conservation and Diversity 10(2): 129-140. (in English) ["1. Hiking may have a negative effect on vertebrates, but the impact on insects is unknown. Large-scale hiking may lead to habitat degradation, the introduction of alien species and the killing of insects occurring in places visited by people. 2. The aim of this study was to determine the influence of hiking on the mortality of insects. Randomly selected hiking trails in the western Carpathians (southern Poland) were surveyed and dead insects lying on the trails were collected. To compare the composition of ground-dwelling insects killed on trails, insects from free-living populations were sampled with ground pitfall traps. 3. The species abundance of insects killed on trails and those caught in traps differed significantly. Apart from common species, rare and legally protected insects were also found on the trails. Trail mortality peaked in July along with increasing hiking activity. 4. Body size did not affect mortality, at either the species or individual levels. Species mobility influenced mortality, with less mobile species being more vulnerable to trampling. Trampled insects remained on the ground for a maximum of 72 h, although 50% disappeared within 24 h. 5. Our results indicate that trail-killing is, to some degree, a random process and that hiking can influence insects by the elimination of individuals. Given the total length of hiking trails in Poland (76 400 km), and the significant human impact on natural areas resulting therefrom, hiking may be having a negative influence on insect populations." (Authors)] Address: Ciach, M., Dept of Forest Biodiversity, Inst. Forest Ecology & Silviculture, Fac. Forestry, Univ of Agriculture, al. 29 Listopada 46, 31-425 Krakow, Poland. E-mail: michal.ciach@ur.krakow.pl

16368. Cicek, K.; Koyun, M.; Tok, C.V. (2017): Food composition of the Near Eastern Fire Salamander, *Salamandra atra* (Amphibia: Urodela: Salamandridae) from Eastern Anatolia. Zoology in the Middle East 63(2): 130-135. (in English) ["This study presents data on the food composition of *S. atra*, from Bingöl, eastern Turkey. A total of 139 prey items was determined in the food content of 28 individuals (14 juveniles, 7 males, and 7 females). Insecta (N%= 37.4), Gastropoda (27.3%), and Isopoda (25.9%) constitute together 91% of the food items. The most frequent prey groups in the diet are Coleoptera (F%=50.0%), Isopoda (57.1%), and Gastropoda (46.4%). Coleoptera (V%= 34.6%), Gastropoda (28.0%), and Isopoda (23.5%) had the highest prey volumes. No significant difference was found between the sexes in food composition. The species generally feeds upon poorly flying or slow-moving invertebrates, but is opportunistic in taking up more mobile prey species as well. Diptera, Odonata and Hemiptera were found in small numbers only." (Authors)] Address: Çiçek, K.; Zool. Sect., Dept Biol., Fac. Science, Ege Univ., Izmir, Turkey. E-mail: kerim.cicek@hotmail.com

16369. Collins, D.S.; McIntyre, N.E. (2017): Extreme loss of diversity of riverine dragonflies in the northeastern U.S. is predicted in the face of climate change. Bulletin of American

Odonatology 12(2): 7-19. (in English) ["Riverine odonates are indicators of riparian health. Since these species are relatively well-surveyed, we can build species distribution models (SDMs) to predict how future climate conditions may impact their habitat availability. Locality data from state surveys were used to generate SDMs for 15 species of riverine odonates in a 784,982 km² portion of the northeastern US. Ensemble climate model projections to the year 2080 indicate that climate change will decrease the number of suitable river reaches by 45–99% depending on species, with 935 km of river identified as climate refugia for 20% or more of these species. Among the 15 focal species, the most vulnerable to climate change were *Lanthus parvulus*, *Stylurus scudderi*, and *S. spiniceps*, whereas the least affected were *Hylogomphus abbreviatus* and *Neurocordulia yamaskanensis*. Less suitable habitat was available in the future, meaning that even species that are not currently considered imperiled may become so in future climates unless actual preservation of refugia is enacted." (Authors)] Address: McIntyre, Nancy, Department of Biological Sciences, Texas Tech University, Lubbock, Texas 79409-3131, USA. E-mail: nancy.mcintyre@ttu.edu

16370. Condello, E.G.; Razzetti, E.; Liuzzi, C.; D'Agostino, Mastropasqua, F. (2017): First records of *Brachythemis impartita* in peninsular Italy (Odonata: Libellulidae). *Fragmenta entomologica* 49(2): 133-136. (in English) ["Two populations of *B. impartita* are here reported in peninsular Italy. The species was found for the first time in 2015 in Calabria in the area of the Angitola artificial lake (Maierato and Monterosso Calabro municipalities) not far from the Tyrrhenian coast. In 2016 the species was also observed in southern Apulia, along the banks of two artificial lagoons in the municipality of Ugento. Information are provided that confirm the habitat preferences of the species and a northward expansion." (Authors)] Address: Mastropasqua, F., CSdR- Association "Centro Studi de Romita", c/o Filippo d'Erasmus, Bari, Italy. E-mail: fabiomastro77@gmail.com

16371. Conesa García, M.A.; Bernal Sánchez, A. (2017): Nuevas claves para la determinación de las larvas del género *Calopteryx* Leach, 1815 (Zygoptera: Calopterygidae) de distribución ibérica. *Boletín de la SAE* N° 27: 40-64. (in Spanish, with English summary) ["New keys for determining the larvae of the genus *Calopteryx* Iberian distribution. This article aims to propose innovative ways of approaching the taxonomic determination of larvae for the three species of the genus *Calopteryx*, existing in the Iberian Peninsula: *C. virgo meridionalis*, *C. haemorrhoidalis* and *C. xanthostoma*. Although the imago can be easily determined, the same cannot be said of their larvae as they have a very homogeneous morphology. Based on the structure of the head, thorax, abdomen and lamellae, we are proposing criteria that allow us to distinguish the three-different species in the last larval stages. In addition, ten parameters are analyzed biometrically in F-0 larvae of the three-species analyzed." (Authors)] Address: Conesa García, M.A., Asociación odonológica de Andalucía. www.libelulas.org. E-mail: mconesa@malaga.uned.es

16372. Conze, K.-J. (2017): Libellen auf Zollverein. Abhandlungen aus dem Westfälischen Museum für Naturkunde 87:

223-232. (in German, with English summary) ["Over the past 20 years 24 species of dragonflies have been found on the area of the UNESCO World Heritage Zollverein, the majority of which are also native. 14 mostly widespread and numerous species form the basement of the species inventory. Of particular importance are the industrial waterbodies for southern species and the Small Bluetail, which is a pioneer species dependent on small, open shallow waters." (Author)] Address: Conze, K.-J., Hamburgerstr. 92, D-45415 Essen, Germany. E-mail: kjc@loekplan.de

16373. Corso, A.; Janni, J.; Pavesi, M.; Viganò, M. (2017): Update to the status of *Pantala flavescens* (Fabricius, 1798) and *Trithemis kirbyi* Selys, 1891 for Italy and Central Mediterranean basin (Odonata Libellulidae). *Biodiversity Journal* 8(1): 33-38. (in English) ["An overview of the records of *P. flavescens* and *T. kirbyi* for the Sicilian Channel islands and mainland Sicily, with comments on their possible status in this area, is provided. In light of the number of observed individuals, *P. flavescens* is likely to be regular in the studied area, with up to 30 individuals recorded per year since autumn 2012. *T. kirbyi*, conversely, is only known from few scattered records, so that its status in the area remains to be elucidated. No evidence of reproductive behaviour nor of actual breeding in this area was hitherto found for any of the two species." (Authors)] Address: Corso, A., Via Camastra, 10 – 96100 Siracusa, Sicily, Italy. E-mail: voloeerrante@yahoo.it

16374. Cuevas-Yañez, K.; Espinosa-Rivera, J.C.; Martínez-Falcón, A.P.; Córdoba-Aguilar, A. (2017): Are all Mexican odonate species documented? An assessment of species richness. *Systematics and Biodiversity* 15(3): 253-258. (in English) ["With the aim of protecting Mexican diversity, one current governmental task is to complete national biological inventories. In the case of odonate insects, several researchers have hypothesized that species richness is complete (205 dragonflies and 151 damselflies), but there has not been any formal exercise to test this. Thus, we have investigated whether odonate species richness (for Mexican endemics, Anisoptera, Zygoptera) and total species) is complete using sample-based and coverage-based rarefaction curves. Along with this, we also showed how good distribution data are in the country. The rarefaction curves have indicated 100% completeness for all groups suggesting that the inventory is complete. However, species' distribution data is highly patchy regarding areas either well (e.g. central Mexico) or badly (e.g. coast of Guerrero and Oaxaca) collected. We encourage researchers to continue odonate sampling in order to support at least three conservation actions: (i) conservation assessment of endangered species; (ii) knowledge of range shifts given rising global temperatures; and (iii) increase public interest and awareness in protected, touristic areas." (Authors)] Address: Cuevas-Yañez, K., Depto de Ecología Evolutiva, Inst. Ecología, Univ. Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, Mexico, D.F., Mexico

16375. Czechowski, P.; Gajda, K. (2017): The records of the White-tailed Skimmer *Orthetrum albistylum* (Selys, 1848) (Odonata: Libellulidae) in Lubuskie Province. *Przegląd Przyrodniczy*

28(1): 107-110. (in Polish, with English summary) ["*O. alibistylum* was recorded on nine sites in Lubuskie Province in 2015 (one site) and 2016 (eight sites). The majority of sites were localised in the southern part of the province. Skimmers were seen in two types of habitats – on fishponds and in the Oder River valley. Apart from the sightings described, *O. alibistylum* had been recorded in the province only once. Recent data prove the species' north-westward expansion." (Authors)] Address: Czechowski, P., Instytut Administracji i Turystyki PWSZ w Sulechowie, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: paczech@wp.pl

16376. Danko, M.J.; Danko, A.; Golab, M.J.; Stoks, R.; Sniegula, S. (2017): Latitudinal and age-specific patterns of larval mortality in the damselfly *Lestes sponsa*: Senescence before maturity? *Experimental Gerontology* 95: 107-115. (in English) ["Highlights: • Populations at high latitudes face higher time constraints and develop faster. • We studied effects of time constraints on accelerated ageing in damselfly larvae. • The high-latitude population exhibited higher mortality rates and ageing rates. • Late hatched individuals showed higher mortality rates. • All populations showed accelerated mortality rates with age in the larval stage. Abstract: Latitudinal differences in life history traits driven by differences in seasonal time constraints have been widely documented. Yet, latitudinal patterns in (age-specific) mortality rates have been poorly studied. Here, we studied latitudinal differences in pre-adult age-specific mortality patterns in the strictly univoltine damselfly *Lestes sponsa*. We compared individuals from three latitudes reared from the egg stage in the laboratory at temperatures and photoperiods simulating those at the latitude of origin (main experiment) and under common-garden conditions at a fixed temperature and photoperiod (supplementary experiment). Results from the main experiment showed that the high-latitude population exhibited higher mortality rates than the central and southern populations, likely reflecting a cost of their faster development. Age-specific mortality patterns, also indicated higher ageing rates in the high-latitude compared to the low-latitude population, which likely had a genetic basis. The strong within-population variation in hatching dates in the low-latitude population caused variation in mortality rates; individuals that hatched later showed higher mortality rates presumably due to their shorter development times compared to larvae that hatched earlier. In both experiments, larvae from all three latitudes showed accelerated mortality rates with age, which is consistent with a pattern of senescence before adulthood." (Authors)] Address: Daňko, M.J., Laboratory of Evolutionary Biodemography, Max Planck Institute for Demographic Research, Konrad-Zuse-Str. 1, 18057 Rostock, Germany. E-mail: danko@demogr.mpg.de

16377. Dao, T.-P.; Huang, S.-C. (2017): Compliant thin-walled joint based on Zygoptera nonlinear geometry. *Journal of Mechanical Science and Technology* 31(3): 1293-1303. (in English) ["This paper introduces a Compliant thin-walled joint (CTWJ) that expands the group of existing compliant joints. The CTWJ design is based on the nonlinear geometry of the Zygoptera animal. With a thin-walled structure, the CTWJ allows a considerably large range of motion in the x-and-y

axes. In addition, the thin-walled structure is then filled by polydimethylsiloxane material to reinforce the stiffness of the CTWJ. First, design of experiment methodology is used for the sensitive analysis of the width and the thickness to the strain of joint. The range of motion, the strain, the buckling behavior, and the first natural frequency of CTWJ are investigated via finite element analysis and experiments. The behavior of the CTWJ is subsequently compared with the conventional compliant joints to realize the efficient performance of the CTWJ. The results revealed that the CTWJ has a range of motion and strain energy larger than those of traditional compliant joints. Finally, an example of vibration isolator is modeled by using the CTWJ as planar spring. It is believed that the CTWJ has a great potential for the development of compliant mechanisms in terms of large range of motions in multiple axes." (Authors)] Address: Dao, T.-P., Division of Computational Mechatronics, Inst. Computational Science, Ton Duc Thang Univ., Ho Chi Minh City, Vietnam. E-mail: daothanphong@tdt.edu.vn

16378. Davis, D.R.; DeSantis, D.L.; Gabor, C.R. (2017): Anti-predator behavior of the Barton Springs salamander (*Eurycea sosorum*) in response to aquatic invertebrates: potential consequences of habitat restoration. *Hydrobiologia* 795: 129-137. (in English) ["*E. sosorum*, is a fully aquatic salamander found in Barton Springs in Texas, USA, and has benefited from habitat restoration efforts. While important to improve overall habitat quality for this imperiled species, current management and restoration practices may also inadvertently increase the abundance of non-target organisms such as predatory invertebrates. Fish represent major predators of this species, but little is known about the role of invertebrates as potential predators. It is important to understand the role of these aquatic invertebrates as predators of *E. sosorum*, especially if habitat restoration also increases predator abundance. Using adult, predator-naïve salamanders, we examined the anti-predator response of *E. sosorum* to chemical cues from the following treatments: crayfish, dragonfly larvae, snails, and water. Salamanders decreased activity (antipredator behaviour) only in response to the crayfish treatment. The responses to dragonfly larvae, snails, and water did not differ, suggesting that dragonfly larvae are not perceived as predators by these salamanders. Our study provides preliminary evidence suggesting that habitat restoration has unexpectedly increased crayfish abundance, which in turn may negatively affect *E. sosorum*, and that future management strategies should consider crayfish removal if salamander abundances decline with increasing crayfish abundance." (Authors)] Address: Davis, D.R., Dept Biol., Univ. of South Dakota, Vermillion, USA

16379. De Knijf, G. (2017): Recent observations and status of the Yellow Clubtail (*Gomphus simillimus*) in Belgium and northern France. *Brachytron* 19(2): 71-76. (in Dutch, with English summary) ["A male of the Yellow Clubtail (*Gomphus simillimus*) was observed at the river Chiers where it forms the border between Belgium (Torgny) and France (Velosnes). This is the sixth observation of this species for Belgium and the first for the French region Lorraine. In the last decade, *Gomphus simillimus* has been observed several times from the rivers Aisne, Marne, Seine and Aube in the region

Champagne-Ardenne. Among them several freshly emerged individuals in several years. This indicates the presence of populations at several localities in northeastern France. The habitat requirements of *G. simillimus* seem to be present at the river Chiers between Torgny and Velosnes, so local reproduction may not be excluded, near the locality of the observation or further downstream where the species has also been seen." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

16380. de las Heras, M.; Cordero-Rivera, A.; Cabana, M.; Romeo, A.; Rey-Muñiz, X.L.; Mezquita, I.; Gainzarain, J.A.; Vilariño, V.S.; Evangelio-Pinach, J.M.; Díaz, C.; Miralles, A.; Torralba-Burrial, A.; Luque, P.; Prieto, E.; Teruel, S.; Conesa, M.A.; Mudeman, J.; Breña, C.T.; Loureiro, N.; Maravalhas, E.; Soares, A.; Pereira, P.; Fonseca, N. (2017): Distribución ibérica de *Gomphus graslinii*, *Oxygastra curtisii* y *Macromia splendens* (Insecta: Odonata), especies protegidas por la Directiva Hábitats. Boletín Rola 9, primer semestre 2017: 15-54. (in Spanish, with English summary) ["This paper reviews and compiles the information on the distribution of the three species of Anisoptera protected and included in the Habitats Directive that are present in the Iberian Peninsula namely *M. splendens*, *O. curtisii* and *G. graslinii*. In recent decades, these three species have greatly expanded their range and number of localities, primarily due to increased interest from both professionals and amateurs in dragonflies and damselflies found in the Iberian Peninsula. In summary, current evidence shows that the north-west quadrant represents the area of greatest frequency followed by the south-west and north east quadrants. A large number of localities are included within the sites protected by the Natura 2000 Network, and it is in Spain where the three species are most represented. As a result of the data contained in this paper, we propose that the threat status of *G. graslinii* should be revised from "Near Threatened" to "Vulnerable". With regard to the other two species we propose their status remains unchanged. Finally we emphasise the need to sample historical localities from which these species have not been recorded in recent years to ascertain if populations still exist and their viability." (Authors)] Address: de las Heras, M., Asociación de Educación Ambiental El Bosque Animado / ROLA, Spain. E-mail: matias.delasheras.carmona@gmail.com

16381. De Roo, P. (2017): Enige bemerkingen over een kwetsbare populatie van de Bosbeekjuffer (*Calopteryx virgo*) in het Peerdsbos (Antwerpse Kempen, België). *Brachytron* 19(1): 16-21. (in Dutch, with English summary) ["During the period 1990-2000 there were no known populations of *C. virgo* anymore in the western part of the Antwerp Campine area (Belgium), where they occurred in the first half of the 20th century. In 2006 however, the author observed some individuals in this region, at the Laarse Brook in the Peerdsbos forest at Brasschaat/Schoten (lon 51,275 lat 4,486). Since 2006 the species has been counted yearly along a 5 km long transect of the Laarse Brook, which has been divided into 9 sections of several hundreds of meters. The article describes the habitat in the different sections and presents an overview

of the monitoring results. After an increase in the first years there was a significant drop in numbers in 2011, but later the population increased again to 141 individuals. In 2015 there was again a prominent drop to only 66. In this year some sections of the brook had been subject to fluctuations in water level or alterations of the habitat structure, and in one of them the habitat of *C. virgo* was completely altered after construction works and reinforcement of the banks with heavy stones. Other sections suffered from extremely low water levels. This case shows that local habitat loss could have serious effects on rather small and vulnerable populations of *C. virgo*. The next years will show to what extent the population of the Laarse Brook will recover." (Author)] Address: E-mail: pierre.de.roo@telenet.be

16382. de Vries, R.; Buesink, R.; van Leeuwen, J.; Baller, G. (2017): Odonata observations in the Danube Delta, Romania, from July 2016. *Brachytron* 19(1): 35-43. (in Dutch, with English summary) ["The Danube Delta is one of the most important wetlands of Europe, but its Odonata fauna is still relatively poorly known. This article presents Odonata observations from a visit to the Romanian Danube Delta in July 2016. Records are from around the village of Sfântu Gheorghe as well as from around the villages of Caraorman, Murighiol and Mahmudia. 25 species were recorded in total. In the Sfântu Gheorghe region we found eleven species that had not been reported previously from this part of the delta. These include the first records of *Anax ephippiger* from the Romanian Danube delta, as well as records of *Lestes macrostigma*, *Chalcolestes parvidens* and *Selysiothemis nigra*." (Authors)] Address: Baller, G.. E-mail: gijb.baller@gmail.com

16383. Deacon, C.; Simaika, J.P.; Samways, M.J. (2017): Description of final instar larvae of *Ecchlorolestes Selys* spp. from South Africa (Odonata: Synlestidae). *Odonatologica* 46 (3/4): 319-330. (in English) ["The final instar larvae of two rare, endemic South African species, *E. nylephtha* and *E. peringueyi*, are described. This first description illustrates important features in identification, and also gives differences between the genera *Chlorolestes* and *Ecchlorolestes*." (Authors)] Address: Deacon, C., Dept of Conservation Ecology & Entomology, Stellenbosch University, Matieland, South Africa. E-mail: charldeacon@sun.ac.za

16384. Debata, S.; Palei, H.S.; Mohapatra, P.P.; Mishra, A.K. (2017): An inventory of Odonata fauna in Bonai Forest Division, Western Odisha, India. *e-planet* 15(1): 76-81. (in English) ["Biodiversity inventory of Odonata was carried out in Bonai Forest Division of Western Odisha, India during 2011 and 2012. During the survey, a total 36 species of Odonates including 26 species of Anisoptera and 10 species of Zygoptera were recorded. Overall, family Libellulidae is dominated by 22 species over others. The odonate diversity of Bonai Forest Division accounted for 37% of the Odonata diversity of Odisha. A long term studies on these lesser known fauna will be useful in understanding their status and monitoring the change over time in this habitat." (Authors)] Address: Debata, S., Dept Biodiversity and Conservation of Natural Resources, Central University of Orissa, Koraput-764021, Odisha, India. E-mail: subrat.debata007@gmail.com

- 16385.** Debecker, S.; Dinh, K.V.; Stoks, R. (2017): Strong delayed interactive effects of metal exposure and warming: latitude-dependent synergisms persist across metamorphosis. *Environ. Sci. Technol.* 51(4): 2409-2417. (in English) ["As contaminants are often more toxic at higher temperatures, predicting their impact under global warming remains a key challenge for ecological risk assessment. Ignoring delayed effects, synergistic interactions between contaminants and warming, and differences in sensitivity across species' ranges could lead to an important underestimation of the risks. We addressed all three mechanisms by studying effects of larval exposure to zinc and warming before, during and after metamorphosis in *Ischnura elegans* damselflies from high- and low-latitude populations. By integrating these mechanisms into a single study we could identify two novel patterns. Firstly, during exposure zinc did not affect survival, whereas it induced mild to moderate post-exposure mortality in the larval stage and at metamorphosis, and very strongly reduced adult life-span. This severe delayed effect across metamorphosis was especially remarkable in high-latitude animals, as they appeared almost insensitive to zinc during the larval stage. Secondly, the well-known synergism between metals and warming was manifested not only during the larval stage but also after metamorphosis, yet notably only in low-latitude damselflies. These results highlight that a more complete life-cycle approach that incorporates the possibility of delayed interactions between contaminants and warming in a geographical context is crucial for a more realistic risk assessment in a warming world." (Authors)] Address: Debecker, Sara, Nat. Inst. Aquatic Resources, Tech. Univ. Denmark, Jægersborg Alle 1D, Charlottenlund 2920, Denmark. E-mail: sara.debecker@kuleuven.be
- 16386.** del Palacio, A.; Diez, F.; Latini, Y. (2017): Odonata from La Pampa province, Argentina. *Odonatologica* 46(1/2): 25-34. (in English) ["In Argentina approximately 280 odonate species have been recorded, which are chiefly found in the north-eastern and north-western regions. With only three previously recorded species, La Pampa province is one of most understudied parts of the country. In the present work we provide a checklist of 17 species from La Pampa, including 14 new records for the province." (Authors)] Address: del Palacio, A., Univ. Nac. de Avellaneda, Depto Ambiente y Turismo, BioGeA, Mario Bravo 1460 CP 1870, Piñeyro, BA, Argentina. E-mail: adelpalacio87@gmail.com
- 16387.** del Palacio, A.; Sarmiento, P.L.; Javier, M. (2017): A new method using Scanning Electron Microscopy (SEM) for preparation of anisopterous odonates. *Microscopy Research and Technique* 80(10): 1085-1088. (in English) ["Anisopterous odonate male's secondary genitalia is a complex of several structures, among them the vesica spermalis is the most informative with important specific characters. The observation of those characters, mostly of membranous nature, is difficult in the Scanning Electron Microscope due to dehydration and metallization processes. In this contribution, we discuss a new and low cost procedure for the observation of these characters in the SEM, compatible with the most common agents used for preserving specimens." (Authors)] Address: del Palacio, A., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nac. de Avellaneda, Mario Bravo 1460, CP1870 Piñeyro, Avellaneda, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com
- 16388.** Deregnaucourt, I.; Wappler, T.; Anderson, J.M.; Béthoux, O. (2017): A new triadotypid insect from the Late Triassic of South Africa. *Acta Palaeontologica Polonica* 62 (3): 613-618. (in English) ["Extant odonates represent a small subset of the historical biodiversity of this group. Among their successive stem-groups, the Triadotypomorpha are poorly documented. Herein we describe a new species *Reisia riei* from the Molteno Formation (South Africa, Upper Triassic) belonging to this taxon. The comparatively large sample allows a relatively complete description of the wing venation in Triadotypomorpha. We noticed the occurrence of a strongly oblique crossvein located between RA and RP1, a condition documented in some other Pandiscoidalia and which might be of phylogenetic importance. The new species probably inhabited open landscapes and foraged above large water bodies. The documentation of a Gondwanian Triadotypomorpha demonstrates that the group had a worldwide distribution by the Triassic." (Authors)] Address: Deregnaucourt, Isabelle, Sorbonne Univ., UPMC Univ Paris 06, MNHN, CNRS, Centre de recherche sur la paléontologie, Paris (CR2P), 57 rue Cuvier, CP38, 75005 Paris, France. E-mail: isabelle.deregnaucourt@edu.mnhn.fr
- 16389.** Deshmukh, G.D.; Dhamani, A.A.; Rudey, R.J. (2017): Diversity of dragonflies in the agro-forest ecosystem of Nagbhid, Maharashtra (India). *International Journal of Applied Research 3 Special Issue Part I*: 259-261. (in English) ["Odonata are among the oldest animal group. The richness in the diversity of dragonflies is significant as they are considered most important bio-indicator of healthy agro-forest ecosystem. The study area presents unique geographical site, having heavy rainfall during rainy season and extreme hot summer. It is the buffer zone of Tadoba National Park where forest area is infiltrated with paddy cultivation. The present study aimed at exploring species diversity of dragonflies which will helps in designing conservation strategy for this important group of animals. In the present study, 25 species of dragonflies belonging to 16 genera of 3 families have been recorded. Among these, Libellulidae is richest family in terms of dragonfly species diversity while, *Pantala flavescens* is the most abundant species." (Authors)] Address: Deshmukh, G.D., Dept of Zoology, RMG College, Nagbhid, Maharashtra, India
- 16390.** Dias Boneto, D.; Batista-Silva, V.F.; Cavalieri Soares, J.A.; Luiz Kashiwaqui, E.A.; Dalla Valle Oliveira, I.A. (2017): Immature Odonata-Anisoptera in the Iguatemi river basin, upper Paraná River, Mato Grosso do Sul State, Brazil. *Acta Scientiarum. Biological Sciences* 39(2): 211-217. (in English, with Portuguese summary) ["This study present an inventory of the genera of Anisoptera in lotic environments of the Iguatemi River basin, upper Paraná River, Mato Grosso do Sul State, Brazil. Samplings were performed from December 2006 to February 2009 in the Iguatemi River and eight streams of the basin. We collected 739 immature Odonata, distributed in 25 genera and three families; of which one genus represent a new record for the Mato Grosso do Sul State.

Progomphus, Tramea, Elasmotemis, Macrothemis, Aphyla and Phylocyda were the most representative genera in the Iguatemi River basin. The genus accumulation curve predicts an increase of new genera for the Iguatemi River basin." (Authors)] Address: Batista-Silva, Valeria, Univ. Estadual de Mato Grosso do Sul, BR-163, Km 20.2, 79980-000, Mundo Novo, Mato Grosso do Sul, Brazil. E-mail: vfb_silva@yahoo.com

16391. Dow, R.A. (2017): A new Bornean species of Drepanosticta allied to *D. actaeon* Laidlaw, with notes on related species (Odonata: Zygoptera: Platystictidae). IDF-Report 104: 1-32. (in English) ["*D. kosterini* sp. nov. (holotype ♂, from Gunung Penrissen, Kuching Division, Sarawak, Malaysian Borneo, deposited in RMNH) is described from both sexes. It is the sister species of *D. actaeon* Laidlaw, 1934; a fresh description of the male of *D. actaeon* and the first description of the female are given, along with discussion of variation in this species. Both *D. actaeon* and *D. kosterini* are considered to belong to a species group also including *D. rufostigma* (Selys, 1886) and a preliminary discussion of variation in this species is given, along with illustrations of both sexes. A neighbour joining COI gene tree for *D. actaeon* and *D. kosterini* is presented. The relationships of *D. actaeon*, *D. kosterini* and *D. rufostigma* to other members of the Platystictidae are briefly discussed." (Author)] Address: Dow, R.A., 6 Bramley Av., Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

16392. Dow, R.A.; Choon, C.Y.; Ng, Y.F. (2017): Drepanosticta rahmani sp. nov., from Kedah, Malaysia (Odonata: Zygoptera: Platystictidae). Zootaxa 4338(1): 44-50. (in English) ["*Drepanosticta rahmani* sp. nov. (holotype ♂, steep tributary to stream in hills between Baling and Gulai, north west Kedah, Malaysia, 15 xi 2016, leg. R.A. Dow, to be deposited in the Natural History Museum, London) is described from both sexes."] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

16393. Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2017): New records of Odonata from Kedah, Malaysia in September 2016, with a checklist of species recorded from the state. Faunistic Studies in Southeast Asian and Pacific Island Odonata 23: 1-18. (in English, with Bahasa Melayu summary) ["The results of a short collecting trip to Kedah in the north-west of Peninsular Malaysia, made in September 2016, are reported. 64 species were collected, 13-14 of these are new records for the state and 28-29 are new records for the mainland of Kedah. A checklist of the Odonata recorded from Kedah (including Langkawi Island) is given in an appendix. At least 126 species of Odonata are now known from the state." (Authors)] Address: Dow, R.A., Naturalis Biodiv. Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

16394. Dow, R.A.; Alfariysi, A.; Bilitoni, J.F. (2017): Odonata survey on Belitung. International Dragonfly Fund - Report 108: 1-24. (in English) ["A survey of Odonata on the Indonesian island of Belitung is reported. The work of Belitung Biodiversity Observer on Odonata is briefly outlined. 64 species were recorded during the survey, including two new records for the

island. A checklist of the known odonate fauna, consisting of 105 species, of the island is given in an appendix." (Authors)] Address: Dow, R.A., 16 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail address: rory.dow230@yahoo.co.uk

16395. Dow, R.A., Stokvis, F., Ngiam, R.W.J. (2017): Revision of the Genus Leptogomphus Selys in Borneo, including gene trees and a two marker molecular phylogeny (Odonata: Anisoptera: Gomphidae). Zootaxa 4358(2): 201-257. (in English) ["The Bornean members of the genus Leptogomphus Selys are revised. Two new species are described: *L. schieli* sp. nov. (holotype ♂, Gunung Penrissen, Kuching Division, Sarawak, Malaysia, to be deposited in BMNH) and *L. sii* sp. nov. (holotype ♂, Sungai Sii, upper Baram, Miri Division, Sarawak, Malaysia, in RMNH). *L. mariae* Liefstinck, 1948 is considered to be a junior synonym of *L. coomansi* Laidlaw, 1936. The true male of *L. pasia* van Tol, 1990 is described for the first time; male specimens previously treated as *L. pasia* or *L. cf pasia* actually belong to a taxon closely allied to, and possibly merely a form of, *L. coomansi*. A description is given of the female of another new species, but the species is not named in the absence of the male. Female specimens from south-western Sarawak, similar to *L. williamsoni* Laidlaw, 1912, are considered likely to also represent a distinct species. The female of *L. pendleburyi* Laidlaw, 1934 is described for the first time and fresh descriptions of the males of *L. coomansi*, *L. pendleburyi* and *L. williamsoni*, and the female of *L. coomansi* are given. Keys to both sexes, and distribution maps are given. A molecular analysis of the Bornean species (except *L. schieli*) using the COI and ITS markers is presented." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

16396. Dube, T.; DeNecker, L.; van Vuren, J.H.J.; Wepener, V.; Smit, N.J.; Brendonck, L. (2017): Spatial and temporal variation of invertebrate community structure in flood-controlled tropical floodplain wetlands. Journal of Freshwater Ecology 32(1): 1-15. (in English) ["The Phongolo floodplain in South Africa is a unique system because of its biodiversity and socio-economic value. The spatial and temporal changes of invertebrate communities of the downstream floodplain influenced by controlled flooding from an upstream dam are poorly understood. The study investigated the spatial and temporal changes in community assemblage of macroinvertebrates and zooplankton in the permanent wetlands (pans) of the Phongolo floodplain in relation to controlled flooding. This was achieved by sampling during the dry period (September) and after controlled release of water (December). Although controlled flooding did not coincide with significant changes in the taxon diversity of macroinvertebrates and zooplankton, macroinvertebrate regional taxa richness (γ -diversity) was relatively higher in the period coinciding with controlled flood (December) compared to the dry period. For zooplankton, regional taxa diversity was similar in both periods. The average local taxa richness (α -diversity) was higher after the controlled flooding period for both macroinvertebrates and zooplankton. Spatial species turnover (β -diversity) was lower after the controlled flooding period suggesting the homogenization of aquatic communities

16399. Dumont, H.J.; Ikemeyer, D.; Schneider, T. (2017): *Lestes concinnus* and *L. pallidus*: two non-metallic species with wide, complementary ranges (Odonata: Lestidae). *Odonatologica* 46(1/2): 99-110. (in English) ["We reiterate the history of two non-metallic, pale brown to greenish-blue marked with black *Lestes* species – *L. concinnus* and *L. pallidus* – that occur over a wide geographic range in the Old World

16401. Dutta, S.P.; Manohar, M.J. (2017): Odonata diversity of Jalgaon city and around (Maharashtra). Indian Journal of Entomology 79(2): 191-201. (in English) ["A total of 46 species of Odonata belonging to 26 genera under 7 families were collected from Jalgaon city and its surrounding area during a study conducted in monsoon and post monsoon seasons, 2012–2014. The post-monsoon abundance was comparatively high. It was observed that the Anisoptera was dominant with 28 species under 3 families. Suborder Zygoptera revealed 18 species under 4 families. Libellulidae was the species rich family (24 species), followed by the Coenagrionidae (12 species), Platycnemididae (3), Lestidae (2), Aeshnidae (2), Gomphidae (2).

and Chlorocyphidae (1). Of the 46 species, 13 were very common, 22 were common, 10 rare and one very rare." (Authors)] Address: Dutta, S.P., Zool. Survey India, Western Regional Centre, Vidya Nagar Sector. No. 29, P.C.N.T. Post, Rawet Rd, Akurdi, Pune, 411044, India. E-mail: priti priyaeco@gmail.com

16402. Dwari, S.; Mondal, A.K. (2017): Diversity of Odonates in agricultural fields of Howrah district, West Bengal, India. *Journal of Entomology and Zoology Studies* 5(3): 1588-1595. (in English) ["The present study documented the odonates of agricultural fields of Howrah, West Bengal, India. Agricultural fields are unique ecosystems that provide some odonates to complete their life cycle. So the main aim of this study to prepare a list of those odonates which use these fields. A total number of 17 species of order Odonata were observed, among them 12 species belongs to sub order Anisoptera and 5 species belongs to suborder Zygoptera. Sub-order Anisoptera was represented by the family Libellulidae and suborder Zygoptera by the family Coenagrionidae. Species composition was highest in the family Libellulidae (70%) followed by the family Coenagrionidae (30%). Among all agricultural fields Rice fields (13) contain highest number of odonates followed by Sugarcane (5), Sesame (5) and others. Rice field is show highest diversity of odonates showing 76.471% of total odonates. Odonata documentation is highly necessary in order to assess the agroecosystem health. The fact that health of agroecosystem is proportionately at par with the presence of the odonates can be easily perceived from this study." (Authors)] Address: Dwari, S., Plant Taxonomy, Biosystematics & Molecular Taxonomy Laboratory Dept of Botany and Forestry, Vidyasagar University Midnapore, West Bengal, India

16403. Dwari, S.; Chowdhury, S.; Mondal, A.K. (2017): First report of *Lestes elatus* (Hagen in Selys, 1862) from West Bengal, India. *Journal on New Biological Reports* 61: 47-51. (in English) ["The first photographic record of the *L. elatus* from Howrah district, West Bengal, India is presented in this paper. During the Odonata survey of Howrah district of West Bengal this species photographed and identified first time for the state West Bengal. *L. elatus*, recorded in October, 2016. A medium sized pale brownish species documented from bush area of Amta 2 block of Howrah, West Bengal, India." (Author)] Address: Dwari, S., Plant Taxonomy, Biosystematics & Molecular Taxonomy Laboratory Dept of Botany and Forestry, Vidyasagar Univ. Midnapore, West Bengal, India

16404. Eck, T. (2017): Tandems der Gemeinen Winterlibelle (*Sympecma fusca*) als Beute von Jagdspinnen (*Dolomedes spec.*) (Odonata: Lestidae, Araneae: Pisauridae). *Mercuriale* 17: 63-66. (in German, with English summary) ["On 29-iii-2017, at ca. 15:30 h CEST, I observed the predation of at least two tandems of *S. fusca* by *Dolomedes spec.* at a shallow water body close to Rheinmunster-Stollhofen, Upper Rhine valley, Germany (48°46,31" N, 8°01'56"E, 119 m a.s.l.)." (Author)] Address: Eck, T., Weserstrafie 16, 76437 Rastatt, Germany. E-mail: tom-eck@t-online.de

16405. Elanchezhyan, K.; Sowmiya, C.; Agilesh, S.; Venkatesh, M. (2017): Diversity of odonates at agricultural college

campus, Killikulam, Tamil Nadu, India. *Journal of Entomology and Zoology Studies* 5(5): 935-940. (in English) ["A study was conducted to assess the diversity of odonates at Agricultural College Campus, Killikulam, Tamil Nadu, India. A total of 29 species of odonates including 17 species of Anisoptera and 12 species of Zygoptera were recorded at Agricultural College Campus, Killikulam. Libellulidae dominated with 15 species among Anisoptera followed by Aeshnidae (1) and Gomphidae (1). Among Zygoptera, Coenagrionidae (7) was the dominant family followed by Lestidae (2), Euphaeidae (1), Synlestidae (1) and Platycnemididae (1). *Diplacodes trivialis* (Libellulidae) was the most dominant Anisoptera and *Ischnura aurora* (Coenagrionidae), the most abundant Zygoptera among the 29 species recorded." (Authors)] Address: Elanchezhyan, K., Dept Agricultural Entom., Agricult. Coll. & Research Inst., Tamil Nadu Agricultural Univ., Killikulam, Vallanadu, Thoothukudi District Tamil Nadu, India

16406. Elfaki, E.A.; Allam, T. (2017): Two new records of Odonata in White Nile State, Sudan. *Journal of Environmental Science and Engineering B* 6: 72-79. (in English) ["White Nile state characterizes by rich healthy habitats especially wetlands which it supports the diversity of wildlife, Odonata species are actually poorly known in the White Nile region. A systematic survey was carried out in aquatic systems located at six localities: Kosti, Al-Kawwa, ELJebelein, Kenana cities, Om Elganateer and El Shawat islands. A total of 357 belonged to 16 species distributed in 4 families were recorded and observed. Libellulidae were dominant, with 9 species, followed by Coenagrionidae; *Brachythemis leucosticta* showed the highest abundance in compare with other species. ELJebelein area showed highest number of Odonata, while Kenana showed highest diversity, 11 species recorded from Kenana sugar scheme and Kenana Zoo Park, *Phyllomacromia africana* and *Olpogastra lugubris* recorded only in Kenana. *Agriocnemis exilis* and *Ictinogomphus ferox* were recorded for first time in Sudan." (Authors)] Address: Elfaki, E.A., Department of Biodiversity, Environment and Natural Resources and Desertification Research Institute, Khartoum 12217, Sudan

16407. Ellenrieder, N. von; Garrison, R.W. (2017): A synopsis of the Neotropical genus *Protoneura* (Odonata: Coenagrionidae). *Zootaxa* 4361: 76 pp. (in English, with Spanish summary) ["A synopsis of the Neotropical genus *Protoneura* is presented, including an identification key to its 22 species accompanied by illustrations of diagnostic characters, and characterizations, diagnoses, and distribution maps for all species. A lectotype is designated for *P. peramans* Calvert in Skinner, 1902." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Dept Food & Agricult., 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

16408. Ellenrieder, N. von; Willink Castro, B.; Svensson, E. (2017): Checklist of the dragonflies and damselflies from Guyana (Insecta: Odonata), with new records from the country. *Check List* 13(2): 2104: 22 pp. (in English) ["The first checklist of the odonates from Guyana is presented, including 46

new species records. Literature sources are provided for all species and for the new records full locality data, colour scans or field photographs, taxonomic and biological notes, and maps for those species whose distribution range is increased considerably." (Authors)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

16409. Escoto-Moreno, J.A.;Novelo-Gutiérrez, R.; Márquez, J.; Adabache-Ortiz, A. (2017): Odonata from the cloud forests of Hidalgo State, Mexico. *Notulae odonatologicae* 8(10): 383-390. (in English) ["A total of 32 collecting trips were made to eight sites covered with cloud forest and associated ecotones in Hidalgo State, Mexico. Data were augmented by historical records. A total of 76 named species and two undescribed taxa belonging to 36 genera, 11 families and eight superfamilies of Odonata were recorded. Within these cloud forests are represented 100% of the superfamilies, 91.7% of the families, 78.2% of the genera and 58.5% of the species richness of Odonata known for Hidalgo. Included are restricted species, which together with overall high species-richness qualify these habitats as priority areas for the conservation of odonates in this state." (Authors)] Address: Escoto-Moreno, J.A., Colección Zool., Depto Biol., Centro de Ciencias Básicas, Univ. Autónoma de Aguascalientes. Avenida Universidad # 940. Ciudad Universitaria, 20131 Aguascalientes, Aguascalientes, Mexico. E-mail: jerjaem2002@yahoo.es

16410. Faasen, T. (2017): *Telebasis igapocola* sp. nov., a new damselfly from Amazonian Peru and Brazil (Odonata: Coenagrionidae). *International Journal of Odonatology* 20(2): 113-121. (in English) ["To date 57 species of *Telebasis* have been described. Most are Neotropical species, only three extending North of Mexico. From Peru 17 species were known. Most are found in the Amazonian lowlands; two are known from higher elevations in the Andes. From Brazil 26 species were known. In this article another Neotropical species is described, hereby named *Telebasis igapocola*. Males of this species differ from other described species of *Telebasis* with a black and red abdomen by the shape of cerci, paraprocts and genital ligula. Cerci are as long as paraprocts with a blunt tip. Genital ligula has a sharp-angled arrow-shape in ventral view. Females can be distinguished from other *Telebasis* species by the shape of the prothorax with two approximate processes curving caudad." (Author)] Address: Faasen, T., Ecologica, Rondven 22, 6026 PX Maarheeze, the Netherlands. E-mail: tim.faasen@ecologica.eu

16411. Ferrández Palacio, J.V.; Álvarez Fidalgo, M. (2017): *Selysiothemis nigra* (Vander Linden, 1825): nueva cita en la provincia de Huesca (noreste de la Península Ibérica) y actualización de su distribución en el territorio peninsular y balear (Odonata: Libellulidae). *BVNPC* 6(78): 74-81. (in Spanish, with English summary) ["... the presence of *S. nigra* in the province of Huesca is confirmed, being also the first record for Aragon in the last twenty years. Furthermore, an update of the species distribution on the Iberian Peninsula and the Balearic Islands is presented." (Authors)] La Mina de Selgua

(Monzón, Huesca), 15-VI-2017] Address: Ferrández Palacio, J.V., Usuario de Biodiversidad Virtual.org – Monzón, Huesca, Spain. E-mail: jv_ferrandez@yahoo.es

16412. Ferretti, A.; Pinkert, S.; Nel, A.; Huang, D.-Y. (2017): A new hawker dragonfly from the Middle Jurassic of China (Odonata: Aeshnoptera). *Comptes Rendus Palevol.* 16: 378-381. (in English) ["A new genus and species *Linqibinia panee* of paracymatophlebiid hawker dragonfly is described from the Middle Jurassic Haifanggou Formation (Inner Mongolia, China). Previously only known from Karatau in Kazakhstan, the discovery of another member of this family extends its range across Central Asia. It confirms that the Aeshnoptera was among the most diverse odonatan clades during the Middle-Late Jurassic." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16413. Ferri, V.; Soccini, C. (2017): I popolamenti odonatologici ed erpetologici del complesso dei Laghi di Cava in località San Polo di Brescia (Lombardia, Italia Settentrionale). *Natura bresciana: annuario del Museo Civico di Storia Naturale di Brescia* 41: 27-36. (in Italian, with English summary) ["Odonatological and Herpetological fauna of San Polo quarry lakes complex of Brescia (Lombardy, northern Italy). Status and conservation proposals". The results of faunistic and ecological research on the populations of Odonata, amphibians and reptiles of the complex of quarry lakes in San Polo Location in the municipality of Brescia (Lombardy, northern Italy) are on display. During the years of research (2014-2017) 7 species of Zygoptera, 11 species of Anisoptera, 6 species of Amphibia and 8 species of Reptilia were found. Stand out in the general faunal context of the Brescia area the reports of *Pyrrhosoma nymphula*, *Ischnura pumilio* and *Aeshna isosceles* for dragonflies, *Triturus carnifex* for amphibians and *Coronella austriaca*, ... The main threat factors and guidelines for the conservation of these wildlife emergencies are presented." (Authors)] Address: Ferri, V., Via Valverde 4, I - 01016 Tarquinia (Vt), Italy. E-mail: csnarcadia@gmail.com

16414. Feurle, A. W.; Holzinger, W. E. (2017): Die Libellenfauna des Dörmleesee in Lingenau (Naturpark Nagelfluhkette), mit dem Erstnachweis der Gabel-Azurjungfer (*Coenagrion scitulum*, Odonata, Insecta) für Vorarlberg. *inatura – Forschung online* 46: 6 pp. (in German, with English summary) ["A survey of the Odonata fauna of the pond Dörmlesee in Lingenau (Vorarlberg; coordinates (WGS84): 9,9106 E; 47,4536 N) carried out in 2017 revealed a total of 14 species. On 21-VI-2017, we spotted a single male of *C. scitulum*. This is the first confirmed record of this species in Vorarlberg. In Austria, *C. scitulum* is autochthonous in its eastern parts (Styria, Burgenland, Lower Austria and Vienna) and has been recorded in Salzburg recently. In addition, an unconfirmed record for Vorarlberg was published in 2002. It is a species with holo-mediterranean distribution and a distinct range expansion (due to climate change) towards Central Europe in recent decades, where it usually inhabits low altitudes. Our record of *C. scitulum* at 663 m a.s.l. therefore is unusual and can be explained by the fact that the Dörmlesee is favoured

by a warm climate." (Authors)] Address: Feurle, A.W., Schwarzen 365/4, A-6861 Alberschwende, Austria. E-Mail: alexander.feurle@gmail.com

16415. Filion, A.; Lagrue, C.; Presswell, B.; Poulin, R. (2017): Behavioural modification of personality traits: testing the effect of a trematode on nymphs of the red damselfly *Xanthocnemis zealandica*. *Parasitology Research* 116: 1773-1779. (in English) ["Research on animal personality is increasingly demonstrating that individuals in a population are characterised by distinct sets of behavioural traits that show consistency over time and across different situations. Parasites are known to alter the behaviour of their hosts, although their role in shaping host personality remains little studied. Here, we test the effect of trematode infection on two traits of their host's personality, activity and boldness, in nymphs of *X. zealandica*. Genetic analyses indicate that the undescribed trematode species falls within the superfamily Microphalloidea. Results of laboratory behavioural tests indicate that the two behavioural traits are related to each other: bolder individuals also show higher levels of spontaneous activity than shy ones. However, parasite infection had no effect on either of these behaviours or on their repeatability over three separate testing sessions. Although our findings suggest that this trematode does not influence personality traits of the damselfly host, it remains possible that other standard personality traits not tested here (exploratory tendency, aggressiveness) are affected by infection." (Authors)] Address: Poulin, R., Département des Sciences de l'environnement, Université du Québec à Trois-Rivières, C.P. 500, Trois-Rivières, Québec G9A 5H7, Canada. E-mail: robert.poulin@otago.ac.nz

16416. Fitt, R.; Lancaster, L.T. (2017): Range shifting species reduce phylogenetic diversity in high latitude communities via competition. *Journal of Animal Ecology* 86(3): 543-555. (in English) ["1. Under anthropogenic climate change, many species are expanding their ranges to higher latitudes and altitudes, resulting in novel species interactions. The consequences of these range shifts for native species, patterns of local biodiversity, and community structure in high latitude ecosystems are largely unknown but critical to understand in light of widespread poleward expansions by many warm-adapted generalists. 2. Using niche modelling, phylogenetic methods, and field and laboratory studies, we investigated how colonisation of Scotland by a range expanding damselfly, *Ischnura elegans*, influences patterns of competition and niche shifts in native damselfly species, and changes in phylogenetic community structure. 3. Colonization by *I. elegans* was associated with reduced population density and niche shifts in the resident species least related to *I. elegans* (*Lestes sponsa*), reflecting enhanced competition. Furthermore, communities colonized by *I. elegans* exhibited phylogenetic underdispersion, reflecting patterns of relatedness and competition. 4. Our results provide a novel example of a potentially general mechanism whereby climate change-mediated range shifts can reduce phylogenetic diversity within high latitude communities, if colonising species are typically competitively superior to members of native communities that are least-closely-related to the coloniser." (Authors)] Address: Fitt, R.,

Institute of Biological and Environmental Sciences, Univ. Aberdeen, Aberdeen, UK. E-mail: r01mf13@abdn.ac.uk

16417. Fleck, G. (2017): Notes on the genus *Navicordulia* Machado & Costa, 1995 (Odonata: Anisoptera: Corduliidae s. str.): description of a new species, phylogenetic affinities and aspects of biogeography. *Zootaxa* 4272(2): 251-262. (in English) ["Based on a single male specimen, a remarkable new species of the genus *Navicordulia* is described from the Massif du Mitaraka in French Guiana (Tumuc-Humac Mountains). Another new species of this genus is also reported from the same locality but is not described. This is the first record of the genus from French Guiana, hitherto being unknown within a radius of more than 1000 km. Apparent rarity or absence of records is probably due to its secretive habits. *Navicordulia tumucurakensis* sp. nov. presents unique characters not present in other species of the genus including: almost no excavation of the anal angle, proximal sternal pilose ridge of abdominal segment 7 transformed into two large lateral oreillets disconnected from the median carina, additional distal sternal pilose ridge transformed into a medial knob, epiproct not extending beyond the distal half of the cerci, very long cerci surpassing those of described species, cerci lacking ventro-medial carina and tubercle and exhibiting a distal ventral brush of hair-like setae. It is a forest species inhabiting hilly landscapes at low altitude, unlike other closely related inter-tropical species which are encountered in more elevated areas above 850 m. It is most closely related to *N. longistyla*, a typical cerrado species from the central Brazilian plateau or possibly to *N. nitens* from the central south Venezuelan Guaiquinima Tepui. Based on unique derived male abdominal structures and also on the female ovipositor and related structures, the South American genus *Navicordulia* and the South-east Asian/Melanesian genus *Metaphya* are considered current adelphotaxa. This disrupted geographic distribution could be explained by a common ancestor having had a Gondwanian dispersal until the Late Cretaceous or Paleocene." (Author)] Address: Fleck, G. E-mail: fleckgunther@gmail.com

16418. Fonseca, N.; Cano-Villegas, F.J.; Soares, A.; Dijkstra, K.-D.B.; Brochard, C. (2017): *Aeshna isoceles* and *Libellula fulva* rediscovered in the Algarve, southern Portugal (Odonata: Aeshnidae, Libellulidae). *Libellula* 36(1/2): 51-58. (in English, with German summary) ["*A. isoceles* and *L. fulva* are rare and local species in the Iberian Peninsula and their presence in the Algarve was summed up to isolated records from the mid-1990. Since 2013 both species were rediscovered and the first evidence of their reproduction was found in Vilamoura." (Authors)] Address: Fonseca, N., Rua da Fábrica 37 – 1.º Fte, 8500-590 Portimão, Portugal. E-mail: nelfonseca@gmail.com

16419. Fontana-Bria, L.; Selfa, J.; Tur, C.; Frago, E.; (2017): Early exposure to predation risk carries over metamorphosis in two distantly related freshwater insects. *Ecological Entomology* 42(3): 255-262. (in English) ["1. Predation and competition play a central role in ecological communities, and it is increasingly recognised that animals use early warning cues to reduce the impact of these antagonistic interactions. 2. Strategies to avoid risk can occur during embryo development

through plasticity in egg hatching time. This strategy, and its associated costs and carryover effects on adults are little understood in insects. In this study, these are explored in two distantly related freshwater insects: the damselfly *Ischnura elegans* and the mosquito *Aedes albopictus*. 3. As predicted, damselfly eggs hatched earlier in response to larval predators cues, a treatment that also affected adult size. Risk cues did not affect mosquito egg hatching time, but they did affect larval development time in a sex-dependent manner. 4. The results suggest that responses aimed at avoiding risks can be triggered during the egg stage, and although they can vary dramatically among species, they are likely to be widespread in insects. Early warning responses can be particularly important to understand the ecology of aquatic insects, some of them global vectors of human diseases." (Authors)] Address: Frago, E., CIRAD, UMR Peuplements Végétaux et Bio-agresseurs en Milieu Tropical, CIRAD-3P 7, Chemin de l'IRAT, Ligne Paradis 97410, Saint-Pierre, La Réunion, France. E-mail: enric.frago@cirad.fr

16420. Fontana-Bria, L.; Frago, E.; Prieto-Lillo, E.; Selfa, J. (2017): Biogeographic evaluation of the dragonflies and damselflies in the Eastern Iberian Peninsula. *Arxius de Miscel·lània Zoològica* 15: 8-29. (in English, with Spanish summary) ["Insects are one of the most diverse groups of animals in terrestrial ecosystems, and are thus a good model system to study macrogeographic patterns in species' distributions. Here we perform a biogeographical analysis of Odonata in the Valencian Country (Eastern Iberian Peninsula). We also compare the species present in this territory with those in the adjacent territories of Catalonia and Aragon, and with those present in the whole Iberian Peninsula. Furthermore, we update the list of species of dragonflies and damselflies in the Valencian territory (65 species), and discuss the current status of two of them: *Macromia splendens* and *Lindenia tetraphylla*. Our results highlight that the Valencian Country has a higher proportion of Ethiopian elements but a lower proportion of Eurosiberian elements than Catalonia and Aragon. We also emphasize the importance of volunteer work in providing new knowledge on this group of iconic insects, and the relevance of museum collections in preserving them. The role of climate change in the distribution of Odonata is also discussed." (Authors)] Address: Fontana-Bria, Laia, Dept. de Zoologia, Fac. de Ciències Biològiques, Univ. de València, c/ Dr. Moliner 50, 46100 Burjassot, València, Spain. E-mail: Laia.Fontana@uv.es

16421. Frances, D.; Moon, J.; McCauley, S.J. (2017): Effects of environmental warming during early life-history on libellulid odonates. *Canadian Journal of Zoology* 95(6): 373-382. (in English) ["Climate warming affects ectotherms globally yet we know little regarding the variability in species' responses to warming, particularly in early life stages. Additionally, intraspecific variation in response to warming is understudied but may determine species' resilience to warming. To assess how temperature affects egg development rate in co-occurring dragonfly species, we manipulated temperature (range: 22° -31° C) and measured time to hatching. Warming decreased egg development time across all species, indicating that while climate warming will advance hatching phenology,

maintained synchrony in hatching order will likely not affect species interactions. Our second experiment examined early life history responses to warming in the dragonfly *Leucorrhinia intacta*. We measured time to hatching, hatchling size, growth rate and survival at four temperatures (23°-30° C), including a treatment with increased thermal variation. Warming resulted in smaller hatchlings with increased growth and mortality rates, while higher thermal variation did not have effects different from those of warming alone. We observed significant intraspecific variation in the responses to warming in both egg development time and hatchling size and this variation was correlated with date of oviposition. High levels of intraspecific variation may be important in buffering populations from the effects of climate warming." (Authors)] Address: Frances, D.N., Dept Biology, Univ. of Toronto Mississauga, Mississauga, ON L5L 1C6, Canada. E-mail: dachin.frances@mail.utoronto.ca

16422. Frye, M.A. (2017): Insect vision: A neuron that anticipates an object's path. *Current Biology* 27: R1076-R1078. (in English) ["Dragonflies are superb aerial predators, plucking tiny insect prey from the sky. This ability depends on a visual system that has fascinated scientists for decades, and now one of its visual-target-detecting neurons has been shown to anticipate the image path of prey." (Author)] Address: Frye, M.A., Dept of Integrative Biology & Physiology, Univ. of California Los Angeles, Los Angeles, CA 90095, USA. E-mail: frye@ucla.edu

16423. Futahashi, R.; Sugiura, N.; Aoki, T. (2017): The first record of *Sympetrum uniforme* (Selvs, 1883) from Rebun Island, off Hokkaido, Japan. *Tombo* 59: 101. (in Japanese, with English summary) ["A male of *S. uniforme* was collected on Rebun Island, off Hokkaido, northern Japan for the first time, 2-X-2013. This is the second record of this species from Hokkaido." (Authors)] Address: Futahashi, R., Nat. Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

16424. Gainzarain, J.A. (2017): *Epithea bimaculata* – a new species for the fauna of Bulgaria (Odonata: Corduliidae). *Notulae odonatologicae* 8(10): 369-373. (in English) ["A female *E. bimaculata* was photographed on 12-vii-2017 in the Rila Mountains of SW Bulgaria, at an altitude of 2 300 m a.s.l. This is the first record for the country and raises the number of Odonata species known from Bulgaria to 71. The possible origin of the individual is discussed." (Authors)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza, apdo. de correos 2092, 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

16425. Galasso, P.; Marletta, A.; Corso, A. (2017): Odonata of the South-eastern swamp lakes 'Pantano Cuba' and 'Pantano Longarini' (Sicily). *Bulletin of the Entomological Society of Malta* 9: 100. (in English) [Verbatim: From March 2015 to September 2017, a study focused on Odonata, funded by the German foundation 'Stiftung Pro Artenvielfalt (Foundation Pro Biodiversity)', was conducted at the swamp lakes 'Pantano Cuba' and 'Pantano Longarini', in the Southeastern coast of

Sicily, near Pachino (Siracusa). This area represents the southern most Italian wetland-complex and is characterised by brackish and standing waters. Alongside with the new data collected during this study, unpublished data collected during previous years will also be reported in this communication, to provide the first complete picture of the Odonata found in this territory. A total of 25 different species were found in Pantano Cuba and Longarini, from the following families: three species of Lestidae, four species of Coenagrionidae, seven species of Aeshnidae and eleven species of Libellulidae. Amongst these species, of particular interest is the discovery of *Brachytron pratense*, recorded for the first time in Sicily during this study and *Pantala flavescens*, never before observed in Italy except for the islands of Linosa and Lampedusa.] Address: Galasso, P., Stiftung Pro Artenvielfalt, Meisenstr. 65, 33607 Bielefeld, Germany. E-mail: paolo_galasso@hotmail.com

16426. Galicia-Mendoza, I.; Sanmartín-Villar, I.; Espinosa-Soto, C.; Cordero-Rivera, A. (2017): Male biased sex ratio reduces the fecundity of one of three female morphs in a polymorphic damselfly. *Behav. Ecol.* 28(4): 1183-1194. (in English) ["Females of *Ischnura graellsii* display 3 color morphs, a male-like androchrome morph and 2 other morphs, infuscans and aurantiaca, which are not male-like. Previous research has suggested that male harassment has a negative effect on female fitness in many different insect species. Studying how male harassment affects fitness of the different female color morphs is key to a better understanding of how these morphs are maintained in natural populations. This study evaluated the response of female morphs of *I. graellsii* to contrasting sex ratios under controlled laboratory conditions. In our experiments, male abundance, through increased harassment, affected differentially the fecundity of females of the 3 color morphs. A male biased (3:1) sex ratio drastically decreased the average fecundity of infuscans females but had no effect on androchrome and aurantiaca females. Taking into account our results and previous studies that indicate that males prefer infuscans females, we propose a mechanism for the maintenance of this polymorphism. In this scenario, within-generation fluctuations in male abundance produce 2 regimes: One in which male abundance disfavors infuscans females by decreasing their fecundity and other in which a low male abundance results in androchromes that do not mate because of their low appeal to males. By studying a simple population genetics model, we found that the mechanism that we propose may contribute to maintain a stable female-limited polymorphism under a wide range of parameter combinations." (Authors)] Address: Cordero-Rivera, A., Depto Ecología e Biología Animal. Grupo de Ecología Evolutiva e da Conservación. Univ. de Vigo, EUET Forestal, Campus de Pontevedra, Pontevedra, 36005, Galiza, Spain

16427. Galliani, C.; Scherini, R.; Piglia, A. (2017): Dragonflies and Damselflies of Europe. WBA Handbook 7 / World Biodiversity Association Handbook 7: 352 pp. (in English) [Inv, "A simple yet detailed guide suitable both for beginners and more expert readers who wish to improve their knowledge of the order Odonata. This book encompasses images and

photographs of all the European species having a stable population with chapters about their anatomy, biology, behaviour, distribution range and period of flight, plus basic information about the vagrants with only a few sightings reported. On the whole, 143 reported species and over 600 photographs are included." (Publisher)]

16428. García Cañal, J.A.; Fatou, P.; Noval Fonseca, N.; Álvarez Fidalgo, M. (2017): Primeros registros e indicios de reproducción de *Anax ephippiger* (Burmeister, 1839) en Asturias (norte de la Península Ibérica) (Odonata: Aeshnidae). *BVNPC* 6(75): 48-55. (in Spanish, with English summary) ["First records and potential reproduction of *A. ephippiger* in Asturias (northern part of the Iberian Peninsula). - Cabo Busto, Valdés (Asturias), 18-X-2014; La Granda, Gozón (Asturias), 29-V-2017] Address: García Cañal, J.A. Experto del Grupo de Aves de Biodiversidad Virtual – Avilés, Asturias, Spain. E-mail: luancopin@gmail.com

16429. Gering, E.J. (2017): Male-mimicking females increase male-male interactions, and decrease male survival and condition in a female-polymorphic damselfly. *Evolution* 71(5): 1390-1396. (in English) ["Biologists are still discovering diverse and powerful ways sexual conflicts shape biodiversity. The present study examines how the proportion of females in a population that exhibit male mimicry, a mating resistance trait, influences conspecific males' behaviour, condition and survival. Like most female-polymorphic damselflies, *Ischnura ramburii* harbours both "andromorph" females, which closely resemble males, and sexually dimorphic "gynomorph" counterparts. There is evidence that male mimicry helps andromorphs evade detection and harassment, but males can also learn to target locally prevalent morph(s) via prior mate encounters. I hypothesized that the presence of male mimics could therefore predispose males to mate recognition errors, and thereby increase rates of costly male-male interactions. Consistent with this hypothesis, male-male interaction rates were highest in mesocosms containing more andromorph (vs. gynomorph) females. Males in andromorph-biased mesocosms also had lower final body mass and higher mortality than males assigned to gynomorph-majority treatments. Male survival and body mass were each negatively affected by mesocosm density, and mortality data revealed a marginally significant interaction between andromorph frequency and population density. These findings suggest that, under sufficiently crowded conditions, female mating resistance traits such as male mimicry could have pronounced indirect effects on male behaviour, condition, and survival." (Authors)] Address: Gering, E.J., Current Address: Dept of Integrative Biology, W.K. Kellogg Biological Field Station, 3700 East Gull Lake Drive, Hickory Corners, Michigan 49060, USA. E-mail: geringeb@msu.edu

16430. Gezie, A.; Anteneh, W.; Dejen, E.; Mereta, S.T. (2017): Effects of human-induced environmental changes on benthic macroinvertebrate assemblages of wetlands in Lake Tana Watershed, Northwest Ethiopia. *Environmental Monitoring and Assessment* 189(4): 152. (in English) ["Wetlands of Lake Tana Watershed provide various ecological and socioeconomic functions. However, they are losing their vigor

at alarming rate due to unwise management. Hence, there is an urgent need to monitor and assess these resources so as to identify the major drivers of its degradation and to provide information for management decisions. In this context, we aimed to assess the effects of human activities on macroinvertebrate assemblages of wetlands in Lake Tana Watershed. Biotic and abiotic data were collected from 46 sampling sites located in eight wetlands. A total of 2568 macroinvertebrates belonging to 46 families were recorded. Macroinvertebrate metrics such as Biological Monitoring Working Party score, Shannon diversity index, Ephemeroptera and Odonata family richness, and total family richness portrayed a clear pattern of decreasing with increasing in human disturbances, whereas Family biotic index score, which is an indicator of organic pollution, increased with increasing in human disturbances. The regression analysis also revealed that livestock grazing, leather tanning, and eucalyptus plantation were important predictors of macroinvertebrate metrics ($p < 0.05$). In conclusion, human activities in and around the wetlands such as farming, leather tanning, solid waste dumping, and effluent discharges were contributed to the degradation of water quality and decreasing in the macroinvertebrate richness and diversity. These alterations could also reduce the availability of wetland products (sedges, craft materials, etc.) and the related ecosystem services. This in turn has an adverse effect on food security and poverty alleviation with considerable impact on communities who heavily depend on wetland products for their livelihood. Therefore, it is essential to formulate wetland policy for achieving wise use goals and necessary legal and institutional backup for sustainable wetland management in Ethiopia." (Authors)] Address: Gezie, A., Deptt of Biology, Bahir Dar University, Bahir Dar, Ethiopia

16431. Guillermo-Ferreira, R.; Appel, E.; Urban, P.; Bispo, P.C.; Gorb, S.N. (2017): The unusual tracheal system within the wing membrane of a dragonfly. *Biology Letters* 13(5). pii: 20160960. doi: 10.1098/rsbl.2016.0960: 5 pp. (in English) ["Some consider that the first winged insects had living tissue inside the wing membrane, resembling larval gills or developing wing pads. However, throughout the developmental process of the wing membrane of modern insects, cells and tracheoles in the lumen between dorsal and ventral cuticle disappear and both cuticles become fused. This process results in the rather thin rigid stable structure of the membrane. The herewith described remarkable case of *Zenithoptera lanei* shows that in some highly specialized wings, the membrane can still be supplemented by tracheae. Such a characteristic of the wing membrane presumably represents a strong specialization for the synthesis of melanin-filled nanolayers of the cuticle, nanospheres inside the wing membrane and complex arrangement of wax crystals on the membrane surface, all responsible for unique structural coloration." (Authors)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zoological Institute, Christian-Albrecht Univ. of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

16432. Gyeltshen, T.; Kalkman, V.J. (2017): Odonata records from western Bhutan, with six new records and a note on the synonymy of *Himalagrion* with *Coenagrion*. *Notulae odonatologicae* 8(9): 341-353. (in English) ["Records of 56

species of Odonata collected from western Bhutan between 03- and 15-viii-2015 are listed. Six of these species are new to Bhutan: *Aeshna shennong*, *Anax guttatus*, *Gynacantha sub-interrupta*, *Neallogaster hermionae*, *Asiagomphus odoneli*, and *Rhyothemis phyllis*. The previously published record of *Lestes thoracicus* from Bhutan is considered incorrect and the species is deleted from the list of Bhutanese dragonflies. *Coenagrion tengchongensis* Yu & Bu, 2007 is synonymised with *Himalagrion exclamatoris* Fraser, 1919 and *Himalagrion* Fraser, 1919 is synonymised with *Coenagrion* Kirby, 1890, resulting in the new combination of *Coenagrion exclamatoris* (Fraser, 1919)." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

16433. Gyeltshen, T.; Kalkman, V.J.; Orr, A.G. (2017): Honouring His Royal Highness the Crown Prince of Bhutan: *Megalestes gyalsey* (Odonata: Synlestidae). *Zootaxa* 4244(4): 588-594. (in English) ["*Megalestes gyalsey* spec. nov. is described from a single male from Trongsa District in Bhutan. The species was discovered during field work conducted in 2015 for the Bhutan invertebrate biodiversity project. The species is named in honour of His Royal Highness Crown Prince Jigme Namgyel Wangchuck, the Gyalsey of Bhutan, on the occasion of his first birthday." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

16434. Gyeltshen, T.; Nfidup, T.; Dorjfi, P.; Dorjfi, T.; Kalkman, V.J. (2017): Bibliography and checklist of the dragonflies and damselflies of Bhutan. *Journal of Threatened Taxa* 9(1): 9743-9747. (in English) ["An overview is given of literature containing distribution records of dragonflies and damselflies in Bhutan. Based on this an annotated checklist is presented which contains 92 species. *Camacinia gigantea* (Brauer, 1867) and *Libellago lineata* (Burmeister, 1839) are listed as new to Bhutan." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

16435. Haber, W.A. (2017): Three new species of *Epigomphus* (Odonata: Gomphidae) from Costa Rica. *Zootaxa* 4282(1): 73-94. (in English, with Spanish summary) ["The male, female and larva of *E. bosquenuboso*, a new species from cloud forest in Costa Rica, is described. The female bears a pair of highly distinctive postocellar horns similar to those of three other species endemic to Costa Rica, *E. corniculatus*, *E. echeverrii*, and *E. verticicornis*. The males of two additional new species, *E. morrisoni* and *E. wagneri*, are described from premontane wet forest on the Pacific slope near Monteverde, resulting in a total of 13 species recorded from Costa Rica." (Author)] Address: Haber, W.A., Apdo. 50-5655, Monteverde, Costa Rica. E-mail: bill.haber01@gmail.com

16436. Hämäläinen, M. (2017): The Caloptera damselflies of Thailand – Distribution maps by provinces (Odonata: Calopterygoidea). *Faunistic Studies in SE Asian and Pacific Island Odonata* 19: 1-28. (in English) ["Distribution maps at province level accuracy are presented for the 44 species of the

superfamily Calopterygoidea (in the old sense, excluding the 'megapodagrionid' families) recorded in Thailand. Brief species accounts are presented with information on the distribution, phenology and the first discovery of the species. For eleven species the primary type was collected in Thailand. The history of the discovery and documentation of these insects in Thailand is discussed." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: matti.hamalainen@helsinki.fi

16437. Hämäläinen, M. (2017): *Rhinocypha peitho* sp. nov. from central Laos (Odonata: Chlorocyphidae). *Odonatologica* 46(1/2): 111-118. (in English) ["A new chlorocyphid damselfly species, *R. peitho* sp. nov. (holotype ♂ from Laos, Vientiane province, Vang Vieng district, Pha Tang), is described and illustrated for the male sex and compared with its congeners, particularly *R. pelops*. *Rhinocypha watsoni* is recorded from Laos for the first time." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

16438. Hämäläinen, M. (2017): Corrections to the depository records of 22 holotypes of Odonata, originally in the collection of Roland A. Müller. *Notulae odonatologicae* 8(10): 374-378. (in English) ["The published depository record of the holotypes of 22 odonate taxa is corrected. Rather than being deposited at the Senckenberg Museum in Frankfurt am Main (SMF) as stated in the original descriptions, the specimens are deposited at the Naturalis Biodiversity Center in Leiden (RMNH)." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

16439. Hardersen, S.; Corezzola, S.; Gheza, G.; Dell'Otto, A.; La Porta, A. (2017): Sampling and comparing odonate assemblages by means of exuviae: statistical and methodological aspects. *Journal of Insect Conservation* 21(2): 207-218. (in English) ["Freshwater species are in serious decline all over the world. Thus, monitoring of freshwater ecosystems and species is crucial to guide policy actions and dragonflies are generally considered to be good indicators for these systems. The aquatic life stage of the Odonata is inherently more susceptible to changes in water quality than the imago and therefore exuviae give better insights into site-specific effects. However, utilizing exuviae for monitoring purposes introduces a number of problems. For example, they often do not persist long in the environment. Some of these problems have been addressed. However, there are no published data that distinguish the influence of sampling frequency and total sampling effort on the faunal completeness. Also the number of exuviae necessary to define local assemblages has not been investigated. These questions were addressed by analyzing the data on exuviae collected in seven sites and we found that for any given total amount of time invested, it was always preferable to conduct more short surveys, rather than fewer surveys lasting longer. The study also showed that a sample size of 300 exuviae allowed us to reliably estimate the similarity of two assemblages from different sites. However, when collecting 40 exuviae or

less, the reliability was low. Based on our findings we recommend sampling exuviae for a minimum of 5 days, evenly spread out over the entire season during which Odonata emerge, to sample each time for approximately 60 min and aim to collect not less than 300 exuviae in total."] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiv. Forestale Carabinieri "Bosco Fontana", Mamirolo, Italy

16440. Harisha, M.N.; Hosetti, B.B. (2017): Status and conservation issues of Odonates in Bathi Lake, Doddabathi Village, Davanagere District, Karnataka, India. *International Journal of Entomology Research* 2(5): 55-59. (in English) ["The study was conducted from November 2014 to October 2015 at Bathi Lake, Davanagere District of Karnataka. A total of 28 odonate species belonging to 5 families have been recorded. Among them Anisoptera were predominant with 21 species, followed by the Zygoptera with 7 species. The family Libellulidae was widely distributed and dominated with high percentage composition, followed by the Coenagrionidae. The status based on the frequency of occurrence shown that 43% were common, 21% were occasional, 18% were very common, 11% were rare and 7% were very rare. The study highlights the importance of odonates and threats in their habitat due to different anthropogenic activities and also provides the baseline data of odonate diversity of Davanagere District of Karnataka state for research on their biology and the conservation." (Authors)] Address: Harisha, M.N., Dept of Post Graduate Studies and Research in Wildlife & Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India

16441. Harisha, M.N.; Hosetti, B.B. (2017): Status, diversity and conservation threats of Odonates in Kundavada Lake, Davanagere district, Karnataka, India. *Journal of Entomology and Zoology Studies* 5(1): 312-316. (in English) ["A study on diversity of odonates was conducted at Kundavada Lake located in Davanagere District of Karnataka. The study was conducted to explore status, diversity and conservation threats of Odonata from October 2010 to September 2011. During the study period, a total of 32 species of Odonates in 24 genera belonging to 6 families have been reported. Among them the Anisoptera dominated with 23 (72%) species, followed by the Zygoptera with 9 (28%) species. The family Libellulidae dominated with 19 species. Among the Zygoptera, the Coenagrionidae were found to be the dominant with 6 species and least by the Lestidae with 1 species. Based on the frequency of occurrence of odonates, 37% of the species were common, 22% were occasional, 19% were very common, 16% were rare and 6% were very rare. The study highlights the importance of odonates and threats in their habitat due to different anthropogenic activities and also provides the baseline data on odonate diversity of some major wetlands of Davanagere District of Karnataka state for research on their biology and the conservation." (Authors)] Address: Harisha, M.N., Dept. of Post Graduate Studies and Research in Wildlife and Management, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shimoga, Karnataka, India

16442. Harter, T.S.; Brauner, C.J.; Matthews, P.G.D. (2017): A novel technique for the precise measurement of CO₂ production rate in small aquatic organisms as validated on Aeshnid dragonfly nymphs. *Journal of Experimental Biology* 220: 964-968. (in English) ["The present study describes and validates a novel yet simple system for simultaneous in vivo measurements of aquatic CO₂ production (MCO₂) and oxygen consumption (MO₂) rates, thus allowing the calculation of respiratory exchange ratios (RER). Diffusion of CO₂ from the aquatic phase into a gas phase, across a hollow fibre membrane, enabled aquatic MCO₂ measurements with a high-precision infrared gas CO₂ analyser. MO₂ was measured with a PO₂ optode using a stop-flow approach. Injections of known amounts of CO₂ into the apparatus yielded accurate and highly reproducible measurements of CO₂ content (R²=0.997, p<0.001). The viability of in vivo measurements was demonstrated on aquatic dragonfly nymphs (Aeshnidae; wet mass 2.17 mg - 1.46 g, n=15) and the apparatus produced precise MCO₂ (R²=0.967, p<0.001) and MO₂ (R²=0.957, p<0.001); average RER was 0.73±0.06. The described system is scalable, offering great potential for the study of a wide range of aquatic species, including fish." (Authors)] Address: Harter, T.S., Dept of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, BC, Canada V6T 1Z4. E-mail: harter@zoology.ubc.ca

16443. Heino, J.; Bini, L.M.; Andersson, J.; Bergsten, J.; Bjelke, U.; Johansson, F. (2017): Unravelling the correlates of species richness and ecological uniqueness in a metacommunity of urban pond insects. *Ecological Indicators* 73: 422-431. (in English) ["City ponds have the potential to harbour a rich biodiversity of aquatic insects despite being located in an urban landscape. However, our current knowledge on the correlates of pond biodiversity is limited and even less is known about the factors that influence the ecological uniqueness of urban ponds. The multiple environmental gradients, at different spatial scales, that may affect biodiversity and ecological uniqueness of urban ponds can thus be seen both as an opportunity and as a challenge for a study. In this study, we aimed to fill this gap by focusing on aquatic insect assemblages in 51 ponds in the Swedish city of Stockholm, using a metacommunity perspective. We found that species richness was primarily determined by the density of aquatic insects, water depth and proportion of buildings around the pond. The uniqueness of ponds was estimated as local contributions to beta diversity (LCBD), and it was primarily related to the proportion of arable land and industry around the ponds. With regard to the metacommunity we found two interesting patterns. First, there was a negative relationship between richness and LCBD. Second, biodiversity was spatially independent, suggesting that spatially-patterned dispersal did not structure species richness or LCBD. These last two patterns are important when considering conservation efforts of biodiversity in city ponds. We hence suggest that the conservation of insect biodiversity in urban pond should consider the surroundings of the ponds, and that high-richness ponds are not necessarily those that require most attention because they are not ecologically

the most unique." (Authors)] Address: Heino, J., Finnish Environ. Inst., Natural Environ. Centre, Biodivers., Paavo Havaksen Tie 3, 90570 Oulu, Finland. E-mail: jani.heino@environment.fi

16444. Hinojosa, J.C.; Martín, R.; Maynou, X.; Vila, R. (2017): Molecular taxonomy of the *Sympetrum vulgatum* (Odonata: Libellulidae) complex in the West Palaearctic. *Eur. J. Entomol.* 114: 373-378. (in English) ["The *S. vulgatum* complex is composed of the subspecies *S. vulgatum vulgatum*, *S. vulgatum decoloratum* (Selys, 1884) and *S. vulgatum ibericum* Ocharan, 1985 in the West Palaearctic. These taxa have parapatric distributions and noticeable morphological differences in colour and body size, and their taxonomic status is debated. Here we revise the systematics of this group using molecular taxonomy, including molecular analyses of mitochondrial (cytochrome c oxidase subunit I, COI) and nuclear (internal transcribed spacer, ITS1) DNA taking into account known morphological differences. Each subspecies has a unique and differentiated COI haplotype, although divergences among them are low (0.4% maximum uncorrected p-distance). The subspecies are not differentiated by the nuclear marker ITS1. The genetic results for these taxa contrast with the deep divergence of the sister species *S. striolatum* (Charpentier, 1840). Given current evidence, we propose to maintain the subspecific status of the *S. vulgatum* complex and hypothesize their biogeographical history. It is likely that the three subspecies became isolated during one of the latest glacial periods, each in a different refugium: *S. vulgatum ibericum* possibly occupied the Iberian Peninsula, *S. vulgatum vulgatum* the Balkan Peninsula or territories further east and *S. vulgatum decoloratum* Anatolia.] Address: Hinojosa, J.C., Inst. Biol. Evol. (CSIC-Univ. Pompeu Fabra), Passeig Marítim de la Barceloneta 37, 08003 Barcelona. E-mail: sirspingidae2@gmail.com

16445. Hirohashi, K.; Inamuro, T. (2017): Hovering and targeting flight simulations of a dragonfly-like flapping wing-body model by the immersed boundary-lattice Boltzmann method. *Fluid Dynamics Research* 49(4) 045502: (in English) ["Hovering and targeting flights of the dragonfly-like flapping wing-body model are numerically investigated by using the immersed boundary-lattice Boltzmann method. The governing parameters of the problem are the Reynolds number Re , the Froude number Fr , and the non-dimensional mass m . We set the parameters at $Re = 200$, $Fr = 15$ and $m = 51$. First, we simulate free flights of the model for various values of the phase difference angle ϕ_{gr} between the forewing and the hindwing motions and for various values of the stroke angle β between the stroke plane and the horizontal plane. We find that the vertical motion of the model depends on the phase difference angle ϕ_{gr} , and the horizontal motion of the model depends on the stroke angle β . Secondly, using the above results we try to simulate the hovering flight by dynamically changing the phase difference angle ϕ_{gr} and the stroke angle β . The hovering flight can be successfully simulated by a simple proportional controller of the phase difference angle and the stroke angle. Finally, we simulate a targeting flight by dynamically changing the stroke angle β ." (Authors)] Address: Inamuro,

T., Advanced Research Institute of Fluid Science and Engineering, Graduate School of Engineering, Kyoto Univ., Kyoto 615-8530, Japan. E-mail: inamuro@kuaero.kyoto-u.ac.jp

16446. Hou, D.; Zhong, Z.; Yin, Y.; Pan, Y.; Zhao, H. (2017): The role of soft vein joints in dragonfly flight. *Journal of Bionic Engineering* 14: 738-745. (in English) ["Dragonflies are excellent flyers among insects and their flight ability is closely related to the architecture and material properties of their wings. The veins are main structure components of a dragonfly wing, which are found to be connected by resilin with high elasticity at some joints. A three-dimensional (3D) finite element model of dragonfly wing considering the soft vein joints is developed, with some simplifications. Passive deformation under aerodynamic loads and active flapping motion of the wing are both studied. The functions of soft vein joints in dragonfly flight are concluded. In passive deformation, the chordwise flexibility is improved by soft vein joints and the air. In active flapping, the wing rigidity in spanwise direction is maintained to achieve the required amplitude. As a result, both the passive deformation and the active control of inspire the design of biomimetic Flapping Micro Air Vehicles (FMAVs)."] (Authors)] Address: Hou, D., Dept Mechanical Engineering, Shanghai Maritime Univ., Shanghai 201306, China

16447. Huang, D.; Azar, D.; Cai, C.; Maksoud, S.; Nel, A.; Bechly, G. (2017): Mesomegaloprepidae, a remarkable new damselfly family (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 73: 1-13. (in English) ["Mesomegaloprepus magnificus gen. et sp. nov. is described from more than 14 specimens in eight pieces of mid-Cretaceous (earliest Cenomanian, ca. 99 Ma) amber from Myanmar. Possible phylogenetic affinities with the Neotropical Latibasaliidae, Thaumtoneuridae, and Pseudostigmatinae are discussed, and a relationship with Pseudostigmatinae considered as possible, but because of conflicting evidence separate family status as Mesomegaloprepidae fam. nov. is tentatively preferred. The remarkable degree of homoplastic conflict in the wing venational similarities indicates that these represent relatively weak evidence for phylogenetic relationships. The palaeoecology, including sexual dimorphism in wing colouration, of the new taxon is discussed, and the large number of inclusions explained with possible breeding behaviour in association with water-filled tree holes (phytotelmata) of the amber tree, similar to extant Pseudostigmatinae. The position of all alleged fossil Thaumtoneuridae are discussed and revised: Eothaumtoneura ptychoptera Pongracz, 1935 from the Eocene Geiseltal locality is restored in Thaumtoneuridae. Cretaceous Euarchistigma and Paleogene Eodysagrion are tentatively retained as subfamilies Euarchistigmatinae and Eodysagrioninae in Thaumtoneuridae. Paleogene Dysagrioninae and Petrolestinae are removed from Thaumtoneuridae and attributed to a restored family Dysagrionidae, and Paleocene Latibasaliidae is transferred from Amphipterygoidea to Epallagoidea."] (Authors)] Address: Huang, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Inst. Geology & Palaeontology, Chinese Acad. Sciences, Nanjing, 210008, People's Republic of China. E-mail: dyhuang@nigpas.ac.cn

16448. Huang, D.; Nel, A. (2017): New fossil damselfly dragonfly clarifies the phylogenetic position of the small Jurassic family Juraheterophlebiidae (Odonata: Epiproctophora). *Alcheringa* 41(4): 536-542. (in English) ["A nearly complete specimen of Juraheterophlebia cancellosa sp. nov., the third species of the family Juraheterophlebiidae, is described from the Middle-Late Jurassic of China and shows the exact structure of its forewing discoidal space. As a consequence, this family is restored, separated from Erichschmidtidae, and its diagnosis amended. It is transferred from Heterophlebiptera to Stenophlebiptera, the first clade being now only known from the Early Jurassic. Erichschmidtidae includes the sole species Erichschmidtia nigrimontana, and this family is now considered of uncertain systematic position."] (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16449. Huang, D.; Cai, C.; Nel, A.; Bechly, G. (2017): A new dragonfly family from the mid Cretaceous Burmese amber (Odonata: Aeshnoptera: Burmaeshnidae). *Cretaceous Research* 78: 8-12. (in English) ["The third Cretaceous Aeshnoptera in amber is described from Myanmar. It represents a new family Burmaeshnidae fam. nov., genus and species Burmaeshna azari gen. et sp. nov. Its exact affinities remain uncertain but it is probably the sister group of the Late Cretaceous family Enigmaeshnidae. This discovery supports the hypothesis of an intense period of appearance of many aeshnopteran subclades during the late Early Cretaceous and the Late Cretaceous."] (Authors)] Address: Huang, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, 210008, People's Republic of China

16450. Huang, D.-Y.; Nel, A.; Cai, C. (2017): An enigmatic hawk dragonfly from the Middle Jurassic of China (Odonata, Aeshnoptera). *Paläontologische Zeitschrift* 91(3): 459-462. (in English) ["The aeshnopteran Propecymatophlebia magnifica gen. et sp. nov. is described from the Middle Jurassic Hiafanggou Formation of Inner Mongolia in China, on the basis of a complete forewing. It confirms the remarkable palaeodiversity of the stem group of the hawk dragonflies in Central Asia in the period between the Middle Jurassic and the Early Cretaceous."] (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16451. Hunger, H.; Bühler, W.; Schiel, F.-J. (2017): Der Ausbreitungsprozess von Coenagrion scitulum in Baden-Württemberg schreitet weiter voran (Odonata: Coenagrionidae). *Mercuriale* 17: 47-56. (in German, with English summary) ["We present the current state of knowledge of the distribution of C. scitulum in Baden-Württemberg. The data show that range expansion continues and that populations in core areas are stabilizing. The most remarkable new records come from the northern Upper Rhine valley and from the western Lake Constance area."] (Authors)] Address: Schiel, F.-J., Inst. Naturschutz & Landschaftsanalyse, Turenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

16452. Ioannidis, P.; Simao, F.A.; Waterhouse, R.M.; Manni, M.; Seppely, M.; Robertson, H.M.; Misof, B.; Niehuis, O.; Zdobnov, E.M. (2017): Genomic features of the damselfly *Calopteryx splendens* representing a sister clade to most insect orders. *Genome Biol Evol.* 9(2): 415-430. (in English) ["Insects comprise the most diverse and successful animal group with over one million described species that are found in almost every terrestrial and limnic habitat, with many being used as important models in genetics, ecology, and evolutionary research. Genome sequencing projects have greatly expanded the sampling of species from many insect orders, but genomic resources for species of certain insect lineages have remained relatively limited to date. To address this paucity, we sequenced the genome of *C. splendens*, a Zygoptera belonging to Palaeoptera, the clade containing the first winged insects. The 1.6 Gbp *C. splendens* draft genome assembly is one of the largest insect genomes sequenced to date and encodes a predicted set of 22,523 protein-coding genes. Comparative genomic analyses with other sequenced insects identified a relatively small repertoire of *C. splendens* detoxification genes, which could explain its previously noted sensitivity to habitat pollution. Intriguingly, this repertoire includes a cytochrome P450 gene not previously described in any insect genome. The *C. splendens* immune gene repertoire appears relatively complete and features several genes encoding novel multi-domain peptidoglycan recognition proteins. Analysis of chemosensory genes revealed the presence of both gustatory and ionotropic receptors, as well as the insect odorant receptor coreceptor gene (OrCo) and at least four partner odorant receptors (ORs). This represents the oldest known instance of a complete OrCo/OR system in insects, and provides the molecular underpinning for odonate olfaction. The *C. splendens* genome improves the sampling of insect lineages that diverged before the radiation of Holometabola and offers new opportunities for molecular-level evolutionary, ecological, and behavioral studies." (Authors)] Address: Zdobnov, E.M., Dept Genetic Medicine & Develop., Univ. Geneva Medical School, Rue Michel Servet 1, 1211, Geneva, Switzerland. E-mail: evgeny.zdobnov@unige.ch

16453. Ivicheva, K.N.; Philippov, D.A. (2017): Aquatic macroinvertebrates of raised bogs in the central part of the Vologda Region, Russia. *Transactions of the Karelian Research Centre of the Russian Academy of Sciences 9, Ecological Studies Series: 30-45.* (in Russian, with English summary) ["The aquatic macroinvertebrates fauna of raised bogs is considered as a complex of faunas of different types of within-bog waterbodies. This study was conducted in 2012-2014 at two large wetlands, Shichenskoe and Alekseevskoe (Vologda Region, Russia). Samples were collected from May to September from pools, spaces between hummocks of water tracks, a mire stream and two within-bog lakes. In total, 120 taxa were found (71 taxa identified to species, 25. to genus), belonging to 5 phyla, 8 classes. Insects were prevalent (91 species, among them 55. Diptera, 14. Odonata, 11. Coleoptera, 5. Trichoptera), other groups were scarce (including 12 species of Oligochaeta, 6 Hirudinea, 5 Mollusca). The greatest number of species was registered from Shichenskoe wetland. 109 species, 80 of which were found within the Shichengskiy Landscape Reserve. The

fauna was specific in each of the studied types of waterbodies. In the stream, amphibiotic insects were prevalent. In the water track, the main role belonged to oligochaetes and chironomids. In the lakes, mollusks and hirudineas were dominant. The most specific were the communities of pools, where odonates and chironomids were prevalent. The similarity between the faunas of the studied wetland waterbodies was minimal ($K_{sc} = 0.07.0.36$). Analysis of the trophic structure showed that detritophagous insects were the most abundant, while predators prevailed in terms of biomass. The latter were well represented in most of the studied waterbodies, and this was a distinctive feature of within-wetland waterbodies as compared to non-mire ones. The most favourable conditions for aquatic invertebrates were found in within-bog lakes." (Authors)] Address: Ivicheva, Ksenya, L. S. Berg State Research Institute on Lake and River Fisheries, Vologda Branch, 5 Levichev St., 160012 Vologda, Russia. E-mail: ksenya.ivicheva@gmail.com

16454. Jacob, S.; Thomas, A.P.; Manju, E.K. (2017): Bio control efficiency of Odonata nymphs on *Aedes aegypti* larvae. *Journal of Environmental Science, Toxicology and Food Technology* 11(9): 1-4. (in English) ["The predatory potential of *Bradinopyga geminata*, *Crocothemis servilia* and *Ceriatrigon cerinorubellum* larvae on *Aedes aegypti* larvae were recorded for 8 hours with three replicates under laboratory condition to suggest biocontrol methods to get away from the spread of dengue fever. The maximum consumption rate of *B. geminata* was on 1st instar larvae of *Aedes aegypti*. *C. servilia* and *C. cerinorubellum* shows maximum consumption rate on 2nd instar larvae of *A. aegypti*. With respect to the One-way ANOVA test conducted, *B. geminata* shows highest predatory impact on all the instars of *A. aegypti*. The present study reveals that the release of odonata nymphs especially *B. geminata* in areas of dengue epidemics will effectively control the *A. aegypti* larval production and thereby dengue epidemics." (Authors)] Address: Jacob, Sonia, School of Environmental Sciences M.G. University, Kottayam, India

16455. Jaggesar, A.; Shahali, H.; Mathew, A.; Yarlagadda, P.K.D.V. (2017): Bio-mimicking nano and micro-structured surface fabrication for antibacterial properties in medical implants. *Journal of Nanobiotechnology* 2017 15:64. 20 pp. (in English) ["Orthopaedic and dental implants have become a staple of the medical industry and with an ageing population and growing culture for active lifestyles, this trend is forecast to continue. In accordance with the increased demand for implants, failure rates, particularly those caused by bacterial infection, need to be reduced. The past two decades have led to developments in antibiotics and antibacterial coatings to reduce revision surgery and death rates caused by infection. The limited effectiveness of these approaches has spurred research into nano-textured surfaces, designed to mimic the bactericidal properties of some animal, plant and insect species, and their topographical features. This review discusses the surface structures of cicada, dragonfly and butterfly wings, shark skin, gecko feet, taro and lotus leaves, emphasising the relationship between nano-structures and high surface con-

tact angles on self-cleaning and bactericidal properties. Comparison of these surfaces shows large variations in structure dimension and configuration, indicating that there is no one particular surface structure that exhibits bactericidal behaviour against all types of microorganisms. Recent bio-mimicking fabrication methods are explored, finding hydrothermal synthesis to be the most commonly used technique, due to its environmentally friendly nature and relative simplicity compared to other methods. In addition, current proposed bactericidal mechanisms between bacteria cells and nano-textured surfaces are presented and discussed. These models could be improved by including additional parameters such as biological cell membrane properties, adhesion forces, bacteria dynamics and nano-structure mechanical properties. This paper lastly reviews the mechanical stability and cytotoxicity of micro and nano-structures and materials. While the future of nano-biomaterials is promising, long-term effects of micro and nano-structures in the body must be established before nano-textures can be used on orthopaedic implant surfaces as way of inhibiting bacterial adhesion." (Authors)] Address: Yarlagadda, P.K.D.V., Science and Engineering Faculty, Queensland University of Technology, Brisbane, Australia. E-mail: y.prasad@qut.edu.au

16456. Jentzsch, M.; Glinka, T.; Link, J.; Lehmann, B. (2017): Einsatz eines Autokeschers im Ziegelrodaer Forst – Ergebnisse und Bemerkungen zur Methode (Arachnida: Araneae, Pseudoscorpiones; Insecta: Ephemeroptera, Odonata, Hemiptera, Coleoptera, Hymenoptera, Lepidoptera, Mecoptera, Diptera). *Hercynia* N.F. 50: 31-93. (in German, with English summary) ["In the late summer of 2012 and in the early summer of 2013 the invertebrate fauna of the Ziegelrodaer Forst in the south of Saxony-Anhalt was collected by car-net. The recording of data took place three times daily on eleven days and on six different tracks especially in forest- and partially in open grassland-habitats. A total of more than 198 samples were collected. The intention was to make a contribution towards testing the car-net concerning its ability to catch invertebrates. Approximately 65.5 % of more than 200.000 captured specimens belong to the order of Diptera, followed by the order of Coleoptera with a percentage of about 17.6 %, whereas the third highest amount of about 11.6 % was determined by the order of hymenoptera. The fourth and fifth places are taken by the order of Hemiptera at a percentage of round about 1.6 % and the class of Arachnida with approximately 0.5 %. The share of the remaining groups of species is around 0.6 %. Altogether 2.5 % of the collected material was classified as undeterminable. Additional to a huge amount of species included in the Red List of endangered animals of Germany and of Saxony-Anhalt, a total of six new records could be registered for Germany and another 18 records for Saxony-Anhalt. Four species were rediscovered in Saxony-Anhalt. Some species of different taxa are still undescribed and thus new to science. The evaluation of the collected sample material has shown that the car-net method is a valuable addition to common collection methods, it provides large amounts of individuals and species and promises the great-

est success in capturing beetles and flies." Only four specimens of Odonata were captured: *Aeshna cyanea* (n=2), *Chalcolestes viridis* and *Orthetrum cancellatum*. (Authors)] Address: Jentzsch, M., Hochschule für Technik & Wirtschaft Dresden, Fakultät Landbau/Umwelt/Chemie, Pillnitzer Platz 2, 01326 Dresden, Germany. E-Mail: matthias.jentzsch.2@htw-dresden.de

16457. Juárez, G.; González, U. (2017): Contribución al conocimiento de los Odonata (Insecta) de la Región Piura, Perú. *Archivos Entomoloxicos* 17: 21-26. (in Spanish, with English summary) ["The first taxonomic list of Odonata from Piura Region, Peru, which is made up of 8 species belonging to 7 genera and 2 families, is presented. Libellulidae with *Erythrodiplax* Brauer, 1868 are the most diverse respectively. For each of these species geographical distribution and landscape ecosystem to regional level is reported." (Authors)] Address: Juárez, G., Lab. Zoología de Invertebrados. Escuela Profesional de Ciencias Biológicas. Universidad Nacional de Piura, Urb. Miraflores s/n, Castilla, Piura-Perú, Peru. E-mail: norbiol@hotmail.com

16458. Kagimoto, B. (2017): The first record of interspecific tandem between *Orthetrum poecilops* Ris, 1916 male and *Orthetrum albistylum* (Selys, 1848) female. *Tombo* 59: 100. (in Japanese, with English summary) ["I observed an interspecific tandem between a *O. poecilops* ♂ and a young *O. albistylum* ♀ in Itsuku-shima Island, Japan. Previously, interspecific tandem has been reported between *O. albistylum* ♂ and *O. poecilops* ♀. To my knowledge, this is the first record of this combination." (Author)] Address: E-mail: miyaiimatonbo@yahoo.co.jp

16459. Kang, S.-H.; Lee, J.-E.; Hong, E.-J.; Kim, Y.-J.; Jeong, J.-C. (2017): A faunistic study of insects and arenaceous insects variation by oil spill accidents of Taeanhaean National Park. *Korean J. Environ. Ecol.* 31(6): 500-507. (in Korean, with English summary) ["The study of insect fauna in Taeanhaean National Park in Korea began with the first survey of natural resources in 1996, and then the surveys were conducted seasonally from 2005 to 2014. The surveyed sites were mostly coastal areas, sand dunes, and back grasslands. Insects were collected by sweeping with insect net, suction, pitfall trap, light trap, and Malaise trap. As a result, a total of 1,540 species of 215 families belonging to 17 orders were identified. Lepidoptera was the most populous group at 34.2% and followed by Coleoptera at 28.3%, Hemiptera at 12.7%, Diptera at 8.5%, Hymenoptera at 7.1%, Orthoptera at 4.7%, Odonata at 2.0%, and others. The analysis of change of arenaceous insect fauna before and after the accident by the Hebei Spirit that spilled oil in Taean in December 2007 showed that 45 arenaceous insect species, mostly belonging to Coleoptera, were observed through the whole survey period. The impact of oil spill on the number of arenaceous insect species appearing in the area was minor." (Authors)] Address: Jeong, J.-C., National Park Research Institute, Wonju-si, 26441, Korea. E-mail: entomologist@knps.or.kr

16460. Kappes, E.; Kappes, W. (2017): Ungewöhnlich früher Schlupf von *Orthetrum coerulescens* an einem Kühlwassergraben in Norddeutschland (Odonata: Libellulidae). *Mercuriale* 17: 11-16. (in German, with English summary) ["Extraordinary early emergence of *O. coerulescens* at a thermally polluted ditch in northern Germany - On 09-1V-2017 seven individuals of *O. coerulescens* emerged at a thermally polluted ditch with cooling water from an industrial plant near Lüchow-Dannenberg, Lower Saxony (Germany). The earliest records of emergence from 2010 to 2016 in Lower Saxony date from the period between 18th May and 6th June. This extraordinary early emergence, together with the finding conditions, is described in detail and briefly discussed." (Authors)] Address: Kappes, E., Eichenweg 27, 22395 Hamburg, Germany. E-mail: eva.wulf.kappes@t-online.de

16461. Karube, H.; Kompier, T. (2017): Two new species of the genus *Cephalaeschna* from northern Vietnam (Odonata: Aeshnidae). *Tombo* 59: 61-70. (in English, with Japanese summary) ["Two new species of the genus *Cephalaeschna* Selys, 1883 are described from northern Vietnam: *C. aipishishi* sp. nov. from Tam Dao National Park and *C. algorei* sp. nov. from Yen Bai Province. Both species belong to a group of species including *C. discolor* Zhang, Cai & Liao, 2013, *C. mattii* Zhang, Cai & Liao, 2013, *C. needhami* Asahina, 1981, and *C. risi* Asahina, 1981, but can be distinguished by details of body maculation and shape of male caudal appendages. Some information on habitat and biology is provided." (Authors)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

16462. Kassner, Z.; Ribak, G. (2017): Strategy and mechanism for intercepting unpredictable moving targets in the Blue-Tailed Damselfly (*Ischnura elegans*). *International Scholarly and Scientific Research & Innovation* 4(10): 1368. (in English) [Verbatim: "Members of the Odonata order stand out for their maneuverability and superb flight control, which allow them to catch flying prey in the air. These outstanding aerial abilities were fine-tuned during millions of years of an evolutionary arms race between Odonata and their prey, providing an attractive research model for studying the relationship between sensory input – and aerodynamic output in a flying insect. The ability to catch a maneuvering target in air is interesting not just for insect behavioral ecology and neuroethology but also for designing small and efficient robotic air vehicles. While the aerial prey interception of Anisoptera have been studied before, little is known about how Zygoptera intercept prey. Here, high-speed cameras (filming at 1000 frames per second) were used to explore how damselflies catch unpredictable targets that move through air. *I. elegans* were introduced to a flight arena and filmed while landing on moving targets that were oscillated harmonically. The insects succeeded in capturing targets that were moved with an amplitude of 6 cm and frequencies of 0-2.5 Hz (fastest mean target speed of 0.3 m s⁻¹) and targets that were moved in 1 Hz (an average speed of 0.3 m s⁻¹) but with an amplitude of 15 cm. To land on stationary or slow targets, damselflies either flew directly to the target, or flew sideways, up to a point in which the target

was fixed in the center of the field of view, followed by direct flight path towards the target. As the target moved in increased frequency, damselflies demonstrated an ability to track the targets while flying sideways and minimizing the changes of their body direction on the yaw axis. This was likely an attempt to keep the targets at the center of the visual field while minimizing rotational optic flow of the surrounding visual panorama. Stabilizing rotational optic flow helps in estimation of the velocity and distance of the target. These results illustrate how dynamic visual information is used by damselflies to guide them towards a maneuvering target, enabling the superb aerial hunting abilities of these insects. They also exemplifies the plasticity of the damselfly flight apparatus which enables flight in any direction, irrespective of the direction of the body." (Authors)] Address: not stated

16463. Kaunisto, K.; Kaunisto, P.; Ilvonen, J.; Suhonen, J. (2017): Parasitism, immune response and egg production of the damselfly *Coenagrion hastulatum*. *Canadian Journal Zoology* 95(5): 367-372. (in English) ["Theoretical models predict that parasites reduce reproductive success of their hosts, but very few empirical studies have given support to this. Using *C. hastulatum*, we tested how immune response, wing length, and the number of both endo- and ectoparasites affect egg production of host damselflies. The study was conducted with four different populations in Southwest Finland. We found a negative association between endoparasitic gregarines and the number of host eggs. Furthermore, immune response increased with the number of water mites, but decreased with the number of eggs. Contrary to previous studies with other damselfly species, the number of ectoparasitic water mites did not affect the number of eggs. Moreover, wing length, used as an indicator of individual size, was not associated with egg numbers. The negative effect of gregarine parasites on egg numbers is likely to affect the composition of host populations, i.e. damselflies that show higher resistance to these endoparasites will have more of their offspring represented in subsequent generations. In future, more experimental research on the varying effects of different parasite species on the number of eggs is needed." (Authors)] Address: Kaunisto, K.M., Zoological Museum, Biodiversity Unit, Univ. of Turku, Turku, Finland. E-mail: kkauni@utu.fi

16464. Kelly, R.S.; Nel, A. (2017): Revision of the damselfly family Campteroptelebiidae (Odonata) from the Early Jurassic of England reveals a new genus and species. *Alcheringa* 42: 87-93. (in English) ["Historical fossil insect collections from England were re-examined and the taxa revised. Lateoptelebia gen. nov. is erected for *Liassoptelebia anglicanopsis* (Zeuner) in Campteroptelebiidae. *Petroptelebia anglicana* Tillyard is confirmed in this family and *Archithemis liassina* (Strickland) is transferred to this family. Lastly, *Archithemis brodiei* (Geinitz), *Archithemis Handlirsch*, and *Architemistidae* Tillyard (reduced to this sole species) are transferred to the Heteroptelebioidea." (Authors)] Address: Kelly, R., School of Earth Sciences, University of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, UK. E-mail: richard.kelly@bristol.ac.uk

- 16465.** Kerakova, M.; Uzunov, Y.; Varadinova, E. (2017): Comparison of trophic structure of the benthic macroinvertebrates in three Bulgarian riverine water bodies. *Turkish Journal of Zoology* 41: 267-277. (in English) ["The trophic structure of benthic macroinvertebrates in three different types of running water bodies subjected to varying degrees of anthropogenic pressure was analyzed. A seasonal survey was conducted at three Bulgarian rivers in 2011. An adapted version of the multihabitat sampling method was applied along with measuring physical and chemical variables. The ecological status was defined by means of biotic and trophic indexes. Distribution of the functional feeding groups shows that the most sensitive groups, shredders and scrapers, dominate the trophic structure of the mountain river types. In contrast, groups of deposit feeders and filterers prevail at the foothill and plain rivers. Multidimensional scaling plot and redundancy analysis demonstrated that anthropogenic impact and altitude are the main factors determining the distribution of the benthic macroinvertebrates by different functional groups. Seasonality has no leading role in the trophic structure formation of the benthic communities. Our results showed a difference between the trophic composition of the macrozoobenthos found in the mountain sections and those found in the foothill/plain stretches of the rivers. A comparison between the last two areas demonstrated that there was no clear distinction between the trophic composition of the functional feeding groups." (Authors)] Address: Kerakova, Maria, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Science, Sofia, Bulgaria
- 16466.** Khelifa, R. (2017): Partial bivoltinism and emergence patterns in the North African endemic damselfly *Calopteryx exul*: conservation implications. *African Journal of Ecology* 55(2): 145-151. (in English, with French summary) ["*C. exul* ... suffers considerable habitat degradation and local extinctions throughout its geographic range. Although recent studies have investigated its distribution, ecology and larval systematics, the life history of the species is still unknown. In this study, a field survey was conducted to determine larval development, temporal pattern of emergence and teneral spatial distribution of the species in the Seybouse watershed, north-east Algeria. Larval growth was investigated in two populations: one at about 200 m (low-elevation population) and the second at 600 m of elevation (high-elevation population). The species showed partial bivoltine life cycle in both low- and high-elevation population. The temporal pattern of emergence of the first flight season of the year at low-elevation population was asynchronous with an emergence season lasting 46 days and half of the population emerging in 15 days. The second flight season was shorter with a most likely smaller population size. Sex ratio at emergence was slightly male biased. After ecdysis, tenerals stayed next to the water within a mean distance of 4.76 ± 4.35 m (\pm SD) with no significant difference between sexes. Conservation measures that should be taken into account in the elaboration of future management plans for the species are discussed." (Author)] Address: Khelifa, R., Institute of Evolutionary Biology and Environmental Studies, Univ. of Zürich, 6 Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com
- 16467.** Khelifa, R.; Mellal, M.K. (2017): Host-plant-based restoration as a potential tool to improve conservation status of odonate specialists. *Insect Conservation and Diversity* 10(2): 151-160. (in English) ["1. Several species worldwide show rapid range retraction due to habitat degradation, and some of them have restricted distribution and specific resource needs. Such cases deserve particular attention and need urgent conservation actions to avoid extinction, and one way is to facilitate colonisation of new habitats by resource supplementation. 2. Here, we investigate the changes in range distribution, during the last decade (2007–2016), of *C. exul*, and assess the importance of its favourite host-plant (*Potamogeton nodosus*) in colonisation and population dynamics in the last existing population of Algeria. 3. We first used dynamic occupancy models to assess range distribution dynamics and we found that both occupancy and colonisation probabilities of the species were positively dependent on the occurrence of *P. nodosus*. There was also evidence that extinction probability increased with habitat disturbance but decreased with the occurrence of *P. nodosus*. Our experimental restoration showed that the augmentation of patches of *P. nodosus* increased the total number of individuals, the number of reproductive events and philopatry. 4. Our study highlights the importance of insect–plant relationship in the establishment of effective restoration plans because of their implication in colonisation and extinction processes and population dynamics. 5. Since most insect species from different orders and ecosystems are ecologically dependent on plants, our restoration approach may benefit a large range of threatened species and improve their conservation status." (Authors)] Address: Khelifa, R., Inst. Evolutionary Biology & Environmental Studies, Univ. of Zürich, 6 Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com
- 16468.** Khelifa, R.; Theischinger, G.; Endersby, I. (2017): A century on from *The Biology of Dragonflies* by Tillyard 1917: what have we learned since then? *Austral Ecology* 56(2): 138-147. (in English) ["The field of odonatology has developed considerably during the past century. Three figures, namely E. Selys-Longchamps, R.J. Tillyard and P.S. Corbet, have undisputedly founded our current knowledge of odonatology and contributed massively to the understanding of systematics, biology, ecology and behaviour of odonates. The year 2017 will mark the 100th anniversary of Tillyard's *The Biology of Dragonflies*. We review the book and the author's life and contributions to Australian odonatology. We present an updated history of odonatology and highlight prominent advances in the field. The influence of the book on non-scientists is described. Future research in odonatology on aspects that have not been studied and others that need further investigations are discussed." (Authors)] Address: Khelifa, R., Dept of Evolutionary Biology & Environmental Studies, University of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com
- 16469.** Kipping, J.; Günther, A.; Uyizeye, E. (2017): *Pseudagrion kamiranzovu* sp. nov., a new flagship species of damselfly from Rwanda's Nyungwe Forest (Odonata: Coenagri-

onidae). *Odonatologica* 46(3/4): 301-318. (in English) ["*P. kamiranzovu* sp. nov. is described from streams in the montane rainforest of Nyungwe National Park in western Rwanda. The species belongs to the *Pseudagrion* A-group and is similar to *P. risi* Schmidt in Ris 1936 and *P. gamblesi* Pinhey, 1978 but is characterized by its unique combination of colours, the lack of blue markings on the abdomen, the male appendages and the short pterostigmata. The body size makes it one of the largest members of the genus in continental Africa." (Authors)] Address: Kipping, J., BioCart, Albrecht-Dürer-Weg 8, 04425 Taucha/Leipzig, Germany. E-mail: biocartkippping@web.de

16470. Klein, C.E.; Pinto, N.S.; Spigoloni, Z.A.V.; Bergamini, F.M.; de Melo, F.R.; De Marco J., P.; Juen, L. (2017): The influence of small hydroelectric power plants on the richness and composition of Odonata species in the Brazilian Savanna. *International Journal of Odonatology* 21(1): 33-44. (in English) ["Regardless of the economic and social development that damming processes related to hydroelectric power plants bring to a region, they represent a wide range of disturbances to the physical, chemical, and biological characteristics of rivers. We evaluated the effects of dams on Odonata communities from the southeastern region of Goiás, Brazil. 13 streams connected to three dams were studied: seven were used as reference samples (located upstream from the damming site, therefore not directly affected by damming) and six were used as affected area samples (located downstream from the dam). A total of 1128 odonates from six families, 22 genera, and 39 species were captured and identified. The results showed that Odonata richness was affected by the presence of dams, with different effects on Anisoptera and Zygoptera sub-orders. We discuss that these effects are related mostly to the physical and chemical variables in waterbodies directly affected by small hydroelectric power plants (SHPs). It is possible that negative effects on the Odonata community in SHP areas are related to changes in waterflow, pH and turbidity." (Authors)] Address: Pinto, N.S., Theoretical, Metacommunity & Landscape Laboratory TheMetaLand, UFG, Campus Samambaia, Goiânia, Goiás, Brazil. E-mail: nelsonsilvapinto@gmail.com

16471. Kojima, T.; Kuroki, I.; Nakamura, K. (2017): Development and sexual dimorphism in body color of in *Sieboldius albardae* larvae (Odonata: Gomphidae). *Naturalistae* 21: 37-42. (in Japanese, with English summary) ["Larvae of *S. albardae* were collected in a stream in Okayama City, Japan. Five larval instars were distinguished from the head width and wing-sheath length. Approximately 90 % of the females were nearly black, whereas approximately 90 % of the males were brown rather than black. Sexual colour dimorphism in larval insects is rare and interesting, although the mechanisms controlling the body colour are unclear." (Authors)] Address: Kojima, T., Dept of Biosphere-Geosphere Science, Fac. Biosphere-Geosphere Science, Okayama Univ. Science, 1-1 Ridai-cho, Kita-ku, Okayama-shi, Okayama-ken 700-0005, Japan

16472. Kok, J.M.; Fatiaki, A.; Rosser, K.; Chahl, J.S.; Ogunwa, T. (2017): Dragonfly inspired MAVs - adaptive and evolutionary approaches. 17th Australian International Aerospace Congress: AIAC 2017. Melbourne, Vic.: Engineers Australia, Royal

Aeronautical Society, 2017: 129-138. (in English) ["Flapping wing flight is complex and has not been solved well enough in any technological system to meet any realistic mission requirements. This raises the question as to the value of flapping wing flight for unmanned aerial vehicles (UAV), and begs reasonable questions about the value of research into the topic. Flapping wings will continue to strive to be as efficient as rotary wing craft, with over-actuation. The justification for flapping wing flight is that a flapping wing craft can approach rotary wing hover efficiency while also being capable of efficient cruise of a fixed wing craft. In this paper, we discuss the existing Micro Air Vehicle (MAV) configurations and the pros and cons of each. We review the hybrid fixed wing, rotary wing configurations and present an argument against its use in addressing the MAV design gap. Key characteristics of the dragonfly were analysed and necessary degrees of freedom for the wing kinematics were identified. We reviewed high speed cinematography of existing systems to determine the range of motion of the dragonfly. We observe large variations between different species suggesting that the ideal wing kinematics are specific to the system. We present a case for adaptive learning and identify existing methods that have been applied to real world experimental systems. We also present a method for efficiently coevolving controller and morphological parameters that uses virtual design supplemented with experimental results from hardware." (Authors)] Address: Kok, J.M., Aerospace Div., Aircraft Performance & Survivability Branch, Defence Sci. & Tech. Group, Edinburgh, South Australia, 5011, Australia

16473. Kompier, T. (2017): The riddle of *Lyriothemis bivittata* (Rambur, 1842): *Lyriothemis kameliya* spec. nov. (Odonata: Libellulidae). *Zootaxa* 4250(4): 315-326. (in English) ["*L. kameliya* spec. nov. from northern Vietnam is described and illustrated for both sexes, and descriptions are given of male and female specimens of *L. bivittata* collected in Vietnam. A comparison of their distinguishing characteristics is provided, and differences from similar *L. tricolor* are discussed. Earlier descriptions and some records of *L. bivittata* are evaluated. Evidently these contain at least some *L. kameliya* specimens, and therefore historic records of *L. bivittata* require evaluation. The ranges of the two species overlap considerably. Some information is provided on the biology of *L. kameliya*." (Author)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompiertokyo@yahoo.com.

16474. Kompier, T. (2017): Two new species of *Stylogomphus* Fraser, 1922 from Vietnam (Odonata: Gomphidae). *Tombo* 59: 46-52. (in English, with Japanese summary) ["*S. annamensis* spec. nov. and *S. delicatus* spec. nov. are described from Quang Binh Province and Lam Dong Province, Central Vietnam, respectively. The former is closest in appearance to *S. chunliuae*, but differs in details of caudal appendages and anterior hamule. The latter is closest to *S. inglisi*, but differs in details of the cerci. Holotypes of both species will be deposited in Naturalis Biodiversity Center, Leiden, The Netherlands (RMNH)." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK, Den Haag, the Netherlands. E-mail: kompiertokyo@yahoo.com

- 16475.** Kompier, T.; Phan, Q.T. (2017): *Coeliccia mientrung* spec. nov. from Central Vietnam (Odonata: Platynemidae). *Zootaxa* 4247(2): 131-140. (in English) ["*C. mientrung* spec. nov. is described from central Vietnam. Detailed differences from the very similar *C. pyriformis* Laidlaw, 1932, are provided. The female of *C. pyriformis* is described for the first time." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com.
- 16476.** Kompier, T.; Holden, J. (2017): A new species of *Gynacantha* Rambur, 1842 from Cat Tien National Park, Vietnam (Odonata: Aeshnidae). *Zootaxa* 4272(3): 411-420. (in English) ["*G. cattienensis* spec. nov. is described from Cat Tien National Park, Dong Nai Province, Vietnam, on the basis of male and female specimens. This species is close in structure to *G. khasiaca* McLachlan, 1896, and differs in details of cerci, auricles and thorax coloration. Historical records of *G. khasiaca* from Vietnam may refer to this new species. Some information on its biology is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com
- 16477.** Kompier, T. (2017): A new species of *Sinogomphus* May, 1935 and a new subspecies of *Sinogomphus peleus* (Liefstinck, 1939) from Vietnam (Odonata: Gomphidae). *Tombo* 59: 53-60. (in English, with Japanese summary) ["Males and females of *S. mobyduck* spec. nov. and *S. peleus fuscatus* ssp. nov. are described from Vietnam and differences with other members of the genus are provided. *S. mobyduck* is closest to *S. leptocercus* and can be separated by details of the caudal appendages. The holotype will be deposited in the Kanagawa Prefectural Museum of Natural History, Japan. *S. peleus fuscatus* differs from the nominate subspecies by a completely black metepisternum. The holotype will be deposited in Naturalis Biodiversity Center, the Netherlands." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK, Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com
- 16478.** Koneri, R.; Nangoy, M.J.; Saroyo; Tallei, T.E. (2017): Diversity and community composition of dragonfly (Insecta: Odonata) in Tangkoko, Nature Reserve, North Sulawesi, Indonesia. *Bioscience Research* 14(1): 1-8. (in English) ["Analysis of dragonfly diversity is one of the important factors in supporting species conservation. This study was aimed to assess community composition and diversity of dragonfly in the area of Tangkoko Nature Reserve, North Sulawesi. Sampling was carried out along the river in three habitat types. Dragonfly collection was done by a sweeping technique along four transect lines that were applied randomly along 1000 m in every type of habitat. Data analysis included species abundance, richness, diversity and evenness among habitats. The result showed that In these three habitats there were six families, 13 genera, 15 species and 1557 individuals. Family Libellulidae was the most common type of species. The family with the most abundance was Coenagrionidae, while the family with least abundance was Platystictidae. Species with the highest number of individuals was Pseudagrion sp and the lowest number was Pantala flavescens. The highest abundance and richness of species were found on agricultural land and the lowest was in primary forest. The highest species diversity and evenness were found in primary forest and the lowest was in secondary forests. The highest diversity of dragonflies in all types of habitats was found in primary forest."] Address: Koneri, R., Dept Biology, Fac. Mathematics and Natural Sciences, Sam Ratulangi Univ., Kampus Bahu Street, Manado, 95115 Indonesia. E-mail: ronicaniago@unsrat.ac.id
- 16479.** Koroiva, R.; Kvist, S. (2017): Estimating the barcoding gap in a global dataset of *cox1* sequences for Odonata: close, but no cigar. *Mitochondrial DNA Part A* 29(5): 765-771. (in English) ["We evaluated the extent of intraspecific and interspecific genetic distances for two highly diverse infraorders of Odonata: Anisoptera and Zygoptera. All cytochrome c oxidase subunit I sequences (*cox1*), the region chosen for zoological DNA barcoding, present in GenBank for each infraorder were downloaded and curated. For Anisoptera, the final dataset consisted of 2,961 individual *cox1* sequences for 536 species and the equivalent numbers for Zygoptera were 2,477 sequences for 497 species. More than 7 million individual genetic comparisons were made and the results indicated that there is a tendency towards a barcoding gap, but that the size of the gap may not be sufficient to robustly infer identities for some taxa. DNA barcoding may be of less use for some odonate taxa, perhaps pertaining to misidentifications in global databases. However, at local scales or with more confined taxonomical sampling, this tool may yet be beneficial in identifying these charismatic organisms." (Authors)] Address: Koroiva, R., Ecology and Conservation Graduate Program, Univ. Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil. E-mail: ricardo.koroiva@gmail.com
- 16480.** Kosterin, O.E.; Solovyev, V.I. (2017): Odonata found in mid-summer 2015 and 2016 at the north-westernmost Black Sea Coast of the Caucasus, with the first record of *Corulegaster picta* Selys, 1854 in Russian Federation. *International Dragonfly Fund Report* 107: 1-43. (in English) ["Results are presented of brief odonatological examination of the Black Sea coastal northwesternmost spurs of the Caucasus between Anapa and Gelendzhik (mostly at Kabardinka village), Russia, in late July/early August 2015 and early-mid July 2016. In total, 28 Odonata species were found, including *C. picta* for the first time in Russia. For *C. picta* and *Caliaeschna microstigma*, the world's northernmost records were made. New localities of species rare in this area are reported: one for *Coenagrion scitulum* and three for *Selysiotthemis nigra*, including their breeding habitat. Numerous migrant individuals of *Pantala flavescens* were observed in many localities in 2015 but none in 2016. Observations on trophic activity of *Aeshna affinis* and *A. mixta* are reported, the former showing predominantly matutinal and vespertinal activity and the latter diurnal activity. Occurrence of the *Chalcolestes* spp. in the Caucasus is discussed." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

- 16481.** Kosterin, O.E.; Kompier, T. (2017): *Coeliccia rolandorum* sp. nov. from eastern Cambodia and southern Vietnam, the eastern relative of *C. kazukoe* Asahina, 1984 (Odonata: Platycnemididae). *Zootaxa* 4341(4): 509-527. (in English) ["*C. rolandorum* sp. nov. is described from the eastern Cambodia (holotype: Cambodia, Monduliri Province, Buu Sraa Waterfall environs, 12°34' N 107°24' E, ~780 m a.s.l., 16 June 2014, RMNH) and southern and central Vietnam. It is related to *C. kazukoe*, which is known from the Cardamom and Sankampaeng Mts., and replaces it in eastern Indochina. New distributional data on *C. kazukoe* are presented and its characters are discussed with respect to their change with age." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru
- 16482.** Kosterin, O.E. (2017): Update to Odonata of the Black Sea coast of the western Caucasus, Russia. International Dragonfly Fund Report 110: 1-23. (in English) ["Results are presented of a brief odonatological examination of the Abrau and Taman' Peninsulas at the northwesternmost Caucasian Black Sea coast in Krasnodarskiy Kray, Russia, on July 20-26, 2017. Twenty three species have been observed at the former peninsula and five at the latter. The Odonata records at the Abrau Peninsula are summarised, to include 34 species." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru
- 16483.** Kosterin, O.E. (2017): A short survey of Odonata in Stung Treng Province in northern Cambodia in mid-summer 2016. IDF-Report 105: 1-40. (in English) ["Results are presented of an odonatological survey of 23 localities in Thala Barivat District of Stung Treng Province, northern Cambodia, on July 26 – August 1, 2016. Most localities were situated in areas of open low deciduous dipterocarp forests on gravel soils, some at hillside areas of tall evergreen dipterocarp forest. The great Mekong River right bank was studied within 7 km downstream of its Nimeth (Nimet, Khon Thai, Labak Koun, Khone Pha Pheng) Waterfall. In total, 55 species were found, of which 52 identified to species and three to genus. Two species, *Gynacantha saltatrix* Martin, 1909 and *Macrogomphus matsukii* Asahina, 1986, were recorded in Cambodia for the first time. Five obligatory lotic species were found at the Mekong River, namely *Dysphaea gloriosa*, *Prodasineura coerulescens*, *Burmagomphus asahinai*, *Nychogomphus duaricus* and *Onychothemis testacea*, including tenerals of *P. coerulescens* and *B. asahinai*. Most probably these species breed in the Mekong reach which is enriched with oxygen downstream of the great waterfall cascade." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru
- 16484.** Kosterin, O.E. (2017): *Calopteryx virgo feminalis* subsp. nov., a long known under the same name but hitherto formally nameless subspecies from the Caucasian Black Sea Coast. International Dragonfly Fund Report 107: 45-57. (in English) ["The populations of *C. virgo* of the Black Sea Coast of the Caucasus have females with the distal hindwing part darkened and males with the underside of S10 and appendages whitish. They are known for more than a century and deserve a subspecific status but since the name *feminalis* Bartenev, 1910 proposed to them is unavailable, a new subspecies is formally erected under the same name, *C. virgo feminalis* Kosterin subsp. nov., with the following type locality: Russia, Krasnodarskiy Kray, Gelendzhik Municipality, Kabardinka village, the Doob River lowermost reaches, 44°38'2653", 37°55'55"57" 58" E." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru
- 16485.** Kousika, J.; Kuttalam, S.; Ganesh Kumar, M. (2017): Evaluation on the effect of tetraniliprole 20 SC, a new chemistry of pyridine derivative to the rice arthropod biodiversity. *Journal of Entomology and Zoology Studies* 5(4): 133-143. (in English) ["A field experiment in rice was conducted to study the insecticide effect of tetraniliprole 20 SC, a new chemistry of pyridine derivative on arthropod biodiversity during 2014 in Boluvampatti, Coimbatore, India. A total of 5,095 individuals belonging to 90 species, 84 genera, 54 families and 11 orders were recorded in rice ecosystem from two classes viz., Insecta and Arachnida. Hemiptera and Hymenoptera were predominant in terms of individuals of exopterygota and endopterygota, respectively. Among exopterygota, maximum individuals were recorded in the order Hemiptera (781) followed by Orthoptera (127), Thysanoptera (85), Odonata (22), ... The biodiversity indices revealed that based on familial level, Species richness indices viz., species number (51), Fishers alpha index (16.483), Q Statistic (16.11), Margelef D index (8.548), Shannon - Weiner index (3.2863) and Brillouin diversity index (3.063), the value was highest in unsprayed field and it was maximum in the month of October." (Authors)] Address: Kousika, J., Research Associate, Dept of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India
- 16486.** Kovacs, T.; Ambrus, A.; Danyik, T.; Olajos, P. (2017): Vörös Listája és faunisztikai bibliográfiája (Odonata). *Folia Historico-naturalia Musei Matraensis* 41: 25-58. (in Hungarian, with English summary) ["(Red data list and bibliography of locality records of Hungarian Odonata.) A revised list of the Hungarian Odonata (64 species) with IUCN Red List categories is presented. The categories with the species are as follows: Critically Endangered (CR) – *Aeshna viridis*, *Leucorrhinia caudalis*; Endangered (EN) – *Lestes macrostigma*, *Cordulegaster bidentata*, *Epithea bimaculata*, *Leucorrhinia pectoralis*; Vulnerable (VU) – *Coenagrion ornatulum*, *Ophiogomphus cecilia*, *Cordulegaster heros*, *Somatochlora flavomaculata*, *Sympetrum depressiusculum*, *S. pedemontanum*; Near Threatened (NT) – *Pyrrosoma nymphula*, *Orthetrum brunneum*; Data Deficient (DD) – *Erythromma lindenii*; Not Applicable (NA) – *Coenagrion hastulatum*, *C. lunulatum*, *Anax ephippiger*, *Sympetrum fonscolombii*, *Sympetrum danae*;

Least Concern (LC) – the other 44 species. Papers concerning the Hungarian Odonata, especially on faunistics, are listed." (Authors)] Address: Kovacs, T., Mátra Museum., Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

16487. Krassilov, V.; Vassilenko, D.; Sokolova, A.; Barinova, S. (2017): New fossil plant and insect records bearing on Cretaceous climate of western Gobi, Mongolia. *American Journal of Plant Biology* 2(2): 43-48. (in English) ["The paper examines new fossil plant and insect findings in the Cretaceous of the western Gobi as a source of climatologic inference. The isophlebiid dragonflies at the base of the Cretaceous sequence witness to an extension of the Late Jurassic climate warming to the earliest Cretaceous. Climatic fluctuations through the late Neocomian – Cenomanian are indicated by a series of paleofloristic events. The allochthonous localities of *Phoenicopsis* (Czekanowskiales) in the basal members of the Mogotuin Formation, Manlay depression, and Khurendukh Formation, Choyr Basin, are evidence of temperate arboreal vegetation on the bordering basement ridges. A mass occurrence of *Otozamites*, a thermophilic bennettitalean plant in the upper part of the Mogotuin Formation near its boundary with the redbeds of Manlay Formation heralds a xerothermic trend of climatic evolution. The first appearance of *Sequoia* at the top of the Barun Bayan redbeds marks reversion of the trend at about the Albion – Cenomanian boundary." (Authors)] Address: Krassilov, V., Paleontological Institute, Russian Acad. of Sciences, Moscow, Russia. E-mail: vakrassilov@gmail.com

16488. Kulijer, D.; Miljevic, I. (2017): Dragonfly (Odonata) fauna of the Zelengora Mountain and Sutjeska National Park. *Glasnik Šumarskog fakulteta Univerziteta u Banjoj Luci* 26: 23-39. (in Croatian, with English summary) ["High mountain habitats of Bosnia and Herzegovina are often isolated and difficult to access. That is why to this day, the dragonfly fauna of the mountain region in BiH remained almost entirely unexplored. The aim of this study was to present the first overview of the dragonfly fauna of Zelengora Mt. and the National Park Sutjeska, the area which includes some of the most important habitats of these insects in the country. This paper is a result of the authors' research combined with the analysis of existing data. The dragonfly fauna of Zelengora Mt. and NP Sutjeska consists of a total of 35 species, representing 55% of the fauna of this insect order in BiH. Together with data obtained with the studies in 2015 and 2016, this paper also includes unpublished data collected by the authors between 2009 and 2014, literature data and the data from the collections of the National Museum of Bosnia and Herzegovina. A total of 457 records from 53 sites were collected and over 76% of these represent new data. According to the number of sites inhabited by a single species, the most numerous are: *Cordulegaster bidentata* (recorded at 26 sites), *Cordulia aenea* (23 sites), *Aeshna grandis* (15 sites), *Libellula quadrimaculata* (15 sites) and *Enallagma cyathigerum* (14 sites). The following localities were inhabited by the highest number of species: Orlovačko Lake (22 species), Gornje Bare Lake (20 species) and Donje Bare Lake (19 species), where also the highest number of threatened and endangered species was recorded. The most important recorded species were:

Coenagrion scitulum, *C. hastulatum*, *A. grandis*, *A. juncea*, *Somatochlora*, *Cordulegaster heros*, *C. bidentata* and *Sympetrum flaveolum*. For relict species *C. hastulatum* and *S. metallica*, mountain lakes of Zelengora Mt. are the only known habitat in Bosnia and Herzegovina so far. Additionally, these lakes were determined as the most important habitats in the country for *A. grandis* and *A. juncea*. Among the registered species, 30 species are included in the Red list of protected species in Republic of Srpska. Additionally, we have recorded all three dragonfly species listed on the Red list of the Federation of Bosnia and Herzegovina. Moreover, *C. heros* is listed in Annexes II and IV of the Habitats Directive of the European Union and as vulnerable (VU) species on the Mediterranean Red list." (Authors)] Address: Kulijer, D., Zemaljski muzej Bosne i Hercegovine, Zmaja od Bosne 3, 71000 Sarajevo, Bosna i Hercegovina. E-mail: dejan.kulijer@gmail.com

16489. Kumari, U.; Gautam, D.C. (2017): Karyotypic studies on two species of *Orthetrum* (Anisoptera: Odonata) from Himachal Pradesh. *J. Cytol. Genet.* 18(NS): 1-7. (in English) ["Chromosomes of two species of dragonflies belonging to family Libellulidae, *Orthetrum glaucum* and *O. prunosum* from Hamirpur district of Himachal Pradesh were studied. In both the species the diploid chromosome number was found to be $2n = 25$ with a pair of m chromosomes in each species. Chromosomes were studied at different meiotic stages and lengths of chromosomes were measured at spermatogonial metaphase. Total complement lengths as well as relative lengths of chromosomes were calculated and karyotypes were prepared for each species." (Authors)] Address: Gautam, D.C., Dept of Biosciences, Himachal Pradesh Univ., Shimla 171 005, India. Email: dcgautam@rediffmail.com

16490. Kunz, B. (2017): Première observation historique de *Gomphus graslinii* en Provence-Alpes-Côte d'Azur (Odonata: Gomphidae). *Martinia* 32(2): 76. (in French) [Durance, Peyrolles-en-Provence, 18 juin 1987 (43,6586°N / 5,5993°E ; WGS84)] Address: Kunz, B., Hauptstraße 111, 74595 Langenburg, Germany. E-mail: libellenbernd@gmail.com

16491. Kuznetsova, V.G.; Maryanska-Nadachowska, A.; Shapoval, N.A.; Anokhin, B.A.; Shapoval, A.P. (2017): Cytogenetic characterization of eight Odonata species originating from the Curonian Spit (the Baltic Sea, Russia) using c-banding and FISH with 18S rDNA and telomeric (TTAGG)_n probes. *Cytogenet Genome Res* 153: 147-157. (in English) ["We studied the karyotypes of 8 dragonfly species originating from the Curonian Spit (the Baltic Sea, Russia) using C-banding and FISH with 18S rDNA and "insect" telomeric (TTAGG)_n probes. Our results show that *Leucorrhinia rubicunda*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum cancellatum*, *Sympetrum danae*, and *S. vulgatum* from the family Libellulidae, as well as *Cordulia aenea* and *Epithecina bimaculata* from the family Corduliidae share $2n = 25$ ($24 + X$) in males, with a minute pair of m-chromosomes being present in every karyotype except for that of *C. aenea*. Major rDNA clusters are located on one of the large pairs of autosomes in all the species. No hybridization signals were obtained by FISH with the (TTAGG)_n probe in the examined

species with the only exception of *S. vulgatum*. In this species, clear signals were detected at the ends of almost all chromosomes. This finding raises the possibility that in Odonata the canonical "insect" (TTAGG)_n telomeric repeat is in fact present but in very low copy number and is consequently difficult to detect by in situ hybridization. We conclude that more work needs to be done to answer questions about the organization of telomeres in this very ancient and thus phylogenetically important insect order." (Authors) Dragonflies were collected from April 1 to October 26, 2016, on the Curonian Spit, 12 km S of Rybachy village, at the field station Fringilla (55°05' N, 20°44' E) belonging to the Biological Station of the Zoological Institute, Russian Academy of Sciences, and in some other localities of the Curonian Spit.] Address: Kuznetsova, Valentina, Dept of Karyosystematics, Zool. Inst., Russian Acad. Sci., Universitetskaya nab. 1, 199034 St. Petersburg, Russia. E-mail: valentina_kuznetsova@yahoo.com

16492. Leandri, F. (2017): Contributo alla conoscenza dell'odonatofauna del Parco Nazionale Dolomiti Bellunesi (Dolomiti, Veneto). Frammenti Conocere e tutelare la natura Bellunese 7: 5-16. (in Italian, with English summary) ["This work surveyed dragonfly population in the Dolomiti Bellunesi National Park. Since dragonflies are hemimetabolic insects whose larval stages are linked to aquatic environments, the investigation took place in both lotic and lentic habitat within the Park or in nearby locations. The Dolomiti Bellunesi National Park is located in the Belluno province (North-Eastern Italy) and belongs to the Alpine Biogeographical Region. The park encompasses medium and high mountain habitat in the Southern portion of the Dolomites mountain range. A total of 25 species have been recorded (9 zygoterans, 16 anisopterans), 13 of which within the boundaries of the park. The most common species were *Cordulegaster bidentata*, which finds its natural habitat in streams in hilly and mountain areas, and *Aeshna cyanea*, a common species of wide ecological niche. Two wetland areas outside the Park host species rated as "near threatened" by the IUCN Red List of Italian dragonflies. Such sites are the Vedana lake, which hosts 17 species (including *Cordulia aenea*) and the Prà Toront peat bog, which hosts the alpine and peat bogs species *Somatochlora arctica*." (Author)] Address: Leandri, F., Vicolo Chiuso 2/a – 26037 San Giovanni in Croce (CR) - e-mail: faustoleandri@hotmail.com

16493. Leaphart, J.C., Zelmer, D.A. (2017): Wrecking the curve: Altered functional response of *Tetragoneuria* (Odonata: Corduliidae) naiads infected with metacercariae of *Haematoloechus floedae*. *Journal of Parasitology* 103(2): 147-151. (in English) ["The ubiquity of host-parasite interactions and their potential for substantial representation, in terms of overall biomass, within ecosystems suggests that parasites have the capacity to influence energy flow within an ecosystem. Although the influence of certain parasites on prey behavior has been well documented, parasites could also exert an influence on ecosystem dynamics by influencing predator feeding behavior. The functional response of *Tetragoneuria* naiads was characterized by presenting naiads with varying abundances of *Daphnia magna*, after which a subset of the naiads were exposed to cercariae of *Haematoloechus floedae*, and

the feeding trials repeated for both the control and exposed odonates. A type II functional response was chosen as an appropriate model for comparison. An indicator variable approach to nonlinear regression of the functional response data indicated that infected odonate naiads spent significantly more time foraging than they did before infection, whereas there was no significant change in the functional response of the control naiads. Infected odonates also had a slower rate of growth. These results imply a metabolic cost to infection of *Tetragoneuria* naiads by *H. floedae* that might be associated with the encapsulating response to the metacercariae that was observed in infected naiads." (Authors)] Address: Zelmer, D.A., Dept of Biology and Geology, University of South Carolina Aiken, Aiken, South Carolina 29801. USA. E-mail: derekz@usca.edu

16494. Leksono, A.S.; Feriwbisano, B.; Arifianto, T.; Pratama, A.F. (2017): The abundance and diversity of Odonata along an altitudinal gradient in East Java, Indonesia. *Entomological Research* 47(4): 248-255. (in English) ["Odonate diversity in East Java was surveyed, and samplings were made during 2 years in ten sites along an altitudinal gradient. The characteristics of odonate assemblages in East Java were analyzed regarding the number of individuals, the number of species, and Shannon's diversity index. The differences in abundance, species richness, and diversity between study sites were analyzed by an independent t-test. There were 3270 individuals of Odonata belong to 30 species, 7 families and 2 suborders identified from all study sites. The abundance, species richness and diversity of Odonata varied between study sites. The greatest abundance of Odonata was found in Malang Coban Talun (MCT) (148.8 ± 9.5), while the lowest was in South Beach Forest (SBF) (14.4 ± 3.6). The highest species richness and diversity was found in Malang Paddy Field (MPF) (richness = 14.4 ± 0.8 and $H' = 2.4 \pm 0.1$), while the lowest was found in South Coastal Area (SCA) (richness = 2.8 ± 0.1 and $H' = 0.4 \pm 0.1$). A significant positive correlation was detected between the elevation and overall odonate abundance ($P < 0.05$), while there was not significant correlation between that and odonate species richness and diversity." (Authors)] Address: Leksono, A.S., Dept Biol., Fac. Mathematic & Natural Sci., Brawijaya Univ., Malang, Indonesia. E-mail: amin28@ub.ac.id

16495. Lesparre, D. (2017): Première observation de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) au Portugal. *Boletín de la SEA* 60: 363-364. (in French, with Spanish summary) [30 mai 2016, valley of Ribeira das Carreiras, 6 km south of Mértola (Baixo Alentejo).] Address: Lesparre, D., An Amourouz - 28, Rue Gabriel Nogues, 22300 Lannion. France. E-mail: daniel.lesparre@laposte.net

16496. Liu, H.; He, G.; Ma, C.; Wang, Q.; Luo, Y. (2017): A computational study of the aerodynamic performance of a dragonfly forewing in gliding flight. *MATEC Web of Conferences* 151, 03001 (2018): 4 pp. (in English) ["Gliding flight is a common mode of flight for dragonfly, the objective of the current research is to use numerical simulations to explore whether the corrugations have positive effect on aerodynamic performance of the dragonfly wings in gliding flight. In order to compare aerodynamic performance of the dragonfly wing and flat

plate, a three-dimensional model of the dragonfly forewing and a three-dimensional flat plate with the same shape of the dragonfly forewing are established. The flow fields around three-dimensional dragonfly forewing and flat plate are simulated for $Re=10000$ and angles of attack changing from 0° to 25° (with an interval of 5°), numerical simulation indicate that aerodynamic performance of the dragonfly wing is slightly better than the flat plate over the entire range of parameters tested, especially the effect of the corrugateions on the flow is more evident at large angle of attack." (Authors)] Address: Liu, H., Nanchang Hangkong Univ. School Aircraft Engineering, China

16497. López Colón, J.I.; Ceballos Escalera, J.M.; López Nieva, P.; Olivares Pantoja, A. (2017): Presencia de *Coenagrion mercuriale* (Charpentier, 1840) en la Zona Especial de Conservación (ZEC) Vegas, cuevas y páramos del sureste de Madrid (Odonata: Zygoptera: Coenagrionidae) (Comunidad Autónoma de Madrid, España). *Archivos Entomológicos* 17: 411-422. (in Spanish, with English summary) ["*C. mercuriale* is a dragonfly included in the Annex II of the Habitat Directive (92/43/EEC) with "Almost threatened" species status by IUCN which populations are declining alarmingly in recent decades. Its effective protection in Spain requires the development of research projects to determine the exact location of its populations and the life cycle and ecology in the different areas where it lives. In this case, the study of a Special Area of Conservation (SAC) in the Autonomous Community of Madrid has been carried out." (Authors)] Address: E-mail: lopezicolon@gmail.com

16498. López-González, B.; Quiroz-González, I.H.; Fabela, M.; Medina, G.T.; González, B.E.; Martínez, H.Q. (2017): Calidad del agua de tres sistemas acuáticos con insectos como modelo de estudio en la región fronteriza México – Estados Unidos de América con el enfoque al control de las descargas de aguas residuales. *Bol. Soc. Mex. Ento. (n.s.) Número especial* 3: 27-32. (in Spanish, with English summary) ["Water quality of three aquatic systems with insects as a study model in the border region Mexico-United States of America with the approach to the control of residual water discharges: Sampling was carried out in the Álamo River, Río Bravo and Río San Juan located in the US - Mexico border area to determine water quality based on aquatic macroinvertebrates, such as insects. To determine water quality, the data were analyzed using the Shannon-Wiener index and the Margalef index. In addition, to determine the ecological status of rivers based on diversity, richness and abundance of aquatic insects was used the index of species richness and the EPT index that considers groups of insects susceptible to drastic changes Ephemeroptera, Plecoptera and Trichoptera. The results of the analysis showed that the San Juan River presented the lowest values in the indexes used, categorized as severely impacted, with low diversity and poor water quality, unlike the Río Álamo that presented higher values in the indexes with a quality of moderate water. The main findings in the monitoring stations are aquatic insects of the orders: Ephemeroptera, Odonata, Hemiptera, Trichoptera, Diptera, Lepidoptera and Megaloptera, being presented greater abundance of Ephemeroptera." (Authors)] Address: López-González, B., Univ. Autónoma de

Nuevo León. Fac. Cien. Biol. Ciudad universitaria, Av. Manuel L. Barragán, San Nicolás de los Garza. Nuevo León. México. E-mail: Bernardo.lgzz.11@gmail.com

16499. Lorenzo-Carballa, M.O.; Hassall, C.; Encalada, A.C.; Sanmartín-Villar, I.; Torres-Cambas, Y.; Cordero-Rivera, A. (2017): Parthenogenesis did not consistently evolve in insular populations of *Ischnura hastata* (Odonata, Coenagrionidae). *Ecological Entomology* 42: 67-76. (in English) ["1. The evolutionary advantages that have driven the evolution of sex are still very much debated, and a number of benefits of parthenogenesis over sexual reproduction have been proposed. In particular, parthenogenetic individuals are thought to exhibit higher probabilities of establishment following arrival in new, isolated habitats such as islands. 2. One notable example of parthenogenesis occurring in islands is *I. hastata*, an American species that has colonised the Azores archipelago, where the populations consist only of females. This is the only known example of parthenogenesis within the insect order Odonata. 3. Here, two island populations of *I. hastata* were studied, one in the Galapagos and one in Cuba, to test whether island colonisation is consistently associated with parthenogenesis in this species. Field capture-mark-recapture studies and laboratory rearing of field-collected eggs were undertaken in both areas. 4. Sex ratios in the field were found to be heavily female-biased among mature individuals; however, fertility rates of field-collected eggs were high, and the sex ratios in the laboratory did not differ from 1:1. Data from laboratory rearing showed that shorter larval development times and shorter adult life spans in males result in protandry, which might explain the skewed sex ratios in the field. 5. These findings are consistent with sex differences in key demographic parameters which could predispose *I. hastata* to parthenogenesis. However, the Azores population of *I. hastata* remains the only documented case of asexual reproduction in this insect group." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

16500. Low, V.L.; Norma-Rashid, Y.; Yusoff, A.; Vinnie-Siow, W.Y.; Prakash, B.K.; Tan, T.K.; Noorhidayah, M.; Chen, C.D.; Sofian-Azirun, M. (2017): Pleistocene demographic expansion and high gene flow in the Globe Skimmer dragonfly *Pantala flavescens* Fabricius (Odonata: Libellulidae) in Peninsular Malaysia. *Zoologischer Anzeiger - A Journal of Comparative Zoology* 266: 23-27. (in English) ["The demographic history, population structure, and intraspecific diversity of *P. flavescens* in Peninsular Malaysia were characterized based on variation of the mitochondria-encoded cytochrome c oxidase subunit I (COI) sequences. A median-joining network of 94 taxa inferred 71 unique haplotypes across four distinct geographic regions (i.e., northern, southern, central, and eastern). The distribution of these haplotypes, however, revealed no apparent geographical pattern, indicating minimal population genetic structure and high gene flow among all populations. A Mantel test showed an absence of isolation by distance (IBD), no significant association between genetic dis-

tance and geographic distance was observed. Mismatch distribution and neutrality tests provided evidence of demographic expansion during the Pleistocene dating back to 190,000–260,000 years ago. Additionally, species delimitation analyses revealed two operational taxonomic units (OTUs) within so-called *P. flavescens*, one restricted to the isolate from Korea; and the other representing isolates from Malaysia, Japan, and India. The present DNA analyses reflect the impact of the Quaternary glaciation in shaping the current genetic diversity and genetic structure of *P. flavescens* in Peninsular Malaysia." (Authors)] Address: Low, V.L., Tropical Infectious Diseases Research and Education Centre (TIDREC), University of Malaya, Kuala Lumpur, Malaysia

16501. Lüders, U.R.; Hernansanz Ortega, F.; Fernández González, R. (2017): Primeras citas de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de Burgos (Castilla y León, Península Ibérica). *Boletín de la Sociedad Entomológica Aragonesa* 61: 237-238. (in Spanish, with English summary) ["First records of *T. kirbyi* from Burgos province (Castilla y León, Spain)."] 13-VI-2017, 2 ♂♂, río Arlanzón, Arlanzón (pueblo), 996 m.a.s.l., 42.321633/3.458253; 21-VI-2017, 1 ♂, río Arlanza, Los Vados, Palacios de la Sierra, 1.045 m.a.s.l., 41.592067/3.102572 (Authors)] Address: Lüders, U.R., C/Fernán González 33, 1ºIzda. 09003 Burgos, Spain. E-mail: Stethophyma@web.de

16502. Maes, D.; Adriaens, D.; van der Meulen, M.; Poelmans, L.; Vandegehuchte, M.; Everaert, J.; Verhaeghe, F.; Anselin, A.; Casaer, J.; Decler, K.; De Knijf, G.; Devos, K.; Engelen, G.; Gouwy, J.; Packet, J.; Stienen, E.; Stuyck, J.; Thomaes, A.; T'jollyn, F.; Speybroeck, J.; Van Den Berge, K.; Van Elegem, B.; Van Landuyt, W.; Vermeersch, G.; Wils, C.; Pollet, M. (2017): Potentially suitable habitat maps for threatened species. Possible applications for nature conservation policy and management in Flanders. *Natuur.focus* 16(2): 56-66. (in Dutch, with English summary) ["Nature policy and management often uses threatened and regionally important species as tools or goals. Knowledge about their ecology and distribution is, therefore, crucial to scientifically underpin conservation measures. Apart from known observations, sites where the focal species is not (yet) observed or sites where potentially suitable ecological conditions are available but that are out of its dispersal range are as important to conserve and manage since they might get colonised in the future or might serve as possible reintroduction sites. To determine potentially suitable sites in an evidence-based approach, we here use so-called mechanistic models that describe the ecological needs of species in a quantitative manner. Subsequently we use a GeoDynamix tool to translate these criteria into a very high resolution map (20 x 20 m) with clusters of grid cells indicating potentially suitable habitats for a given species. These maps are then validated using existing observations and, if necessary, corrected in an iterative way to maximally match the known distribution to the obtained suitability map. We give an example of this method using *Dolomedes fimbriatus*, a species of regional conservation importance. Several possible applications of delineating potentially suitable habitat maps are given: (1) directing people to the most probable sites

when looking for a species for which the distribution is not well known, (2) locating sites where nature management is most appropriate, (3) locating possible reintroduction sites with the highest amount of suitable habitat, (4) locating sites that have a high suitability for a high number of species can underpin the delineation of nature reserves or Natura2000 areas, (5) the tool is able to select the best option for increasing the area of potentially suitable habitats by including the maps of the different potential scenarios and calculating their impact and (6) locating priority sites for defragmentation of the landscape, especially for larger mammals." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

16503. Makbun, N. (2017): *Anisogomphus yingsaki* (Odonata: Gomphidae) sp. nov., a new gomphid species from Thailand. *Zootaxa* 4306(3): 437-443. (in English) ["*A. yingsaki* sp. nov. (holotype ♂: Ban Na Kha, Ban Muang, Sakon Nakhon province, Thailand, altitude 170–175 m, 22-vi-2016) is described and illustrated. The new species is most similar to *A. bivittatus* from India and Nepal, and also *A. flavifacies*, and *A. resortus* from China in the shape of anal appendages. However, it can be separated from all of these by a combination of the following characters: shape of antehumeral stripes, abdominal pattern, shape of vesica spermalis and female valvula vulvae. The behavior of the new species, including crepuscular activity, is briefly discussed." (Authors)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

16504. Makbun, N. (2017): A new species of the genus *Burmagomphus* Williamson (Odonata: Gomphidae) from Northern Thailand. *Zootaxa* 4269(1): 133-136. (in English) ["*B. Chiangmaiensis* sp. nov. (holotype: Ban Luang, Chom Thong, Chiang Mai province, Thailand, 890-900 m, 14 v 2012) is described and illustrated. It can be differentiated from its most similar congener, *B. apricus* from China, by shape of posterior hamulus, yellow trapezoid band on occiput, and larger size." (Author)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

16505. Mandal, R.; Aditya, S. (2017): An observation on the Odonata diversity in and around Sarojini Naidu College campus, Kolkata, West Bengal, India. *International Journal of Entomology Research* 2(4): 31-34. (in English) ["Odonates play vital role in environmental monitoring and can be used as biological indicators of ecological health. The present investigation was undertaken as a pilot study to study the diversity and abundance of Odonata in Sarojini Naidu College campus, Kolkata, West Bengal, India. A combination of direct search and opportunistic sighting methods were applied to record 23 different Odonata species (18 dragonflies and 5 damselflies) from the study area during May, 2015 to April, 2016. In spite of the college campus being located in an industrial urban area, the present study revealed a striking diversity of odonates. A suitable geographic location, favourable climatic conditions, appropriate vegetation provided a comfortable shelter for Odonata species to flourish in this area. This study is aimed towards contributing to the plan of

biodiversity restoration in our campus and development of management strategies for conservation of this important group of insects." (Authors)] Address: Mandal, Ritu, Dept of Zoology, Sarojini Naidu College for Women, 30, Jessore Road, Dum Dum, Kolkata, West Bengal, India

16506. Manger, R. (2017): Behaviour of a female *Sympecma paedisca* during hibernation in the Netherlands. *Brachytron* 19(2): 104-113. (in Dutch, with English summary) ["A female *S. paedisca* has been studied for over three months in the winter, on a heathland in southwest Drenthe. Perching and roosting heights and movements were studied during this period. The weather conditions during this winter were normal for Dutch standards with 34 frost days and seven ice days. From the beginning of December 2016 a female *S. paedisca* stayed for 92 days within a range of about half a square meter. When it was cloudy or raining and the temperature was below five degrees for days, the damselfly remained at one place and moved only a few centimeters on these days. A few times, as the days became longer and the sun gained more power, the female moved a few centimeters. During one visit in the dark, she had not crawled down for extra shelter, but even stayed a little higher. It has been found that this winter damsel only traveled over distances > 10 cm when there was enough solar heat." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

16507. Mansoor, R. (2017): Do herbicide effects on Odonata larvae, depend on their location of origin?: An ecotoxicological study using Glyphosate. Independent thesis Advanced level (degree of Master), Halmstad University, School of Business, Engineering and Science: 22 pp. (in English) ["Concentrations of herbicides in our aquatic ecosystems increase more and more. Among these, the herbicide glyphosate is the most common one. This ecotoxicological study was performed in order to examine the toxic effect of the herbicide glyphosate on aquatic invertebrates. Odonata were selected as study organisms in order to serve as bio-indicators of environmental contamination. Two populations, each of two species (*Erythronia najas* and *Libellula quadrimaculata*) were collected from four different locations, to study inter-specific differences, as well as, differences among populations within a species, in response to herbicide exposure. The experiment was conducted for 15 days in a 2 x 4 factorial design with 4 replicates (n = 32). The most common brand of weed-killer 'Roundup' containing 7.2 gL⁻¹ of glyphosate) was used as source of glyphosate. Glyphosate was applied at a concentration of 7.6 mgL⁻¹ in the experiment equalling the high end of environmentally relevant concentrations of glyphosate present in contaminated shallow waters. Response variables measured were larval survival, growth and activity. The results showed that glyphosate exposure reduced the survival of the larvae, but the magnitude of the glyphosate effects depended on species identity of the larvae and varied also with population within species. This study clearly shows that herbicide effects on invertebrate fitness depends on species identity and may even vary within species from different populations, possibly due to evolved resistance of random

genetic variations between populations or due to random genetic variation between populations." (Author)] Address: Mansoor, Ramla, Halmstad University, School of Business, Engineering and Science

16508. Marinov, M.; Campbell-Snelling, J.; Marinova, S. (2017): On a probable new oviposition style in female *Antipodochlora braueri* (Odonata: Corduliidae). *Agrion* 21(2): 72-75. (in English) ["Short investigations of known localities of *A. braueri* revealed a behaviour that is considered hitherto to be unrecorded for the species. Female *A. braueri* has usually been reported laying eggs in instream pools of water bodies. During the current study one adult was observed performing movements towards the water surface typical of ovipositing females and therefore considered as probable egg-laying behaviour. The utilised habitat was a small remnant pool completely isolated from other sections of the stream. Since the two sexes of *A. braueri* are morphologically very close, sex determination is preferably achieved in the hand. As the reported adult here was not caught and its sex confirmed the oviposition habitat choice remains to be validated by further observations." (Authors)] Address: Marinov, M., Plant Health & Environment Lab., Diagnostic & Surveillance Services, Ministry for Primary Industries, 231 Morrin Rd, 1072 Auckland, New Zealand. E-mail: milen.marinov@mpi.govt.nz

16509. Markovic, D.; Carrizo, S.F.; Kärcher, O.; Walz, A.; David, J.W. (2017): Vulnerability of European freshwater catchments to climate change. *Global Change Biology* 23: 3567-3580. (in English) ["Climate change is expected to exacerbate the current threats to freshwater ecosystems, yet multifaceted studies on the potential impacts of climate change on freshwater biodiversity at scales that inform management planning are lacking. The aim of this study was to fill this void through the development of a novel framework for assessing climate change vulnerability tailored to freshwater ecosystems. The three dimensions of climate change vulnerability are as follows: (i) exposure to climate change, (ii) sensitivity to altered environmental conditions and (iii) resilience potential. Our vulnerability framework includes 1685 freshwater species of plants, fishes, molluscs, odonates, amphibians, crayfish and turtles alongside key features within and between catchments, such as topography and connectivity. Several methodologies were used to combine these dimensions across a variety of future climate change models and scenarios. The resulting indices were overlaid to assess the vulnerability of European freshwater ecosystems at the catchment scale (18 783 catchments). The Balkan Lakes Ohrid and Prespa and Mediterranean islands emerge as most vulnerable to climate change. For the 2030s, we showed a consensus among the applied methods whereby up to 573 lake and river catchments are highly vulnerable to climate change. The anthropogenic disruption of hydrological habitat connectivity by dams is the major factor reducing climate change resilience. A gap analysis demonstrated that the current European protected area network covers <25% of the most vulnerable catchments. Practical steps need to be taken to ensure the persistence of freshwater biodiversity under climate change. Priority should be placed on enhancing stakeholder cooperation at the major

basin scale towards preventing further degradation of freshwater ecosystems and maintaining connectivity among catchments. The catchments identified as most vulnerable to climate change provide preliminary targets for development of climate change conservation management and mitigation strategies." (Authors)] Address: Markovic, Daniela, Faculty of Business Management and Social Sciences, Osnabrück University of Applied Sciences, Caprivistr. 30A, 49076 Osnabrück, Germany. E-mail: markovic@quant-works.de

16510. Márquez-Rodríguez, J.; Campos, F.; Vega-Maqueda, M.A.; Ferreras-Romero, M. (2017): Contribución al conocimiento de las poblaciones reproductoras de *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegastridae) en Sierra Morena occidental. *Archivos Entomológicos* 18: 275-277. (in Spanish, with English summary) ["Contribution to the knowledge of the *C. boltonii* breeding populations in western Sierra Morena. By collecting last stadium exuviae, the occurrence of breeding populations of *C. boltonii* is reported from three localities within the Sierra de Aracena y Picos de Aroche Natural Park (Sierra Morena, Huelva). Records of other six species are also included." (Authors)] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Univ. Pablo de Olavide. A-376, km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

16511. Márquez-Rodríguez, J. (2017): Odonata records from southeast Portugal. *Archivos entomológicos* 18: 7-16. (in Spanish, with English summary) ["An annotated list of 20 species recorded in summer between 2012 and 2016 during several journeys to SE Portugal is presented. The studied localities on the border between Portugal and Spain, rich in thermophilic species, are a favourable biotope for the settlement of African dragonflies. Species of the genera *Trithemis* Brauer, 1868 and *Crocothemis* Brauer, 1868 are the most abundant. Additional notes on the abundance and distribution in the region along the summer are given." (Author)] Address: Márquez-Rodríguez, J., Zoología. Depto de Sistemas Físicos, Químicos y Naturales - Facultad de Ciencias Experimentales. Universidad Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

16512. Marrón, G.; Hernández-Alvarez, A.; Carmona, R. (2017): Riqueza temporal de odonatos (Odonata) en el Oasis San Pedro del Palmar, Baja California Sur, México. *Southwestern Entomologist* 42(1): 313-316. (in Spanish) [Odonate (Odonata) temporary richness in the San Pedro del Palmar Oasis, Baja California Sur, Mexico] Address: Marrón, G., Depto de Biología Marina, Universidad Autónoma de Baja California Sur, A.P. 19-B, La Paz, B.C.S., 23080, Mexico

16513. Martens, A.; Dunst, J.; Fröhlich, A.; Grabow, K. (2017): Just 55 days: Rapid development of *Ischnura elegans* and *I. pumilio* in a flooded maize field in Central Europe (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(10): 379-382. (in English) ["At a flooded maize field in the Upper Rhine River floodplain near Elchesheim Illingen south of Karlsruhe, Germany, the first emergence of adult *Ischnura elegans* and

I. pumilio was recorded on 07-vii-2016, i.e., just 55 days after the beginning of the field being inundated by upward seepage flow caused by the elevated water levels of the River Rhine. These are the first field data on odonate development from oviposition to emergence in Central Europe lasting less than 60 days." (Authors)] Address: Martens, A., Institute for Biology, Karlsruhe Univ. Education, Bismarckstr. 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

16514. Marthelot, J.; Brun, P.T. (2017): Abstract: L3.00012: Dragonfly wings-inspired deployable structures. *Bulletin of the American Physical Society*, 70th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, November 19–21, 2017; Denver, Colorado. (in English) [Verbatim: Transport networks of liquids in leaves and insect vasculature are ubiquitous in nature and serve to a broad spectrum of functions. In particular, dragonfly wings present a network of vein structure held together by a very thin rigid film. When a larva undergoes its metamorphosis and emerges, its wings expand tremendously and then harden. Inspired by this insect, we build a model experiment of the inflatable deployable structure composed of a tubular network of the veins. We characterize the in-plane expansion of the structure and study its correlation to the network geometry and the pressure applied in the system. A systematic variation of the geometric and elastic parameters allows us to search for an optimal design and operational conditions for maximal extension, while minimizing the input pressure.]

16515. Martynov, V.V.; Nikulina, T.V. (2017): Dragonflies (Insecta, Odonata) of the "Khomutovskaya steppe" Nature reserve. *Nature Conservation Research* 2(2): 47-54. (in Russian, with English summary) ["A review and comparative analysis of the Odonata fauna from the Khomutovskaya Steppe Reserve including nature conservation areas of the northern territories of the Sea of Azov (within Donbass) are given. 28 species of 14 genera from the six families are listed for the Reserve and its protected territories. The Khomutovskaya Steppe Reserve is suggested as a monitoring centre for the dragonfly fauna of the Cis-Azov region." (Authors)] Address: Martynov, V.V., Donetsk Botanical Garden, Donetsk People's Republic. E-mail: martynov.scarab@yandex.ua

16516. Mekhlif, A.F.; Khadair, G.T.; Alzakabe, L.H. (2017): Influence of the damselfly, *Ischnura evansi* (Odonata: Coenagrionidae) on the immature stage of *Culex pipiens molestus* (Diptera: Culicidae) as biological control. *Journal of Babylon University/Pure and Applied Sciences* 25(2): 446-454. (in English, with Arabian summary) ["*C. pipiens* are annoying pests and obligate vectors of many vertebrate pathogens. Their immature stages are common in fauna of a wide range quality of water bodies. Most of the alternative biocontrol strategies focus on mosquito immature stages. Predators play a major role in mosquito control programs. The naiads of *I. evansi* naturally inhabitate with the mosquito, *C. pipiens molestus* immature stages, the large naiads with average size 1.5 ± 0.5 cm more than daily predated 12.1 larvae of 1st and 2nd instars, with 0.63 clearance rate, the naiads strongly preferred mosquito larvae over the chironomids *C. ninavah* larvae of the

density 20/liter. The starred naiad tends to ingest the egg rafts. But not more than 3 rafts/day. The presence of the predator with 5 individuals/liter extended the life cycle from 13.0 in control to 20.8 days with high significant effect on 3rd and the instars and pupa stage." (Authors)] Address: Mekhlif, A.F., Dept of Biology, Collage of education, Mousel Univ., Irak. E-mail: atalla@yahoo.com

16517. Mendes, T.P.; Oliveira-Junior, J.M.B.; Cabette, H.S.R.; Batista, J.D.; Juen, L. (2017): Congruence and the biomonitoring of aquatic ecosystems: Are odonate larvae or adults the most effective for the evaluation of impacts? *Neotropical Entomology* 46(6): 631-641. (in English) ["Odonata have been widely used as indicators for the biomonitoring of terrestrial and aquatic habitats due to their sensitivity to environmental impacts. We aimed to determine whether the larval or adult phases of these insects were the best predictors of variation in habitat parameters and the loss of environmental integrity. Specimens were collected during three seasons (dry, rainy, and ebb) from 12 points in the Suiá-missu River basin, at the headwaters of the Xingu River in Mato Grosso, Brazil. The Procrustes analysis indicated a high degree of congruence between the assemblages of larvae and adults in streams with varying degrees of habitat integrity ($R = 0.832$, $p < 0.001$, $m^2 = 0.307$). When the congruence with environmental factors was analyzed, a significant association was found only for the larval phase ($R = 0.318$, $p = 0.03$, $m^2 = 0.888$). When the suborders were analyzed separately, congruence was confirmed for anisopteran adults ($R = 0.338$, $p = 0.031$, $m^2 = 0.885$) and larvae ($R = 0.417$, $p = 0.003$, $m^2 = 0.826$) and for the zygopteran adults ($R = 0.345$, $p = 0.027$, $m^2 = 0.881$) and larvae ($R = 0.405$, $p = 0.011$, $m^2 = 0.836$). These results indicate that both larvae and adults respond systematically to environmental impacts. We suggest that either life phase can be used for biomonitoring, given their effectiveness for the interpretation of disturbance in terrestrial and aquatic habitats. These findings further reinforce the effectiveness of this insect order for the detection of modifications to the environment, showing that they are good indicators of environmental conditions." (Authors)] Address: Mendes, T.P., Ecology & Conservation Lab, Graduate Program in Zoology, Univ Federal do Pará-UFPa, Museu Paraense Emílio Goeldi-MPEG, Belém, PA, Brasil. E-mail: thiagomendes.bio@gmail.com

16518. Merahi, H. (2017): Répartition spatio-temporelle de la faune Odonatologique de la région d El-Aouinet. MSc. thesis, Tebessi University: 65 pp. (in French, with Arabian and English summary) ["From a systematic research perspective and of conservation of biodiversity. We have undertaken to improve our knowledge of wild life of the Algerian freshwater macroinvertebrates. Indeed, 8 species belonging to 4 families of Odonates have been identified in two stations in river (Oued Mellegue) of a region called El-Aouinet in the extreme east of Algeria with a considerable domination of Zygoptera with two species *Ischnura graellsii* 52,45% and *I. pumilio* 26,77%. Our research that focuses on inventory and the bioecology is a contribution of the update of the Odonata fauna used as bioindicators of aquatic environments in a semiarid bioclimatic. The same, their presence is therefore

a sure index of the faunistic. Whoever translates by weakness diversity with $H' > 1.65$ bits and average equilibrium with $E > 0, 50$." (Author)] Address: not stated

16519. Mikó, Z.; Ujszegi, J.; Gál, Z.; Hettyey, A. (2017): Effects of a glyphosate-based herbicide and predation threat on the behaviour of agile frog tadpoles. *Ecotoxicology and Environmental Safety* 140: 96-102. (in English) ["Highlights: •Glyphosate-based herbicides can cause behavioural changes in non-target organisms. •We found decreased activity and increased hiding at higher herbicide concentration. •At lower concentration tadpoles tend to move closer to the surface. •We did not find interactive effects of predation threat and herbicide exposure. •Examine behavioural changes effected by contaminants may relevant in ecotoxicology. Abstract: The widespread application of pesticides emphasises the importance of understanding the impacts of these chemicals on natural communities. The most commonly applied broad-spectrum herbicides in the world are glyphosate-based herbicides, which have been suggested to induce significant behavioural changes in non-target organisms even at low environmental concentrations. To scrutinize the behavioural effects of herbicide-exposure we exposed agile frog (*Rana dalmatina*) tadpoles in an outdoor mesocosm experiment to three concentrations of a glyphosate-based herbicide (0, 2 and 6.5 mg acid equivalent (a.e.) / L). To assess whether anti-predator behaviour is affected by the pesticide, we combined all levels of herbicide-exposure with three predator treatments (no predator, caged *Aeshna cyanea* dragonfly larvae or *Lissotriton vulgaris* newt adults) in a full factorial design. We observed hiding, activity, proximity to the predator cage and vertical position of tadpoles. We found that at the higher herbicide concentration tadpoles decreased their activity and more tadpoles were hiding, and at least at the lower concentration their vertical position was closer to the water surface than in tadpoles of the control treatment. Tadpoles also decreased their activity in the presence of dragonfly larvae, but did not hide more in response to either predator, nor did tadpoles avoid predators spatially. Further, exposure to the herbicide did not significantly influence behavioural responses to predation threat. Our study documents a definite influence of glyphosate-based herbicides on the behaviour of agile frog tadpoles and indicates that some of these changes are similar to those induced by dangerous predators. This may suggest that the underlying physiological mechanisms or the adaptive value of behavioural changes may similar." (Authors)] Address: Mikó, Zsannett, Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Herman Ottó út 15, Budapest 1022, Hungary. E-mail: miko.zsannett@agrar.mta.hu

16520. Mikolajczuk, P. (2017): Mobility of imagines of *Nehalennia speciosa* (CHARPENTIER, 1840) (Odonata: Coenagrionidae): observations of dispersal behavior. *Odonatrix* 132: 4 pp. (in Polish, with English summary) ["Imagines of *N. speciosa* are considered as low mobile due to: 1) their small size and delicate body build; 2) strong attachment to narrow-leaved vegetation in a breeding habitat, within which

they fly at short distances; 3) infrequent observations outside of a breeding habitat; 4) results of mark-release-recapture studies. However, colonization of new habitats and less often adults' presence in unsuitable habitats are regularly reported. Flights, which may be related to colonization haven't been described so far. In the year 2014, several types of long-distance flights were observed at two acidic fens in Poland (Fig. 1). The flights occurred only at evening – after 18:30 CEST, as soon as surface of fens began shaded, with temperature more than 16 °C. The observations show that imagines of *N. speciosa* may actively relocate outside of vegetation at a breeding site and rise actively towards the air space above. Flight type D and E seem to lead to final leave of a site inhabited so far. In further part of flights D and E types, imagines may use air streams. Supposedly, flights related to search for new habitats, may have rather long-distance character, during which imagines observe terrain from a height and fall on suitable places. Occurrence of the dispersal behavior at evening may be related to avoidance of predation, especially by other odonates, which activity significantly decrease at evening." (Author)] Address: Mikolajczuk, P., ul. Partyzantów 59c/26, 21-560 Miedzyrzec, Poland. E-mail: gugapm@wp.pl

16521. Miller, E.; Miller, J. (2017): Zur Überwinterung von *Sympetma fusca* im bayerischen Alpenvorland (Odonata: Libellulidae). *Mercuriale* 17: 67-71. (in German, with English summary) ["Hibernation of *S. fusca* in the prealpine area of Bavaria - From 2005 to 2017, we observed the hibernation behaviour of *S. fusca*. The individuals left the developmental water during autumn by stages. During winter they perched at stems of different herbs, grasses and woody plants in a forest clearing. This behavior appears to assure the highest chance of surviving the humid winter climate of the prealpine area. We discuss an alternative hibernation mode hidden under leaf litter, which we consider impossible in our study area." (Authors)] Address: Miller, Elfi, Leharstr. 6c, 86179 Augsburg, Germany

16522. Minot, M.; Gaschignard, D. (2017): *Micrathyria wasscheri* sp. nov. from the coastal savannahs of French Guiana (Odonata: Libellulidae). *Odonatologica* 46(3/4): 287-300. (in English) ["On July 2014, a teneral specimen of an unknown *Micrathyria* species was found during the survey of an open marsh in Trou-Poissons in the coastal savannah of French Guiana. Further specimens were subsequently collected at the same place and at two other localities in Kourou and Macouria. The male and female of this new species are described here. *M. wasscheri* sp. nov. seems to depend on open marshes vegetated with *Eleocharis intersincta* (Cyperaceae), which constitute a very specific ecosystem of limited extent. This discovery highlights biodiversity issues in the coastal marshlands ('pri-pri'), which are currently threatened by demographic trends." (Authors)] Address: Minot, M., Normandie Univ, UNIROUEN, IRSTEA, ECODIV, 76000 Rouen, France. E-mail: m.minot@hotmail.fr

16523. Miralles-Nunez, A.; Diaz-Martínez, C. (2017): Catálogo provisional de los odonatos (Insecta: Odonata) de la provincia de Toledo (Castilla-La Mancha, España). *Boletín de*

la Sociedad Entomológica Aragonesa 61: 297-305. (in Spanish, with English summary) ["Provisional catalogue of the Odonata of Toledo (Castilla La-Mancha, Spain): A provisional catalogue of odonata of the Toledo province is presented based on an exhaustive bibliographic review and the addition of new records from the citizen science platform Biodiversidadvirtual, unpublished data and own records. The catalogue includes 45 species (17 Zygoptera and 28 Anisoptera). Eleven species (*Lestes dryas*, *Ischnura pumilio*, *Aeshna cyanea*, *Anax parthenope*, *Gomphus graslinii*, *G. simillimus*, *Onychogomphus costae*, *O. uncatus*, *Orthetrum brunneum* and *Paragomphus genei*) are cited for the first time in the province, and *P. genei* is also cited for the first time in the region of Castilla-La Mancha. Species cited in the literature but not recorded in this paper are discussed, as well as species that are likely to be present in the province but have not been detected yet. An analysis of the biogeographical composition of the species and their threat category is also included." (Authors)] Address: Miralles-Nunez, Adrià, Área de Biodiversidad y Conservación, Universidad Rey Juan Carlos, Tulipán s/n, Móstoles. 28933, Madrid (España). E-mail: adria.miralles@urjc.es

16524. Miralles-Núñez, A.; Álvarez, A. (2017): Primera cita de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de Toledo (Castilla-La Mancha, España). *Archivos entomológicos* 18: 61-64. (in Spanish, with English summary) [*T. kirbyi* is recorded from Toledo (Spain) for the first time, the only province of southern Spain where the species had not been recorded yet." (Authors)] Address: Miralles-Núñez, Adrià, Área de Biodiversidad y Conservación, Univ. Rey Juan Carlos. C/Tulipán, s/n. E-28933 Móstoles, Spain. E-mail: adria.miralles@urjc.es

16525. Miralles-Nunez, A.; Obregón-Romero, R.; Mezquita-Aranburu, I. (2017): Nuevos registros sobre la distribución y reproducción de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la Península Ibérica. *Boletín de la Sociedad Entomológica Aragonesa* 61: 241-244. (in Spanish, with English summary) ["*T. kirbyi* is recorded for the first time from the provinces of Gipuzkoa and Zaragoza and from the Navarra administrative region. That extends the known distribution range of the species in the Iberian Peninsula. Its reproduction in Zaragoza and Huelva is confirmed based on the observation of teneral specimens. Finally, a comprehensive review is provided of the first records and the first cases of reproduction observed in Spain per province. Unpublished data about reproduction are also included." (Authors)] Address: Miralles-Núñez, Adrià, Área de Biodiversidad y Conservación, Univ. Rey Juan Carlos, Tulipán s/n, Móstoles. 28933, Madrid, Spain. E-mail: adria.miralles@urjc.es

16526. Miroglu, A. (2017): An interesting dragonfly record, *Selysiotthemis nigra* (Vander Linden, 1825) from Black Sea region of Turkey. The 3rd International Symposium on EuroAsian Biodiversity, 05-08 July 2017, Minsk - BELARUS: 17. (in English) [Samsun province, Turkey, July 2011.] Address: Miroglu, A., Ordu University, Fatsa Faculty of Marine Sciences, Ordu/Turkey. E-mail: alimiroglu@gmail.com

16527. Mishra, Y.; Sharma, A.K.; Pachori, R.; Kumi, A. (2017): Taxonomic documentation of insect pest fauna of rice collected in light trap at Jabalpur district of Madhya Pradesh. *Journal of Entomology and Zoology Studies* 5(6): 1212-1218. (in English) ["The present investigation was conducted for taxonomic documentation of insect pest fauna of rice. Information on insect pest fauna of rice ecosystem collected in Jabalpur region during the period between the last weeks of June to last week of December 2015. Total 62 species were recorded in kharif cropping season of rice cropping area. These insect belongs to 11 orders and 34 families. ... Orders of minor significance are represented by Odonata and Neuroptera having 2 species each ... These species were grouped on the basis of their economic importance in three major categories viz. Harmful insects- as crop pests 32 species, beneficial insects- as bio-control agents (predators and parasites) 28 species and beneficial insects- as commercially important 2 species. The present study also reviles that documented information on these species gives broader scope of using light trap as Integrated Pest Management tool against these insect pests of vegetables and other crops." (Authors)] Address: Mishra, Y., Dept Entomol., Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India

16528. Mochon, A. (2017): Une odonatofaune inusitée à la tourbière du parc national de Frontenac. *Le Naturaliste canadien* 141(2): 26-41. (in French, with English summary) ["Odonata were surveyed in the string fen of the Frontenac National Park, situated in the mixed temperate zone of the Appalachian region of southern Québec (Canada). This fen biotope, considered exceptional due to its ecological uniqueness and southern location, was surveyed 22 times from 2014 to 2016, covering the full flight period of the study taxa. Hundreds of adult specimens and exuvia were collected, which together with behavioral observations of adults, served to rate species abundance and to establish which were resident. The fen hosts a unique community of at least 52 odonate species (22 common, 11 occasional and 19 accidental). In total, 33 were proven or considered likely to have resident populations. The ranges of 21 species show a clear northern affinity, with some likely being relic populations in the biogeographic context of the fen, such as *Somatochlora brevicincta*, which until recently, had never been observed south of the St. Lawrence River. Discoveries included 4 threatened or endangered species: *Gomphaeschna furcillata*, *Williamsonia fletcheri*, *S. brevicincta* and *Nannothemis bella*; and 3 species that have recently expanded into Québec: *Enallagma anna*, *E. civile* and *Libellula semifasciata*." (Author)] Address: Mochon, A.; E-mail: mochon.alain@sepaq.com

16529. Modiba, R.V.; Joseph, G.S.; Seymour, C.L.; Fouché, P.; Foord, S.H. (2017): Restoration of riparian systems through clearing of invasive plant species improves functional diversity of Odonate assemblages. *Biological Conservation* 214: 46-54. (in English) ["Riparian systems are threatened globally, but contribute disproportionately to biodiversity and ecosystem function. Restoration to reverse their loss is costly, and requires careful monitoring and evaluation. Odonates are amongst the most reliable arthropod bio-indicators

for monitoring riparian ecosystems. Despite functional diversity (FD) reflecting ecosystem pattern and processes better than taxonomic diversity, Odonate FD has yet to be used in evaluating riparian conservation and restoration outcomes. We surveyed 45 sites across six river-systems in northeastern South Africa, to compare Odonate FD and standardised effect size of Odonate FD (sesFD) in riparian systems that had been invaded by alien plants, cleared of alien invasives, and sites that had never been invaded (15 sites each). Although species richness did not differ between treatments, Odonate sesFD was lower in invaded sites than those that had been cleared of alien riparian vegetation and those that had never been invaded. Clearance of 40% of alien riparian vegetation was associated with sesFD greater than that of invaded sites by almost two standard deviations. Representation of traits varied between treatments but was similar between cleared and natural sites, suggesting that invasion by alien plants directly impacts food webs, and that clearance can restore ecosystem processes and ecological services. This study confirms that Odonate FD can respond to restoration efforts. Secondary impacts of restoration to complete suites of functional groups can be anticipated to enhance ecological services and impact food webs at a range of scales." (Authors)] Address: Modiba, R.V., School of Education, Sol Plaatje Univ., Private bag X5008, Kimberley, South Africa

16530. Moeller, K.T.; Moeller, A.K.; Moyano, F.; Lundgren, E.J. (2017): Observation of an American black bear eating odonates in Yosemite National Park. *Western North American Naturalist* 77(1): 99-101. (in English) ["American black bears (*Ursus americanus*) are opportunistic omnivores with diets that vary seasonally and geographically depending on food availability. Previous scat analyses across several populations suggest that the majority of animal material in the diet of black bears is from insects (mainly ants and wasps). In 2015, a black bear in Yosemite National Park was observed eating dragonflies, a previously unidentified insect food item. Emerging aquatic insects may be an important but overlooked aspect of black bear diet. Documenting the food sources of organisms is critical to understanding their natural history and ecology. In the case of highly digestible food items, visual observation is an important and underrepresented tactic for documenting diet." (Authors)] Address: Moeller, Karla, School of Life Sciences, Arizona State Univ., Tempe, AZ 85281, USA. E-mail: karla.moeller@asu.edu

16531. Möstel, C.; Schorr, M.; Bechly, G. (2017): A new stem-coenagrionoid genus of damselflies (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Zootaxa* 4243(1): 177-186. (in English) ["A new genus and species of damselfly, *Burmagrion marjanmatoki*, gen. et sp. nov., is described from Early Cretaceous Burmese amber. It is attributed to the basal stem group of Coenagrionoidea. The inclusion of five wings from the same species suggests that the amber piece contains the remains of a mating pair of damselflies." (Authors)] Address: Möstel, Claudia, Universität Hohenheim, Schloss Hohenheim 1, 70599 Stuttgart, Germany. E-mail: Claudia-Sareyka@web.de

16532. Moroz, M.D.; Lipinskaya, T.P. (2017): Aquatic insects of the Neman River and its tributaries. *Entomological Review* 97(1): 30-43. (in English) ["The aquatic insects of the Neman River and its tributaries were studied. 178 species belonging to 9 orders were found: ... Odonata - 16, ... Two species of aquatic insects new for the Belarusian fauna were found, *Pomatinus substriatus* (Ph. Müller, 1806) (Coleoptera) and *Brachycercus europaeus* Kluge, 1991 (Ephemeroptera)."] (Authors)] Address: Moroz, M.D., Scientific & Practical Center for Bioresources, National Academy of Sciences of Belarus, Minsk, 220072 Belarus. E-mail: mdmoroz@bk.ru

16533. Moskowitz, D.; May, M. (2017): Adult tiger spiketail (*Cordulegaster erronea* Hagen) habitat use and home range observed via radio-telemetry with conservation recommendations. *Journal of Insect Conservation* 21(5/6): 885-895. (in English) ["*C. erronea* is geographically restricted to the eastern half of North America, patchily distributed within the range and a habitat specialist of small spring and seepage fed headwater streams running through mature forest. These habitats are highly sensitive to disturbance and the Tiger Spiketail is of conservation concern throughout most of its range. Yet little is known about the habitat use of either sex away from the breeding stream hampering conservation strategies. In this study we use miniaturized radio transmitters to investigate the habitat use and home range of individual males and a female Tiger Spiketail in New Jersey. This is the first and only radio-telemetry for this species. We also provide recommendations for habitat protection and conservation. Our studies demonstrate that this species is critically dependent upon mature forest and the high quality, perennial headwater streams that run through them. These habitats are particularly sensitive to disturbance. Except when patrolling and ovipositing, both sexes are in the canopy above the breeding stream and in the adjacent mature forest, indicating the inseparable linkage between the aquatic and forested terrestrial habitat for this species. Our observations also suggest that *C. erronea* occurs in a metapopulation of nearby streams in our study area. Conservation of this species may therefore require forest protection far beyond the breeding stream. In New Jersey, and in other places throughout the range, there are many potential pressures on these habitats and current regulatory protections are not likely suitable. These same habitats may also be important for other Odonate species of conservation concern suggesting that protection of *C. erronea* may benefit a suite of species. We hope the information obtained from this study can assist resource managers in developing conservation and habitat protection measures."] (Authors)] Address: Moskowitz, D., EcolSciences, Inc., 75 Fleetwood Drive, Suite 250, Rockaway, NJ 07866, USA. E-mail: dmoskowitz@ecolsciences.com

16534. Muhil, M.S.; Pramod, P. (2017): Odonates of Coimbatore District, Tamil Nadu, India. *Journal of Threatened Taxa* 9(2): 9814-9828. (in English) ["Odonates were surveyed in Coimbatore District from September 2012 to January 2016. The survey sites covered three major rivers—the Noyyal, Bhavani and Aliyar. Aquatic habitats such as forest streams, riverine sites, irrigational tanks and paddy fields were surveyed in the study. A total of 70 species of odonates were recorded

in the survey, which brings the list of odonates in Coimbatore to 87 species. 18 species are first time records to the district. In this paper, we catalogue odonates and their distribution from the present survey and pre-existing records."] (Authors)] Address: Muhil, Suhirtha, Salim Ali Centre for Ornithology and Natural History, Anaikatti, Coimbatore, Tamil Nadu 641108, India. E-mail: suhirthamuhil@gmail.com

16535. Nagahata, Y.; Futahashi, R.; Tshistjakov, Y.A. (2017): New record of *Sympetrum darwinianum* from Russia. *Tombo* 59: 84. (in English, with Japanese summary) ["So far *S. darwinianum* was known from Japan, continental China, and Korean Peninsula (Tsuda, 2000). Here we report an occurrence of this species from Russia from where it has been unknown. Material examined. 1 male (Figs. 1 & 2), Lotus lake, near Khasan, Khasansky, Primorsky, Russia, (N 42.454240, E 130.641317), 14-IX-2010, Yoshiyuki Nagahata leg. This male perched on a branch of a broad-leaved tree (Fig. 2) while no other individuals of this species were involved within a hundreds of individuals of *S. uniforme*, *S. frequens*, and *S. kunkeli* observed around the tree at that occasion. Although one of the authors (Y.N.) had opportunities to survey *Sympetrum* species at this locality on September 9, 2008 and also at Vityas, Zarubino, Andreyevka in Gamov Peninsula (approx. 40 km to the north from Khasan) in eight occasions from 2003 to 2014, no other individuals of *S. darwinianum* has been found. This suggests that Khasan is located around the distribution edge of *S. darwinianum* though it remains unknown whether this species is resident at this locality or not. We would like to thank Dr. Oleg E. Kosterin and Mr. Akihiko Sasamoto for helpful information on the odonate fauna of Russia.] Address: Nagahata, Y., ZaoHango91, Yamagata, Yamagata, 990-2305, Japan E-mail: rosalia@muse.ocn.ne.jp

16536. Naik, K.L.; Sayeswara, H. (2017): Diversity, occurrence, and abundance of odonates of Tunga river bank, adjoining fields, and cultivated lands in Shivamogga district of Karnataka, India. *Innovare Journal of Science* 5(2): 1-7. (in English) ["Objective: The major objective of this study was to find out the diversity, occurrence, and abundance of odonates of Shivamogga at three localities, viz., Tunga river bank, adjoining fields, and cultivated lands. Methods: Odonates were sampled for 5 months from July to November 2016. Field observations were made once in a week. They were observed, captured, identified, and released immediately at the spot of capture. Odonates were identified using field guides and handbook of common odonates of central India. Results: A total of 29 species of odonates belonging to 7 families and 24 genera were recorded from the study localities. 14 species of dragonflies and 15 species of damselflies were observed and identified. Conclusion: The present investigation shows that the study localities host a number of odonates. Due to different anthropogenic activities, the odonates diversity is in declining mode."] (Authors)] Address: Naik, K.L., Dept Zool., Sahyadri Science College, Kuvempu Univ., Shivamogga - 577 203, Karnataka, India. E-mail: sscautzoology@gmail.com

- 16537.** Nair, V.P. (2017): Dragonflies: Additions to the Odonata (Insecta) fauna of Varadoor, Kannur, Kerala, South India. *Zoo's Print* 32(11): 24-30. (in English) ["Varadoor is a small village about 24 km east from Kannur city, near Sir Syed College Taliparamba, belonging to Kurumathur gramapanchayath of Kannur district (latitude 120.2'N & longitude 750.24'E), Kerala. The village has an area of 50 acres and has agricultural fields, rubber plantations, scrub jungles, home gardens, ponds etc. 44 species of odonates have been reported from Varadoor, Kannur, South India (Nair, 2014). Further surveys indicated the presence of 24 more species at Varadoor, Kerala. This raises the total species of odonates at Varadoor to sixty eight. In order to avoid collection and killing, most of the species which could be visually identified were photo documented and cross checked with field guides. Difficult species were collected with insect net, photographed and released after studying the characters. Certain odonates which resisted capture were photographed and identified upto generic level. The surveys were made during 2012-2016 in all three seasons viz. summer (March to May), monsoons (June to October) and winter (November to February). Collected odonates were identified with the help of standard field guides, Fraser (1933, 1934, 1936), Kiran & Raju (2013), Emiliyamma et. al., (2005, 2007) and Subramanian (2009). Nomenclature and classification followed is after Schorr et. al., (2013). Common name followed is after Kiran & Raju (2013). Odonates were categorized into four groups depending upon their occurrence during the study period. Accordingly species observed 75-100% of survey days were categorized as very common (VC), 50-75% as common (CO), 25-50% as occasional (OC) and below 25% as rare (RA). Species observed only once or twice in any one season is considered as very rare (VR). Of the 24 species observed additionally at Varadoor, three are endemic to Western Ghats. A systematic list of all the odonates reported so far has been given below with figures showing species richness of the suborders. [...] With the addition of 24 species, the odonate diversity of Varadoor reaches 68 species. Three new families viz. Euphaeidae, Chlorociphidae and Protoneuridae have been added under sub order Zygoptera and one family Macromiidae under Anisoptera. *Pseudagrion decorum* (Rambur, 1842), *Ischnura senegalensis* (Rambur, 1842), *Agriocnemis keralensis* Peters, 1981, *Prodasineura verticalis* (Selys, 1860), *Elatoneura tetrica* (Laidlaw, 1917), *Onychothemis testacea* Laidlaw, 1902 and *Epophthalmia vittata* Burmeister, 1839 has not been reported from Kannur as per Emiliyamma et. al., (2007). So they are new records from Kannur. *Paracerion calamorum* (Ris, 1916) is a very rare odonate of Kerala. It has been recorded for the first time from North Kerala in this study. *Pseudagrion indicum* Fraser, 1924, *Euphaea fraseri* (Laidlaw, 1920) and *Microgomphus souteri* Fraser, 1924 are endemic to Western Ghats. Apart from diversity studies, abundance studies and long term monitoring in this area may reveal interesting results. Majority of the odonates were found associated with the stream passing through the area. Urbanisation and water pollution are major threats to the wetlands of this area. Public attentiveness and involvement of local self government is required to conserve the habitat of these odonates." (Author)] Address: not stated
- 16538.** Narzari, S.; Samah, J. (2017): Nutritional aspects of an aquatic edible insect *Sympetrum* sp. (Odonata: Libellulidae) of Assam, northeast India. *International Journal of Food Science and Nutrition* 2(4): 38-42. (in English) ["Insects are popularly consumed in different parts of the globe. The aquatic edible nymphs of *Sympetrum* sp. of Assam, Northeast India is little known to science but is a delicacy among certain tribal communities in the region. This study reports the nutritional compositions of the edible nymph of *Sympetrum* sp. The proximate composition analysis revealed that it contains 76.75 g/100g of protein. Mineral analysis by Atomic Absorption Spectrophotometer showed that this food can supplement rich amount of phosphorus, iron and copper to human nutrition. Amino acids analysed by High Performance liquid Chromatography presented all essential amino acids excluding leucine. Fatty acid analysis by Gas Chromatography Mass Spectrometry revealed that it contains 50.62% of Saturated Fatty Acids, 49.36% of Unsaturated Fatty Acids. This study first reports the rich nutritional aspects of the nymphs of *Sympetrum* sp. The results of this work would possibly be a nutritional reference for local consumers." (Authors)] Address: Narzari, Silistina, Dept of Biotechnology, Bodo-land University, Kokrajhar, -783 370, Assam, India
- 16539.** Neiss, U.G.; De Marmels, J (2017): *Gynacantha dryadula* sp. nov. from the Guiana Shield (Odonata, Anisoptera: Aeshnidae). *Zootaxa* 4254(5): 563-574. (in English) ["The new species is described and illustrated on the basis of two reared, subterminal males from Brazil, their larval exuviae, a mature male from French Guiana, a mature female from Venezuela, and a mature female from Surinam. One of the Brazilian males is the holotype (BRAZIL, Amazonas State, Manaus, Reserva Florestal Ducke, BR 174-km 26, trail to Acará creek, 02°55'47"S, 59°58'22"W, 0.7 m elevation, deposited in INPA). The new species (total length 50–54 mm) differs from other small species of same genus by colour pattern of thorax, middle and hind tibiae dark with external (dorsal) yellow streak, male cercus with truncated tip lacking apical spine, and male epiproct reaching or slightly surpassing midlength of cercus. The larva, besides of its small size (28–31 mm), has an epiproct with well-developed and slightly diverging apical spines and an unusually long paraprot." (Authors)] Address: Neiss, U.G., Instituto de Criminalística, Departamento de Polícia Técnico-Científica, Manaus, AM, Brazil. E-mail: ulisses.neiss@gmail.com
- 16540.** Nel, A.; Frese, M.; McLean, G.; Beattie, R. (2017): A forewing of the Jurassic dragonfly *Austroprotolindenia jurassica* from the Talbragar Fish Bed, New South Wales, Australia. *Alcheringa* 41(4): 532-535. (in English) ["The discovery of a well-preserved dragonfly forewing in the Upper Jurassic Talbragar Fish Bed near Gulgong and attributed to *Austroprotolindenia jurassica* Beattie & Nel allows this taxon to be placed in Protolindeniidae. It extends the palaeogeographical distribution of this family, previously known only from the Jurassic of Europe, to Australia." (Authors)] Address: Frese, M., Univ. Canberra, Institute for Applied Ecology & Faculty of Education, Science, Technology & Mathematics, Bruce, ACT 2601, Australia. E-mail: michael.frese@canberra.edu.au

16541. Nel, A.; Gross, M.; Engel, M.S. (2017): First fossil occurrence of the jewel damselflies (Odonata: Chlorocyphidae): a new species from the Late Miocene of Styria, Austria. *Annales de la Société entomologique de France* (N.S.) 53(4): 280–285. (in English, with French summary) ["The first fossil representative of the jewel damselflies (Calopterygoidea: Chlorocyphidae), a family of large, prominent, and often brilliantly colored Old World tropical Zygoptera, is described and figured. *Chlorocypha cordasevae* n. sp. was recovered from the Late Miocene (Early Pannonian, Serravalian to Tortonian, c.11 Ma) locality of Paldau, in the Styrian Basin, Austria. The fossil seems to be related to the African genus *Chlorocypha* Fraser, and within a larger group of African genera also including *Stenocypha* Dijkstra, *Africocypha* Pinhey, and *Platycypha* Fraser, and collectively set apart from southern Asiatic genera. The discovery of a central European species of *Chlorocypha* as recently as the Late Miocene reveals a much wider range to the family than its generally disjunctive modern distribution, demonstrating a Neogene contraction to their range, likely in connection with climatic cooling, drying, and developing seasonality. Modern chlorocyphids live under warm, humid climates, and the presence of *C. cordasevae* in the Pannonian fauna of Paldau further corroborates such a subtropical paleoclimate for the locality at that time." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16542. Ngiam, R.W.J.; Orr, A.G. (2017): *Oligoaeschna sirindhornae* sp. nov., a new dragonfly species from Thailand (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 4353(1): 195–200. (in English) ["*Oligoaeschna sirindhornae* sp. nov. is described from a ♂ from Sakaerat Silvicultural Research Station, Nakhon Ratchasima Province in Thailand. It is the only known *Oligoaeschna* species recorded from Thailand since *O. pramoti* (Yeh, 2000) and *O. minuta* (Hämäläinen & Pinratana, 1999) were transferred to the genus *Sarasaeschna*." (Authors)] Address: Ngiam, R.W.J., National Parks Board, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569. E-mail: yanrobin@hotmail.com

16543. Nieto, C.; Ovando, X.M.C.; Loyola, R.; Izquierdo, A.; Romero, F.; Molineri, C.; Rodríguez, J.; Martín, P.R.; Fernández, H.; Manzo, V.; Miranda, M.J. (2017): The role of macroinvertebrates for conservation of freshwater systems. *Ecology and Evolution* 7: 5502–5513. (in English) ["Freshwater ecosystems are the most threatened ecosystems worldwide. Argentinian protected areas have been established mainly to protect vertebrates and plants in terrestrial ecosystems. In order to create a comprehensive biodiverse conservation plan, it is crucial to integrate both aquatic and terrestrial systems and to include macroinvertebrates. Here, we address this topic by proposing priority areas of conservation including invertebrates, aquatic ecosystems, and their connectivity and land uses. Location: Northwest of Argentina. We modeled the ecological niches of different taxa of macroinvertebrates such as Coleoptera, Ephemeroptera, Hemiptera, Megaloptera, Lepidoptera, Odonata, Plecoptera, Trichoptera, Acari, and Mollusca. Based on these models, we analyzed the con-

tribution of currently established protected areas in the conservation of the aquatic biodiversity and we propose a spatial prioritization taking into account possible conflict regarding different land uses. Our analysis units were the real watersheds, to which were added longitudinal connectivity up and down the rivers. A total of 132 species were modeled in the priority area analyses. The analysis 1 showed that only an insignificant percentage of the macroinvertebrates distribution is within the protected areas in the North West of Argentina. The analyses 2 and 3 recovered similar values of protection for the macroinvertebrate species. The upper part of Bermejo, Salí-Dulce, San Francisco, and the Upper part of Juramento basins were identified as priority areas of conservation. The aquatic ecosystems need special protection and 10% or even as much as 17% of land conservation is insufficient for species of macroinvertebrates. In turn the protected areas need to combine the aquatic and terrestrial systems and need to include macroinvertebrates as a key group to sustain the biodiversity. In many cases, the land uses are in conflict with the conservation of biodiversity: however, it is possible to apply the connectivity of the watersheds and create multiple-use modules." (Authors)] Address: Nieto, Carolina, Institute de Biodiversidad Neotropical (IBN), CONICET-UNT, San Miguel de Tucuman, Tucuman, Argentina. E-mail: carolinanieto@gmail.com

16544. Nijjavalli, H.M.; Hosetti, B.B. (2017): Preliminary observations on Odonata fauna of Daroji Sloth Bear Sanctuary, Ballari District, North Karnataka (India). *Biodiversity Journal* 8(4): 875–880. (in English) ["The preliminary study was conducted from February 2011 to January 2012 at Daroji Sloth Bear Sanctuary, Hosept. The study revealed the occurrence of a total of 22 species of Odonates in 19 genera belonging to 5 families from the study area. Among them the order Anisoptera which includes dragonflies was predominated with 17 (76%) species, followed by the order Zygoptera which includes damselflies with 5 (24%) species. The family Libellulidae was found to be the most dominant by 13 species with high percentage composition i.e., 76%, followed by the family Coenagrionidae by 3 species with 40% of total odonates species recorded from the study area. The status based on the frequency of occurrence of shows that 8 (36%) were common, 5 (23%) were very common, 3 (14%) were occasional, 4 (18%) were rare and 2 (9%) were very rare. The study highlights the importance and also provides the baseline information on status and composition of Odonates at Daroji Sloth Bear Sanctuary, Ballari District of North Karnataka for research on their biology and the conservation." (Authors)] Address: Nijjavalli, H.M., Dept of Post Graduate Studies and Research in Wildlife and Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India. E-mail: harishwild@gmail.com

16545. Nishijima, S.; Nishikawa, C.; Miyashita, T. (2017): Habitat modification by invasive crayfish can facilitate its growth through enhanced food accessibility. *BMC Ecology* 17(37): 9 pp. (in English) ["Background: Invasive ecosystem engineers can facilitate their invasions by modifying the physical environment to improve their own performance, but this positive

feedback process has rarely been tested empirically except in sessile organisms. The invasive crayfish *Procambarus clarkii* is an ecosystem engineer that destroys aquatic macrophytes, which provide a physical refuge for animal prey, and this destruction is likely to enhance vulnerability to predators. Using two series of mesocosm experiments, we tested the hypothesis that the invasive crayfish increases its feeding efficiency on animal prey by reducing submerged macrophytes, thus increasing its individual growth rate in a positive density-dependent manner. Results: In the first experiment, increasing crayfish density reduced both macrophytes and animal prey (dragonfly and chironomid larvae) and, importantly, increased the growth rate of individual crayfish, in accordance with our expectation. In the second experiment, we used artificial macrophytes to clarify whether the physical architecture of macrophytes itself protects animal prey and limits crayfish growth rate. Increasing the artificial macrophyte quantity not only increased the survival of animal prey, but also retarded the crayfish growth rate. Conclusions: We conclude that macrophytes strengthen bottom-up control of crayfish, but this effect can be relaxed by increasing the density of crayfish via reduction in macrophytes. This positive feedback process may explain the crayfish outbreaks and regime shifts occasionally observed in invaded freshwater ecosystems." (Authors)] Address: Nishijima, S., Lab. Biodiversity Sci., School of Agric. & Life Sciences, The Univ. of Tokyo, 1-1-1 Yayoi, Bunkyo, Tokyo 113-8657, Japan. E-mail: nishijimash@gmail.com

16546. Okude, G.; Futahashi, R.; Tanahashi, M.; Fukatsu, T. (2017): Laboratory rearing system for *Ichnura senegalensis* (Insecta: Odonata) enables detailed description of larval development and morphogenesis in dragonfly. *Zoological Science* 34(5): 386-397. (in English) ["In an attempt to establish an experimental dragonfly model, we developed a laboratory rearing system for *I. senegalensis*. Adoption of multi-well plastic plates as rearing containers enabled mass-rearing of isolated larvae without cannibalism and convenient microscopic monitoring of individual larvae. Feeding *Artemia* brine shrimps to younger larvae and *Tubifex* worms for older larvae resulted in low mortality, synchronized ecdysis, and normal development of the larvae. We continuously monitored the development of 118 larvae every day, of which 49 individuals (41.5%) reached adulthood. The adult insects were fed with *Drosophila* flies in wet plastic cages, attained reproductive maturity in a week, copulated, laid fertilized eggs, and produced progeny. The final larval instar varied from 9th to 12th, with the 11th instar (56.5%) and the 12th instar (24.2%) constituting the majority. From the 1st instar to the penultimate instar, the duration of each instar was relatively short, mainly ranging from three to 11 days. Afterwards, the duration of each instar was prolonged, reaching 7–25 days for the penultimate instar and 14–28 days for the final instar. Some larvae of final, penultimate and younger instars were subjected to continuous and close morphological examinations, which enabled developmental staging of larvae based on size, shape, and angle of compound eyes and other morphological traits. This laboratory rearing system may facilitate the understanding of physiological, biochemical, and molecular mechanisms underlying metamorphosis, hormonal control, morphogenesis, body color polymorphism, and

other biological features of dragonflies." (Authors)] Address: Okude, G., Dept. Biol. Sci., Graduate School Sci., Univ. Tokyo, Tokyo 113-0033, Japan Bioproduction Research Inst., Nat. Institute of Advanced Industrial Science & Technology (AIST), Tsukuba 305-8566, Japan. E-mail: g-okude@aist.go.jp

16547. Okuyama, H.; Takahashi, J. (2017): The complete mitochondrial genome of *Mnais costalis* Selys (Odonata: Calopterygidae) assembled from next generation sequencing data. *Tombo* 59: 77-83. ["We describe the complete mitochondrial genome of *M. costalis* from Shiga Prefecture, which is sympatric region where closely related species show loss of their wing-color polymorphism. The mitochondrial genome of *M. costalis* was determined to be a circular molecule of 15,484 bp. It was predicted to contain 13 protein-coding, 22 tRNA and two rRNA genes, and a non-coding control region. The organization of the genome is similar to that in the other Odonata species, including *M. costalis* (KU871065). The frequencies for occurrence of A, T, C and G nucleotides were 40.02, 26.25, 19.53 and 14.17%, respectively, with an average AT content of 66.27%. Four start codons (ATG, ATC, ATT, and TTG) and four stop codons (TAA, TAG and an incomplete TA and T) were observed in the 13 protein-coding genes. 22 tRNAs were predicted to form the cloverleaf secondary structures." (Authors)] Address: Okuyama, H., Fac. Life Sci., Kyoto Sangyo Univ., Kamigamo-Motoyama, Kita-ku, Kyoto, Kyoto, 608-8555 Japan. E-mail: k5533@cc.kyoto-su.ac.jp

16548. Op de Beeck, L.; Verheyen, J.; Stoks, R. (2017): Integrating both interaction pathways between warming and pesticide exposure on upper thermal tolerance in high- and low-latitude populations of an aquatic insect. *Environmental Pollution* 224: 714-721. (in English) ["Highlights: •Exposure to multiple chlorpyrifos (CP) pulses reduced thermal tolerance (CTmax). •CP effect on CTmax was lower under warming due to lower CP accumulation. •Reduction in CTmax can partly be explained by reduction of the aerobic scope. •Thermal adaptation did not shape the impact of warming and CP on CTmax. •Climate-induced toxicant impact shaped toxicant-induced climate sensitivity. Global warming and chemical pollution are key anthropogenic stressors with the potential to interact. While warming can change the impact of pollutants and pollutants can change the sensitivity to warming, both interaction pathways have never been integrated in a single experiment. Therefore, we tested the effects of warming and multiple pesticide pulses (allowing accumulation) of chlorpyrifos on upper thermal tolerance (CTmax) and associated physiological traits related to aerobic/anaerobic energy production in *Ichnura elegans*. To also assess the role of latitude-specific thermal adaptation in shaping the impact of warming and pesticide exposure on thermal tolerance, we exposed larvae from replicated high- and low-latitude populations to the pesticide in a common garden rearing experiment at 20 and 24 °C, the mean summer water temperatures at high and low latitudes. As expected, exposure to chlorpyrifos resulted in a lower CTmax. Yet, this pesticide effect on CTmax was lower at 24 °C compared to 20 °C because of a lower accumulation of chlorpyrifos in the medium at 24 °C. The effects on CTmax could partly be explained by reduction of the aerobic scope. Given that these

effects did not differ between latitudes, gradual thermal evolution is not expected to counteract the negative effect of the pesticide on thermal tolerance. By for the first time integrating both interaction pathways we were not only able to provide support for both of them, but more importantly demonstrate that they can directly affect each other. Indeed, the warming-induced reduction in pesticide impact generated a lower pesticide-induced climate change sensitivity (in terms of decreased upper thermal tolerance). Our results indicate that, assuming no increase in pesticide input, global warming might reduce the negative effect of multiple pulse exposures to pesticides on sensitivity to elevated temperatures." (Authors)] Address: Op de Beeck, Lin, Lab. Aquatic Ecol., Evol.n & Conserv., Univ. Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: lin.opdebeeck@kuleuven.be

16549. Orr, A.G.; Richards, S.J. (2017): Two new *Papuargia* Liefstinck, 1938 from Papua New Guinea (Odonata: Platycnemididae). *Odonatologica* 46(1/2): 137-152. (in English) ["A second species of the hitherto monotypic New Guinean genus *Papuargia* Liefstinck, 1938 and a new subspecies of *P. stueberi* Liefstinck, 1938 are described from Papua New Guinea. These are *P. brevistigma* sp. nov. and *P. stueberi* *luciedecknerae* ssp. nov. The characters which define the genus are discussed with special reference to the labium and penis, which appears to show a previously unknown synapomorphy." (Authors)] Address: Orr, A.G., Cooperative Res. Centre Tropical Rainforest Ecol. & Management, Environ. Sci., Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@university.net.au

16550. Orr, A.G.; Richards, S.J. (2017): Addendum and corrigenda to *Odonatologica* 46: 137-152. The type repository of *Papuargia stueberi* *luciedecknerae* ssp. nov. (Odonata: Platycnemididae). *Notulae odonatologicae* 8(10): 391-392. (in English) ["To ensure that the name *P. stueberi* *luciedecknerae*, described (2017) in *Odonatologica* 41: 283-291, is available, the type repository, inadequately presented in the original description, is stated along with a diagnosis of the subspecies." (Authors)] Address: Orr, A.G., 1 Environmental Futures Research Institute, Griffith University, Nathan, Qld 4111, Australia. E-mail: agorr@bigpond.com

16551. Orzechowski, R. (2017): Observations of dragonflies (Odonata) in the western part of the Notecka Forest. *Odonatrix* 134 (2017): 4 pp. (in Polish, with English summary) ["The paper presents results of three weeks' dragonfly observations in the western part of the Notecka Forest (Voivodeship Lubuskie), which took place between the 30-V- and 18-VI-2014. In 4 UTM squares (WU43, WU44, WU54, WU55) 22 species were recorded. *Leucorrhinia pectoralis* and *Crocothemis erythraea* were found in the investigated for the first time." (Author)] Address: Orzechowski, R., ul. Cisowa 1A/6, 65-960 Zielona Góra, Poland

16552. Osozawa, S.; Sato, F.; Wakabayashi, J. (2017): Quaternary vicariance of lotic *Coelicia* in the Ryukyu-Taiwan Islands contrasted with lentic *Copera*. *Journal of Heredity* 108(3): 280-287. (in English) ["Lotic Odonata are expected to be more

affected by vicariance than lentic sister species. We demonstrated that severe vicariant speciation acted on lotic *Coelicia* in contrast to lentic *Copera* damselflies, which are both included in the family Platycnemididae. We constructed maximum likelihood and Bayesian inference trees of these Platycnemididae species from the continental islands of Ryukyu (Amami, Okinawa, and Yaeyama islands), Taiwan, and Japan relative to Chinese species using raxmlGUI and BEAST, based on the mitochondrial COI gene (682 bp), COII gene (494 bp), 16SrRNA (478 bp), and the nuclear 28SrRNA gene (807 bp). In BEAUti, we calibrated the splitting age of the MRCA of all the *Coelicia* species as 1.55-0.15 million years ago (Ma), a date that corresponds to a geologic constraint: the Okinawa trough and associated straits, including the Yilan basin in Taiwan, began to rift at 1.55 Ma, isolating the Ryukyu-Taiwan islands from the Chinese continent. The vicariance split *Coelicia* into the Ryukyu-side clade of *Coelicia* *ryukyuensis* (Coe. r. *ryukyuensis* in Okinawa and Coe. r. *amami* in Amami) and *Coelicia* *flavicauda* (Coe. f. *masakii* in Yaeyama and Coe. f. *flavicauda* in southern Taiwan), and the Chinese-side clade of *Coelicia* *cyanomelas* (northern Taiwan and China), separated by the Okinawa trough. These *Coelicia* species were further deeply differentiated to form local populations on the major islands and some of the minor islands. The *Copera* clade constituted a sister of the lotic *Coelicia* clade, but genetic differentiation was not recognizable in lentic *Copera* between China, Taiwan, and Japan. Base substitution rates applying a strict clock model were estimated for COI: 0.0783, COII: 0.0803, 18SrRNA: 0.0186, 28SrRNA: 0.00577, and combined: 0.0408 substitutions/site/myr, and these rates are relatively high." (Authors)] Address: Osozawa, S., Dept of Earth Sciences, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan

16553. Ott, J. (2017): Neozoen in Rheinland-Pfalz – Segen oder Fluch für unsere Arten und Lebensräume? Eine erste Zusammenstellung von Arten im Hinblick auf ihr Schädigungspotenzial für Libellen (Odonata). *Mainzer naturwissenschaftliches Archiv* 54: 193-217. (in German, with English summary) ["For the first time all invasive species – vertebrates and invertebrates – which have a known or potential impact on dragonflies in Rheinland-Palatinate have been compiled. They have direct and indirect effects and even both. To date adult dragonflies are not impacted, but the larval and aquatic stages are, even more and often to a large extent. The most negative impact derives from invasive crayfish (Decapoda), which even leads to destroyed habitats and reduced ecosystem services. Beside the invasive crayfish also some fish, molluscs and insects have a distinct impact. To avoid or at least reduce further damages the execution of existing environmental laws by the authorities must be intensified and the release of new invasive species must be avoided by all means. The expansion of already introduced invasive species must be stopped or should at least been reduced, as prevention is much better from the ecological as well as from the economic point of view. The populations of invasive species as well as their impact have to be monitored permanently. In the general public there is still a lack of knowledge concerning this topic, consequently also pro-

grammes for environmental education should be implemented." (Author)] Address: Ott, J., L.U.P.O. GmbH, Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16554. Ott, J. (2017): Erfassung der Libellenfauna am Mühlgraben im Bereich der Lampertsmühle bei Kaiserslautern (Insecta: Odonata). Fauna Flora Rheinland-Pfalz 13(3): 693-706. (in German, with English summary) ["Investigation on the dragonfly fauna of the "Mühlgraben" near the Lampertsmühle (city of Kaiserslautern). The author reports on an investigation of the dragonfly fauna of a two kilometer long ditch, which runs parallel to the river Lauter in the northern part of the city of Kaiserslautern. At first glance the water seemed not very important for nature conservation, but a remarkable diversity of dragonflies was found. So plans to destroy the ditch should be reconsidered and given up." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16555. Ott, J. (2017): Erfassung der Libellenfauna (Odonata) am Glan im Jahr 2015 – mit störungsökologischen Betrachtungen. Mitteilungen der Pollichia 98: 91-104. (in German, with English summary) ["The river Glan, 87.5 km long and situated in the German federal states Saarland and Rhineland-Palatinate, is used for canoe tourism. In particular in its lower section between the villages Lauterecken and Odemheim, where it flows into the river Nahe, this type of recreation led to conflicts with fishing, water management, nature conservation, and the residents. After a moderation in 2015, several studies had been carried out to provide evidence for this impact of canoeing, e.g. on birds, fish and also dragonflies. In this article, the study on the dragonfly fauna of the Glan with reference on their disturbance ecology is presented. 18 species were found in total during summer 2015. The rheophilic *Onychogomphus forcipatus* and *Ophiogomphus cecilia* (which is listed on Annex II and IV of the EC Habitats Directive and according to the national law "strictly protected") are of particular interest here. For these two species (larvae and adults) no significant negative impact could be found, as well as for the other species present at this river and consequently no contravention of the national law could be expected. However, on the basis of all studies some management measurements and some rules of action were proposed to minimize any possible impact, moreover suggestions for more detailed studies on the disturbance ecology of dragonflies were given." (Authors)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16556. O'Brien, M.F.; O'Brien, D.S.; Craves, J.A. (2017): *Cordulegaster erronea* Hagen in Selys (Tiger Spiketail) rediscovered in Michigan (Odonata: Cordulegastridae). The Great Lakes Entomologist 50(1-2): 1-5. (in English) ["*C. erronea* has been included on the list of Michigan Odonata based on one specimen collected in 1934. In 2016, the species was found in Kalamazoo County, Michigan. It is the least abundant *Cordulegaster* species in Michigan, and the habitat requirements in Michigan are compared with known *C. erronea* habitats in

Ohio and New Jersey." (Authors)] Address: O'Brien, M.A., Museum of Zoology, University of Michigan, 3600 Varsity Drive, Ann Arbor, MI 48108, USA.

16557. Padinjattayil, S.; Agrawal, A. (2017): Abstract: L8.00009: Flow around a corrugated wing over the range of dragonfly flight. Bulletin of the American Physical Society, 70th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, Nov. 19–21, 2017; Denver, Colorado: (in English) [Verbatim: The dragonfly flight is very much affected by the corrugations on their wings. A PIV based study is conducted on a rigid corrugated wing for a range of Reynolds number 300-12000 and three different angles of attack (5°-15°) to understand the mechanism of dragonfly flight better. The study revealed that the shape of the corrugation plays a key role in generating vortices. The vortices trapped in the valleys of corrugation dictates the shape of a virtual airfoil around the corrugated wing. A fluid roller bearing effect is created over the virtual airfoil when the trapped vortices merge with each other. A travelling wave produced by the moving virtual boundary around the fluid roller bearings avoids the formation of boundary layer on the virtual surface, thereby leading to high aerodynamic performance. It is found that the lift coefficient increases as the number of vortices increases on the suction surface. Also, it is shown that the partially merged co-rotating vortices give higher lift as compared to fully merged vortices. Further, the virtual airfoil formed around the corrugated wing is compared with a superhydrophobic airfoil which exhibits slip on its surface; several similarities in their flow characteristics are observed. The corrugated airfoil performs superior to the superhydrophobic airfoil in the aerodynamic efficiency due to the virtual slip caused by the travelling wave.] Address: not stated

16558. Pandey, P.; Mohapatra, A.K. (2017): Diversity of two families Libellulidae and Coenagrionidae (Odonata) in Regional Institute of Education Campus, Bhubaneswar, Odisha, India. Journal of Threatened Taxa 9(2): 9851-9857. (in English) ["Libellulidae and Coenagrionidae are the most dominant families among Odonata. The present study deals with the diversity, occurrence and present status of libellulids and coenagrionids within the Regional Institute of Education Campus in Bhubaneswar, Odisha, India (RIEC). The major objectives of this study are to prepare a preliminary checklist of libellulids and coenagrionids species in the RIEC and to find out the status and distribution of genera and species in their respective families. This study is also aimed at systematic planning for developing different strategies for conservation of odonates in the campus. During this study a total of 24 species have been recorded out of which 20 species belong to the family Libellulidae representing 15 genera and four species belong to the family Coenagrionidae representing four genera. The findings of this study are based on the survey which was carried out for a period of four months in 2015." (Authors)] Address: Pandey, Priyamvada, Dept Life Sci. Education, Reg. Inst. Education (NCERT), Bhubaneswar, Odisha 751004, India. E-mail: riyamwada.pandeytai@gmail.com

16559. Parr, A.J. (2017): Migrant and dispersive dragonflies in Britain during 2016. J. Br. Dragonfly Society 33(2): 104-111.

(in English) ["The year 2016 was a relatively quiet one for migrant dragonflies in Britain, at least in terms of the volume of migration. *Anax parthenope* thus had no more than an 'average' season with reports from fourteen sites, while *Sympetrum fonscolombii* had one of its quietest years for some time. Some small scale arrivals of *S. fonscolombii* were never-the-less still observed. Despite the generally low numbers of migrants, a few highlights did, however, stand out. In particular, *Anax ephippiger* was noted at five sites during the autumn, with individuals being photographed on the Scilly Isles (2 sites), the Orkneys (2 sites) and in coastal Norfolk. Our recent colonist species in general seemed to fair well. In particular, *Chalcolestes viridis* continued its range expansion with sightings from no less than four new counties during the season, namely Bedfordshire, Buckinghamshire, Lincolnshire and Northamptonshire. A new breeding site for *Lestes barbarus* was discovered on the Isle of Wight during June, while in Essex not only did *Aeshna affinis* appear in numbers at its strongholds along the greater Thames Estuary, but what seems likely to be a new breeding site was discovered near St Osyth, well away from sites in the south of the county. Other events of note during the year involved important 'extralimital' sightings of a number of our more established resident species that are currently undergoing range expansion. In particular, *Libellula fulva* produced several unexpected sightings, including reports from Leicestershire and Lincolnshire. *Aeshna isoeles* also continued to be seen in new areas." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

16560. Payra, A.; Deepak, C.K.; Tripathy, B.; Mondal, K.; Chandra, K. (2017): New distributional record of *Megalestes ima Fraser, 1926* (Odonata: Zygoptera: Synlestidae), a damselfly from Arunachal Pradesh, Eastern Himalayas, India. *Eurasian Entomological Journal* 16(4): 314-318. (in English, with Russian summary) ["*M. ima* is recorded for the first time from Arunachal Pradesh, Eastern Himalayas, India. A single specimen was collected from West Kameng District of Arunachal Pradesh. Information on its distribution, habitat and taxonomic characteristics, viz. male genitalia, wing venation and anal appendages, are described together with information on the distribution of the genera in the Indian sub-continent." (Authors)] Address: Payra, A., Zoological Survey of India, M-Block, New Alipore, West Bengal, Kolkata 700053 India. E-mail: arajushpaâra@gmail.com.

16561. Payra, A.; Das, G.N.; Pal, A.; Patra, D.; Tiple, A.D. (2017): New locality records of a rare dragonfly *Gynacantha khasiaca* McLachlan, 1896 (Odonata Aeshnidae) from India. *Biodiversity Journal* 8(1): 27-32. (in English) ["*G. khasiaca* [...] is [...] distributed mainly in South-eastern Asia. During Odonata survey in different parts of North-Eastern and Eastern India from 2014 to 2016, some specimens of this species were observed and photographed from 6 localities. Present record of this species from Purba Medinipur, West Bengal represents its Southernmost distribution in India." (Authors)] Address: Payra, A., Dept of Wildlife & Biodiversity Conservation North Orissa University, Takatpur, Baripada-757003, Odisha, India. E-mail: arajushpayra@gmail.com

16562. Paz, L.; Conesa, M.A. (2017): First record and confirmation of reproduction of *Gomphus vulgatissimus* (Linnaeus, 1758) (Odonata: Gomphidae) in Gipuzkoa (Basque Country, Spain). *Munibe, Cienc. nat.* 65: 4 pp. (in Spanish, with English and Basque summaries) ["Following the discovery in 2016 of a *G. vulgatissimus* larva in the river Araxes, this species is recorded for the first time in the province of Gipuzkoa (N Iberian Peninsula), confirming its reproduction on this site." (Authors)] Address: EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. • 20180 Oiartzun, Sûain. E-mail: leire@ekolur.com

16563. Paz Leiza, L.; Conesa García, M.A.; Torralba Burial, A. (2017): Contribución de la red de seguimiento de la calidad de los ríos guipuzcoanos al conocimiento de la distribución de los Odonata de Gipuzkoa (España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 278-280. (in Spanish, with English summary) ["Contribution of the Guipuzcoan river quality monitoring network to the knowledge of the distribution of Odonata in Gipuzkoa (Spain). Abstract: Data on the distribution of rheophilic Odonata are presented, extracted from the analysis of the larvae included in the samples of benthic macroinvertebrates collected in a series of river quality monitoring campaigns conducted in Gipuzkoa (Spain). Records of special interest are those of *Coenagrion mercuriale*, *Onychogomphus forcipatus forcipatus*, *O. forcipatus unguiculatus* and *Oxygastra curtisii*." (Authors)] Address: Paz Leiza, L., EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. 20180 Oiartzun, Spain. E-mail: leire@ekolur.com

16564. Pérez Fernández, P.J.; Rodríguez Lozano, B. (2017): Primeras citas de *Onychogomphus forcipatus* subsp. *unguiculatus* (Vander Linden, 1820) y *Platycnemis latipes* Rambur, 1842 (Insecta, Odonata) para la provincia de Almería (SE Península Ibérica). *Revista gaditana de Entomología* 7(1): 177-182. (in Spanish, with English summary) ["*O. forcipatus* subsp. *unguiculatus* and *P. latipes* are recorded for first time in the province of Almería, in Caramel river, Segura river basin, within Parque Natural Sierra María - Los Velez." (Authors)] Address: Pérez Fernández, P.J., SERBAL, Sociedad para el Estudio y Recuperación de la Biodiversidad Almeriense. Baqueira Beret nº 2, 04720 Aguadulce 04009, Almería, Spain. E-mail: pedroperez@serbal-almeria.com

16565. Peterson, M.G.; Lunde, K.B.; Chiu, M.-C.; Resh, V.H. (2017): Seasonal progression of aquatic organisms in a temporary wetland in northern California. *Western North American Naturalist* 77(2): 176-188. (in English) ["Seasonal wetlands are important habitats for biodiversity of both invertebrate and vertebrate fauna. Many aquatic species have life history traits adapted to colonizing and developing in temporary aquatic habitats, and these traits influence the annual succession of the macroinvertebrate community. The chronology of taxon appearance and the variation in relative abundances during the hydroperiod are important for understanding population dynamics, trophic interactions, and responses to drought. This study investigated the successional

changes in macroinvertebrate abundances in a seasonal wetland in northern California. Water quality parameters were measured regularly, including dissolved oxygen, temperature, pH, surface area, and specific conductance during the wet season (January–July) in 2007–2009. Macroinvertebrates were collected with net sweeps (mesh > 500 mm), and the presence of life stages of amphibians were visually observed from March to June each year. As the hydroperiod progressed, wetland surface area decreased, while water temperature and specific conductance increased. Macroinvertebrate abundance increased with the progression of the hydroperiod, and the richness of macroinvertebrate predator taxa tripled from 2 families in March to 6 families in June. The earliest part of the hydroperiod in the wetland was dominated by *Cyzicus* clam shrimp and *Linderiella occidentalis* fairy shrimp. *Limnephilus* caddisfly larvae were few in number but were found exclusively in the early season. Sequential changes of dominant invertebrate taxa and relative abundances of macroinvertebrates were evident, particularly among several macroinvertebrate predators. Among these predators, the early-season community was dominated by larval dytiscid beetles, while later-season communities demonstrated increased predator richness (e.g., *Notonecta* backswimmers) and were dominated by *Lestes* damselflies. Larvae of the vertebrate predator *Taricha torosa*, which may act as a top predator, were present during the later stages of the hydroperiod. The phenology of individual aquatic taxa and their specific life history strategies may impact the sensitivity of macroinvertebrate populations to increased annual variation in hydroperiod that may result from climate changes in this region." (Authors)] Address: Peterson, M.G., Dept of Environmental Science, Policy and Management, University of California, Berkeley, CA 94720-3114, USA. E-mail: petersmg@berkeley.edu

16566. Petrulevicius, J.F. (2017): First Frenguelliidae (Insecta: Odonata) from the middle Eocene of Río Pichileufú, Patagonia, Argentina. *Archivos Entomológicos* 18: 367-374. (in Spanish, with English summary) ["A new genus, *Treintamilun* gen. nov., based on *Treintamilun vuelvenlucha* sp. nov. is described from Río Pichileufú (Lutetian), Río Negro province, Patagonia, Argentina. The new genus is assigned to Frenguelliidae. The finding of a second genus and third species of Frenguelliidae is noteworthy, contributing to the better knowledge of this little known family and bear out its presence in the Eocene of Patagonia. While the previous species of Frenguelliidae were recorded from the Ypresian (52 Ma) of Laguna del Hunco, the new one comes from the neighbour locality 160 Km far and 48 Ma old. The Frenguelliidae share a nodal furrow reduced, a ScP reaching costal margin very obliquely at nodus, a nodal Cr sub-vertical and subnodus vertical, and one of the groundplan apparent characters of the Eiproctophora, a curved CuP." (Author)] Address: Petrulevičius, J.F., División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata and Consejo Nacional de Investigaciones Científicas y Técnicas – CONICET. Paseo del Bosque, s/n. La Plata (1900), Buenos Aires, Argentina. E-mail: levicius@fcnym.unlp.edu.ar

16567. Petrulevičius, J. (2017): A new burmagomphid dragonfly from the Eocene of Patagonia, Argentina. *Acta Palaeontologica Polonica* 62(4): 779-783. (in English) ["A new burmagomphid anisopteran, *Satellitula soberana* gen. et sp. nov. is described from the lower Eocene of Laguna del Hunco, Patagonia, Argentina. The new genus is characterised by hindwing characters such as the subdiscoidal triangle not elongated; anal loop divided longitudinally; paranal cell divided longitudinally; five terminal cells between RP and MA; five terminal cells between MP and CuA; and obtuse angle between PsA and CuP+AA. Burmagomphid dragonflies were represented so far only by one specimen from the middle Cretaceous of South-east Asia. This new record extends the distribution to Patagonia, to the Cenozoic, and also to paleolake deposits." (Author)] Address: Petrulevičius, J.F., CONICET & División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Univ. Nac. de La Plata, Paseo del Bosque s/n, La Plata (1900), Argentina. E-mail: levicius@fcnym.unlp.edu.ar

16568. Petzold, F. (2017): Rote Liste und Gesamtartenliste der Libellen (Odonata) von Berlin. 2. Fassung, Stand Juli 2016. In: Der Landesbeauftragte für Naturschutz und Landschaftspflege / Senatsverwaltung für Umwelt, Klima und Verkehr (Hrsg.): Rote Listen der gefährdeten Pflanzen, Pilze und Tiere von Berlin, 30 S. doi: 10.14279/depositonce-5849: 1-30. (in German, with English summary) ["Red List and checklist of the dragonflies of Berlin] So far, 61 species of dragonflies were recorded in Berlin. Since 2005, when the last checklist was published, three species were newly found in Berlin (*Anax ephippiger*, *Crocothemis erythraea*, *Sympetrum meridionale*). A total of 23 species (40 %) were classified as threatened. Four species are considered "extinct or missing". Six species were classified as "critically endangered", three species as "endangered" and seven as "very rare". One species was not rated due to an insufficient data base. 34 species (59 %) are considered to be of least concern. Four species, in the former Red List from 2005 classified as "extinct" (*Epithea bimaculata*, *Leucorrhinia albifrons*, *L. caudalis*, *Orthetrum coerulescens*), were rediscovered. For selected species information regarding the population status is provided. Furthermore, the degree of endangerment of the Odonata communities of different habitats is discussed." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-mail: petzold.falk@googlemail.com

16569. Phan, Q.T. (2017): *Coeliccia duytan* sp. nov. from the Central Highlands of Vietnam (Odonata: Platycnemididae). *Zootaxa* 4324(1): 195-200. (in English) ["*C. duytan* sp. nov. (holotype ♂, from Chu Mom Ray National Park, Kon Tum Province, the Central Highlands of Vietnam, deposited in zoological collection of Duy Tan University) is described based on both sexes. The new species is closely related to *C. hayashii* Phan & Kompier, 2016 by the extensive rectangular pruinosity on the synthorax but differs in lacking a pale antehumeral stripe, genital ligula with flagella pointed at tip and the shape of cerci." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research & Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16570. Phan, Q.T.; To, V.Q.; Ho, V.H.; Pham, A.T.; Ta, P.M. (2017): Study on the damselfly genus *Prodasineura* Cowley, 1934 (Odonata: Zygoptera: Platycnemididae) of Vietnam. Proceedings of the 7th national scientific conference on ecology and biological resources: 989-997. (in English) ["Damselfly of the genus *Prodasineura* Cowley, 1934 had been placed in the family Protoneuridae before Dijkstra et al. (2014) rearranged it into the family Platycnemididae by using a molecular phylogenetic approach. They are very slender built damselfly, the male coloured usually with deep black, striped with blue, red or yellow, respectively. Thoracic pattern are usually used for identifying species in the genus. Superiors of anal appendages are hammer-like with pointed at apex; inferiors is broad at base and tapering abruptly to a round tip. The females are similar in shape of body and thoracic colour pattern. The posterior lobe of female prothorax characteristically well developed and can be good character for separating close species. They are usually found at the slowly flowing near the opened streams of secondary forests or backwaters of swift rivers in lowlands. In this study, three species of the genus *Prodasineura* are recorded for the first time for Vietnam, including *P. doisuthepensis* Hoess, 2007, *P. hoffmanni* Kosterin, 2015 and *P. verticalis* Selys, 1860. This result brings the number of *Prodasineura* species known in Vietnam into 7. Moreover, we also provided an updating distribution of all recorded *Prodasineura* species based on several related publications and personal database of the authors." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research and Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16571. Pierce, A.J. (2017): The first record of *Anax ephippiger* for Thailand and Southeast Asia (Odonata: Aeshnidae). *Notulae odonatologicae* 8(9): 365-368. (in English) ["*A. ephippiger* is reported from Thailand for the first time on the basis of photographic records. On 28-ix-2016 one male was found on the outskirts of the village of Saphli, Chumphon province in southern Thailand. *A. ephippiger* was previously unrecorded in Southeast Asia, being the sixth species in the genus to have been recorded in Thailand." (Author)] Address: Pierce, A.J., Conservation Ecol. Program, School of Bioresources and Technology, King Mongkut's Univ. of Tech. Thonburi, Bangkokkhunthien, Bangkok 10150, Thailand; andyp67@gmail.com

16572. Pinach, J.M.E.; Teruel, S. (2017): Aportaciones al conocimiento de la odonofauna (Insecta: Odonata) de la Comunitat Valenciana (este de España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 285-291. (in Spanish, with English summary) ["Contributions to the knowledge of the odonofauna (Insecta: Odonata) of the valencian community (east of Spain): New information is collected about 14 species of dragonflies scarce in the Valencian Community (distributed less than 10 UTM 10x10 km squares) and/or threatened (includes in the Red List of Invertebrates of Spain), updating their distribution in this Spanish autonomous region. Among these species are *Oxygastra curtisii*, *Gomphus graslinii*, *Onychogomphus costae*, *Orthetrum nitidiverve* or *Brachytron pratense*. We provide the first record of reproduction of *Diplacodes lefebvrei* for the provinces of Castellon and Valencia and the

first record of *Zygonyx torridus* for the province of Castellon." (Authors)] Address: Pinach, J.M.E., Parotets- Sociedad Odonatologica de la Comunitat Valenciana. C/ Padre Vicente Cabanes, 5-12. 46900 Torrent (Valencia, Spain

16573. Pinach, J.M.P.; Díaz-Martínez, C. (2017): Odonatos (Insecta: Odonata) del Parque Natural de la Serranía de Cuenca (Castilla-La Mancha, centro-este de España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 257-268. (in Spanish, with English summary) ["The Odonata (Insecta) of the Serranía de Cuenca natural park (Castilla-La Mancha, central-eastern Spain): The odonate fauna of the Serranía de Cuenca natural park and its surrounding area is described from bibliographic records, unpublished data and observations recorded during 2015 and 2016. A total of 49 species have been found so far. *Sympetrum flaveolum*, with a single previous record from 1902, was found at 16 new sites. The known distribution of species which are scarce in Cuenca province or have only recently been detected there, such as *Lestes sponsa*, *L. dryas*, *Anax ephippiger*, *Sympetrum sanguineum* or *Trithemis kirbyi* is extended. Regarding threatened species, *Coenagrion mercuriale* was present at 36 sites, while *Aeshna juncea* and *S. vulgatum ibericum* have their only known provincial localities within the study area." (Authors)] Address: Pinach, J.M.E., Dirección Provincial. Delegación de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. C/Colón, 2, 16071 Cuenca, Spain. E-mail: jjevanach@hotmail.com

16574. Pinkert, S.; Bechly, G.; Nel, A. (2017): First record of hawker dragonflies from Eocene Baltic amber (Odonata: Anisoptera: Gomphaeschnidae). *Zootaxa* 4272(2): 263-275. (in English) ["Based on three specimens, the first record of hawker dragonflies from Baltic amber is described in a new genus with two new species: *Elektrogomphaeschna peterthieli* gen. et sp. nov. and *E. annekeae* sp. nov.. They belong to the family Gomphaeschnidae and are tentatively attributed to the extinct subfamily Gomphaeschnaoidinae. The latter was previously only known from Cretaceous fossils and is here shown to have survived the K-Pg mass extinction event. This discovery also confirms the still higher diversity of Gomphaeschnidae during the Paleogene compared to the Neogene that was dominated by the more derived Aeshnidae sensu stricto." (Authors)] Address: Pinkert, S., Faculty of Biol., Department of Ecology – Animal Ecology, Philipps-Universität Marburg, Karl-von-Frisch-Strasse 8, 35043 Marburg, Germany. E-mail: StefanPinkert@posteo.de

16575. Polaskova, V.; Schenkova, J.; Bartosova, M.; Radkova, V.; Horsák, M. (2017): Post-mining calcareous seepages as surrogate habitats for aquatic macroinvertebrate biota of vanishing calcareous spring fens. *Ecological Engineering* 109, Part A: 119-132. (in English) ["Many studies have investigated the vegetation and terrestrial fauna of post-mining spoil heaps, but little is known about aquatic macroinvertebrates in these areas, particularly at spring-fed habitats. We studied nine seepages (i.e. spring-fed habitats) located at two neighbouring spoil heaps in the Sokolov brown-coal basin (Czech Republic),

characterised by basic water pH, calcium carbonate precipitation, high heavy metal and sulphate concentrations. Along with these nine artificial calcareous seepages, we also sampled macroinvertebrates at 15 natural and well-preserved calcareous spring fens to compare species richness and assemblage similarity between these two systems. We also categorised recorded species as spring specialists or generalists (i.e. matrix-derived species) to compare their importance for the similarity in diversity of these two habitat types. Our study revealed that post-mining calcareous seepages harboured unusually taxa-rich macroinvertebrate assemblages (158 taxa), despite their harsh conditions related to extreme water chemistry. Diptera, with 85 taxa, were the most diverse group, reaching taxon richness comparable with dipteran assemblages in natural calcareous spring fens. According to Sørensen pairwise dissimilarity, dipteran assemblages of postmining and natural sites were more similar in the composition of spring specialists than that of generalists, showing a strict relationship between specialist assemblages and specific environmental conditions of postmining and natural sites. In addition, dipterans inhabiting post-mining seepages were demonstrated not to be limited by their extreme water chemistry, but they seemed to be associated with specific substratum properties, creating a mosaic of various microhabitats. We can therefore conclude that calcareous post-mining seepages have great potential to offer valuable analogues of natural habitats and may create biodiversity refuges for a high number of aquatic invertebrates, including spring habitat specialists and nationally threatened species. Thus, post-mining seepages seem to have similar or even higher conservation potential to more complex and larger post-mining freshwater habitats, such as post-mining streams and mine subsidence pools." (Authors)] Address: Polášková, Vendula, Dept of Botany and Zoology, Faculty of Science, Masaryk Univ., Kotlářská 2, CZ-611 37 Brno, Czech Republic

16576. Polette, P.; Abbott, C.; Gouys, J.; Jenard, P.; Julian, P.; Darnaud, S.; Boudot, J.-P. (2017): Premières mentions de *Trithemis kirbyi* (Odonata: Libellulidae) en France. *Martinia* 33(1/2): 15-25. (in French, with English summary) ["During two months starting on 21 June 2017, *T. kirbyi* has been recorded from five localities in continental France, in perfect agreement with the heatwave which reached the whole of the country and nearby regions from 18 to 25 June. These observations are discussed in the light of the expansion and dispersion of the species in Europe, which began in 2003 in remote insular localities and knew further developments since 2007 on the continent. Thanks to its opportunistic behaviour and physiology allowing it to carry out a successful reproductive cycle in most of natural and artificial waterbodies, and its propensity to nomadism allowing it to take advantage of warm atmospheric flows going from Africa to Europe, the species did not take more than ten years to expand from the South to the North of the Iberian Peninsula and to reach France. Rather than a simple step by step expansion, the 2017 French records appear to constitute a long-distance vagrancy which may have reached a mean of 45-90 km per day during six days, favoured by unusual warm weather conditions on the west of Europe. These records deal mostly

with isolated males standing during several consecutive days at a constant place, which suggests that the involved individuals remained the same throughout in a given locality, pointing to an onset of settlement. The possible establishment of the species on the long run in southern France will have to be surveyed during the following years.] Address: Polette, P., Impasse des Amoureux, F-11250 Couffoulens, France. E-mail: p.polette@orange.fr

16577. Poulin, B.; Lefebvre, G.; Muranyi-Kovacs, C., Hilaire, S. (2017): Mosquito traps: An innovative, environmentally friendly technique to control mosquitoes. *Int. J. Environ. Res. Public Health* 2017, 14, 313: 8 pp. (in English) ["We tested the use of mosquito traps as an alternative to spraying insecticide in Camargue (France) following the significant impacts observed on the non-target fauna through Bti persistence and trophic perturbations. In a village of 600 inhabitants, 16 Techno Bam traps emitting CO₂ and using octenol lures were set from April to November 2016. Trap performance was estimated at 70% overall based on mosquitoes landing on human bait in areas with and without traps. The reduction of *Ochlerotatus caspius* and *Oc. detritus*, the two species targeted by Bti spraying, was, respectively, 74% and 98%. Traps were less efficient against *Anopheles hyrcanus* (46%), which was more attracted by lactic acid than octenol lures based on previous tests. Nearly 300,000 mosquitoes from nine species were captured, with large variations among traps, emphasizing that trap performance is also influenced by surrounding factors. Environmental impact, based on the proportion of non-target insects captured, was mostly limited to small chironomids attracted by street lights. The breeding success of a house martin colony was not significantly affected by trap use, in contrast to Bti spraying. Our experiment confirms that the deployment of mosquito traps can offer a cost-effective alternative to Bti spraying for protecting local populations from mosquito nuisance in sensitive natural areas." (Authors)] Address: Poulin, Brigitte, Tour du Valat Research Institute for the conservation of Mediterranean wetlands, Le Sambuc, 13200 Arles, France. E-mail: poulin@tourduvalat.org

16578. Prokop, J.; Pecharova, M.; Nel, A.; Hömschemeyer, T.; Krzeminska, E.; Krzeminski, W.; Engel, M.S. (2017): Paleozoic nymphal wing pads support dual model of insect wing origins. *Current Biology* 27: 1-7. (in English) ["Highlights: *Palaeodictyopteran wing pad joints corroborate dual origin of insect wings. *Three pairs of wing pads were medially articulated and markedly fused with notum. *Wing pads were functionally unable to perform active flight due to limited divergence. *Arrangement of wing pad axillary sclerites corresponds to Hamilton's ancestral model. The appearance of wings in insects, early in their evolution [1], has been one of the more critical innovations contributing to their extraordinary diversity. Despite the conspicuousness and importance of wings, the origin of these structures has been difficult to resolve and represented one of the "abominable mysteries" in evolutionary biology [2]. More than a century of debate has boiled the matter down to two competing alternatives—one of wings representing an extension of the thoracic notum, the other

stating that they are appendicular derivations from the lateral body wall. Recently, a dual model has been supported by genomic and developmental data [3–6], representing an amalgamation of elements from both the notal and pleural hypotheses. Here, we reveal crucial information from the wing pad joints of Carboniferous palaeodictyopteran insect nymphs using classical and high-tech techniques. These nymphs had three pairs of wing pads that were medially articulated to the thorax but also broadly contiguous with the notum anteriorly and posteriorly (details unobservable in modern insects), supporting their overall origin from the thoracic notum as well as the expected medial, pleural series of axillary sclerites. Our study provides support for the formation of the insect wing from the thoracic notum as well as the already known pleural elements of the arthropodan leg. These results support the unique, dual model for insect wing origins and the convergent reduction of notal fusion in more derived clades, presumably due to wing rotation during development, and they help to bring resolution to this long-standing debate.] Address: Prokop, J., Dept Zoology, Fac. Science, Charles Univ., Vinicná 7, 128 44 Praha 2, Czech Republic. E-mail: jprokop@natur.cuni.cz

16579. Prunier, F. (2017): Observaciones de odonatos en la sierra de Baza, verano 2017. Boletín Rola 10: 19-38. (in Spanish, with English summary) ["The paper presents the results of the first faunistic study of dragonflies undertaken in the Sierra de Baza Natural Park, one of the most arid area in Andalusia. The water bodies present in the park are described, the most relevant ones for Odonata being four permanent streams and various water tanks associated with natural springs. The sampling was carried out during summer 2017 and allows for the detection of 18 species, highlighting populations of *Aeshna cyanea* in lentic waters and *Coenagrion mercuriale* in lotic ones. Finally, samples of benthonic macro-invertebrates allowed to established the water quality of the streams and the associated dragonflies." (Author)] Address: Prunier, F., Asociación de Educación Ambiental El Bosque Animado / ROLA. E-mail: aaelbosqueanimado.info@gmail.com

16580. Punam, D.; Mitali, D.; Rezina, A. (2017): A study on aquatic insect diversity on some selected water bodies in Guwahati, Kamrup district, Assam. The Clarion 6(1): 18-22. (in English) ["The present study has generated qualitative and quantitative data of insects from selected habitats of Guwahati, Assam which were then assessed at the family level. Abundance and diversity of aquatic insects was studied in five water bodies, (four ponds and a beel) of Guwahati during 2013 to 2014 and insects belonging to 26 genera, under 17 families and 5 orders were recorded. From this study, it was observed that the most abundant order in all the water bodies is the order Ephemeroptera, followed by Odonata, Hemiptera and Diptera. During the study period abundance of insects was comparatively higher in Dighalipukhuri." (Authors)] Address: Punam, D., Bajali College, Pathsala, India. E-mail: punamjalideka@gmail.com

16581. Rafi, M.; Bhat, M.A.; Bhawsar, A.; Vyas, V. (2017): Distribution and abundance of odonates in Palakmati stream of Narmada River Basin. International Journal of Research

in Applied, Natural and Social Sciences 5(11): 127-132. (in English) ["During the present study, odonatan diversity of Palakmati stream was evaluated, using Shannon-Weiner diversity index and Margalef's richness index. Within a 100 m transect, encircling the variety of habitats, odonates were sampled from all the major habitats. A total of 11 species, belonging to 6 families of odonates were recorded, during the study. It was observed during the investigation that, aquatic vegetation forms the favorable habitat for odonates, while it gets negatively affected by the limited shade cover and less riparian vegetation, along the stream banks. During the present survey, low species diversity and richness of odonates were observed in Palakmati stream, possibly due to limited shade cover." (Authors)] Address: Rafi, M., Department of Environmental Sciences and Limnology, Barkatullah University

16582. Rajeshkumar, S.; Raghunathan, C.; Kailash Chandra (2017): *Nososticta nicobarica* sp. nov. (Odonata: Platycnemididae: Disparoneurinae) from Great Nicobar Island, India. Zootaxa 4311(3): 426-434. (in English) ["*Nososticta nicobarica* sp. nov. is described (holotype ♂: ZSI-ANRC-T-4418; 11.ii.2016) from Gandhi Nagar, Great Nicobar Island in the Andaman & Nicobar Islands, India. This is the first record for the genus *Nososticta* from the Indian sub-continent, and a formal description is given. The new species is described on the basis of male anal appendages, particularly cerci with a deeply bifurcate, acute apex, distinctly curved downward. Paraprocts almost straight with blunt apex slightly curved upward and inner margin with small, roughly rectangular hook. The female is characterised by the anterior lobe of the pronotum, which bears two long, divergent hornlike processes and a short posterior lobe with paired club-shaped processes. Affinities with species of Lesser Sundaic region are discussed." (Authors)] Address: Rajeshkumar, S., Zoological Survey of India, Andaman and Nicobar Regional Centre, Horticulture road, Haddo, Port Blair-744 102, Andaman & Nicobar Islands. E-mail: rajeshkumar0802@gmail.com

16583. Ramos, L.S.; Lozano, F.; Muzón, J. (2017): Odonata diversity and synanthropy in urban areas: A case study in Avellaneda City, Buenos Aires, Argentina. Neotropical Entomology 46(2): 144-150. (in English) ["The increase of human population, especially in urban areas, correlates with an alarming destruction of green spaces. Therefore, understanding the mechanisms by which urbanization processes affect biodiversity is crucial in integrating the environment in a proper urban planning. The main urban center of Argentina is known as the Greater Buenos Aires (GBA), and it includes the autonomous city of Buenos Aires and 24 surrounding districts. Avellaneda, one of the districts of the GBA, is an important urban and industrial center with green areas and low level of urbanization on the coastal area of the Río de la Plata. This paper provides the first Odonata inventory for Avellaneda, determines the species' level of synanthropy with the Nuorteva index, and assess the Odonata species replacement along a latitudinal gradient on the occidental margin of the Río de la Plata." (Authors)] Address: Muzón, J., Lab de Biodiversidad y Genética Ambiental (BioGeA), Univ Nacional de Avellaneda, Avellaneda, Argentina

16584. Rathod, P.P.; Manwar, N.A.; Raja, I.A. (2017): Territory behavior, copulation and oviposition in *Brachythemis contaminata* Odonata: Libellulidae. International Journal of Applied Research 3 Special Issue Part E: 125-128. (in English) ["The present investigation explains the reproductive behavior i.e. territory, copulation and oviposition for *B. contaminata* which was carried out for a year between June 2013 to April 2014. The male plays significant role in mating as competing for fertilization by attracting females, but in odonates female also actively involving as taking mating decision, male selection and activities during tandem formation. Territory of mating male is well marked of about 2 to 3 meter in diameter and is at the same place of oviposition. Male prefer territory attachment as strategies of mutual avoidance which reduces energy spent in inter-male fight. Male-females are generally in group with high male ratio till evening and male become more careful and aggressive in evening for his territory. When receptive female visits to mate in male's territory she chooses the fittest male for mating. Male shows aggressiveness, wing vibration, abdominal display, chasing to competitor are the main events use for mating strategies. Copulation takes place in air for only few seconds and mating success for territorial male is high." (Authors)] Address: Rathod, P.P., Dept. of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola (M.S.), India

16585. Reshetnikova, S.N.; Babkina, I.B.; Simakova, A.V.; Susliaev, V.V.; Blohin, A.N.; Interesova, E.A. (2017): Macrozoobenthos diversity of the Middle Ob river tributaries. International Journal of Environmental Studies 74(5: Siberian Biodiversity): 803-810. (in English) ["The data show quantitative and qualitative composition of macrozoobenthos of the 12 left-bank confluences of the Middle Ob. The research has documented the presence of various groups, such as Oligochaeta, Diptera, Odonata, Hirudinea, Tabanidae, Trichoptera and Mollusca. The chironomids, molluscs and leeches play a significant role in the generation of biomass in the surveyed streams, and the abundance mostly depends on chironomids, oligochaetes and leeches. In general, zoobenthos abundance ranges from 8.8 (the Shudelka river) to 1839.9 (the Kochebilovka river) ind./m², biomass is from 0.08 (Tatosh river) to 8.37 (Lozunga river) g/m². The amount and benthos biomass of the Middle Ob's second-order tributaries is higher than in the first-order tributaries." (Authors)] Address: Interesova, E.A., Novosibirsk branch of State Scientific-and-Production Centre of Fisheries, Novosibirsk, Russia. E-mail: tomsk.fish.science2gmail.com

16586. Rodrigues, M.E.; Roque, F. (2017): Checklist de Odonata do Estado de Mato Grosso do Sul, Brasil. Iheringia, Sér. Zool. 107(supl.): e2017117: 4 pp. (in English) ["We recorded 198 species of Odonata for the state of Mato Grosso do Sul, distributed in ten families: Calopterygidae (6 spp.), Coenagrionidae (58 spp.), Dictyrididae (1 sp.), Lestidae (5 spp.), Protoneuridae (10 spp.), Pseudostigmatidae (1 sp.), Aeshnidae (8 spp.), Corduliidae (1 sp.), Gomphidae (13 spp.), and Libellulidae (95 spp.), the first record of one family, six genus and 33 species for the state are included." (Authors)] Address: Rodrigues, M.E., Universidade Federal da Grande Dourados, Programa de Pós-graduação em Entomologia e

Conservação da Biodiversidade, 79804-970, Dourados, MS, Brasil. E-mail: rodrigues.mbio@gmail.com

16587. Rodríguez Esteban, M. (2017): Primeras citas de las libélulas *Lestes sponsa* (Hansemann, 1823), *Aeshna affinis* Vander Linden, 1820, *Trithemis annulata* (Palisot de Beauvois, 1807) y *Trithemis kirbyi* Selys, 1891 en la provincia de Salamanca (centro-oeste Península Ibérica) (Odonata: Lestidae, Aeshnidae, Libellulidae). Boletín de la Sociedad Entomológica Aragonesa 61: 223-226. (in Spanish, with English summary) ["This study provides the first records for Salamanca province (central-western Spain) referring at four dragonfly species, belonging to a diverse biogeographic composition." (Authors)] Address: Rodríguez Esteban, M., Avenida San Agustín, 44. Portal 1. 1º A. 37005. Salamanca (Salamanca), Spain. E-mail: resteban@usal.es

16588. Rychla, A. (2017): Die Libellenfauna des Tongrubengebiets bei Gozdnica (SW Polen) mit besonderer Berücksichtigung von *Leucorrhinia caudalis* (Charpentier, 1840). International Dragonfly Fund Report 109: 1-16. (in German, with English and Polish summary) ["Waters of anthropogenic origin potentially represent a high value for the dragonfly fauna. For this reason, post mining waters were examined for dragonflies in a clay pit area near Gozdnica (Lubuskie Voivodeship, SW Poland) in 2017. The main goals of this study were the verification of the potential occurrence of *L. caudalis* in this area as well as the contribution of these water bodies to the regional dragonfly diversity. As a result of the investigation were two new records of *L. caudalis* with reproduction evidence at one water body and the observations of imagines at two sites. Additionally, two further species protected according to national and European law: *L. pectoralis* and *L. albifrons* were found in the area. Furthermore, the entire area is particularly suitable for pioneer colonizers such as *Ischnura pumilio* and *Libellula depressa*, as well as for thermophilous species such as *Orthetrum coerulescens* and *Crocothemis erythraea*. A total of 30 species of dragonflies were detected. For 16 species the proof of reproduction was provided. The examined water bodies are an important habitat for widespread generalists and for rare specialists. Therefore, they significantly contribute to the regional biodiversity." (Author)] Address: Rychla, Anna, ul. Osiedlowa 12, Ploty, 66-016 Czerwiensk, Poland. E-mail: an.rychla@gmail.com

16589. Saha, S.K. (2017): Odonate (Insecta: Odonata) diversity of West Bengal State University Campus; a checklist and pictorial catalogue. International Journal of Zoology Studies 2(5): 132-138. (in English) [Odonata "are amongst the most attractive creatures on earth, first to have conquered the aerial domain. Yet we know little of their diversity in India and detailed ecology and habitat preferences of many species are poorly documented. Although much work have been carried out regarding the abundance and distribution of insect orders, no sufficient effort has been made to study the diversity and distribution of Odonates. Thus, in the present study an attempt has been taken to study the diversity and abundance of Odonates in West Bengal State University (WBSU) campus, West Bengal, India. A total of 32 species of Odonates

were recorded from the study area from July to September, 2017. The family Libellulidae with 18 species was the most dominant among the Anisoptera followed by Gomphidae (1sp.) and family Aeshnidae (1 sp.). Among the Zygoptera, the 11 species recorded belong to the family Coenagrionidae and 1 species of family platynemididae. As the area houses 32 species of Odonates including 20 species of Anisoptera and 12 species of Zygoptera, it can be presumed to have a good diversity which may be attributed to the grasslands, shrubs and small water bodies inside the campus." (Author)] Address: Saha, S.K., Dept of Zoology, West Bengal State Univ., Berunanpukuria, PO Malikapur, Kolkata, West Bengal, India

16590. Saito, V.; Senzaki, Y.; Yonezawa, C.; Chiba, K.; Jinguji, H. (2017): Assessment of mid-summer drainage regime on the potential for *Sympetrum frequens* conservation by using low threshold temperature and total effective temperature for development of larvae to 10th instar. IDRE Journal 304(85-1): 37-46. (in Japanese, with English summary) ["The aim of the present study was to clarify the effect of a mid-summer paddy field drainage regime on the conservation of *S. frequens*. We investigated the theoretical lower threshold temperature and total effective temperature required for *S. frequens* egg and larval development under laboratory conditions. The lower theoretical threshold temperature and total effective temperature for egg hatching under early, typical and late inundation conditions were 5.7°C and 55.2 degree-days, 5.6°C and 36.8 degree-days, and 6.8°C and 21.7 degree-days, respectively. The theoretical lower threshold temperature and total effective temperature for larval development to the 10th-instar stage were estimated at 5.6°C and 909.1 degree-days. We then estimated the water temperature in paddy rice fields in Miyagi Prefecture based on meteorological data represented on a 1-km grid. Mean days to hatching and days required for larval development to the 10th-instar stage were estimated based on the paddy field water temperature, theoretical lower threshold temperature, and total effective temperature. These results were then represented in a GIS to show the mean time to hatching in days and the time required for development of 10th-instar larvae. Finally, we compared the estimated time required for the development of 10th-instar larvae and the timing of mid-summer paddy field drainage. We considered that the drainage of paddy fields in mid-summer would be conducted before the development of 10th-instar larvae. Based on these findings, we consider that the adoption of a mid-summer drainage regime by rice farmers after *S. frequens* larvae development to 10th-instar stage would promote the conservation of this species. The risks associated with mid-summer drainage are also discussed." (Authors)] Address: Saito, V., Miyagi Univ., Graduate School of Food, Agricultural and Environmental Sciences, Japan

16591. Salmah, M.R.C.; Siregar, A.Z.; Hassan, A., Nasution, Z. (2017): Dynamics of aquatic organisms in a rice field ecosystem: effects of seasons and cultivation phases on abundance and predator-prey interactions. Tropical Ecology 58(1): 177-191. (in English) ["The influence of different rice growing seasons and rice cultivation phases on aquatic organisms was investigated in the Manik Rambung rice field (MRRF)

ecosystem in North Sumatera. Composite collections of core samples and aquatic net samples from four rice growing seasons and five cultivation phases (fallow, plough, transplanting-young, tiller, maturepreharvest) were analysed. There were marked seasonal variations in abundances of these organisms, but the abundance pattern in various rice cultivation phases was comparable among rice growing seasons. The rice field was dominated by tubificids, baetids, chironomids and ceratopogonids. High populations of these organisms were observed during the plough, transplanting-young, and tiller phases, but lower in the other rice cultivation phases. The proliferation of larval *Agriocnemis femina*, one of the rice pest predators in the adult stage, was dependent on its interactions with 14 aquatic taxa in different phases; nine taxa in the plough phase and three to five taxa in other phases. Hemipterans, coleopterans, other odonates, chironomids, baetids and tubificids were important for successful emergence of *A. femina* to a predatory adult. Rice cultivation managements that focus on enhancing the population of *A. femina* would contribute to more effective biological control of rice pests in MRRF." (Authors)] Address: Salmah, M.R.C., School of Biol. Sci., Univ. Sains Malaysia, 11800 Penang, Malaysia. E-mail: csalmah@usm.my

16592. Samraoui, B. (2017): The hand of man or Santa Rosalia's blessing? A rebuttal of the paper "on the restoration of the relict population of a dragonfly *Urothemis edwardsii* Selys (Libellulidae: Odonata) in the Mediterranean". J. Insect Conserv. 22: 345-350. (in English) ["The intentional reintroduction and translocation of animals and plants has, over the last few decades, become an integral part of the panoply of conservation tools. In a recent published paper in J. Insect Conserv. (doi: 10.1007/s10841-016-9911-9), Khelifa et al. (2016) claimed to have restored the last relict population of *U. edwardsii* in the Mediterranean. Here, I provide evidence that their claims are unwarranted, and that what has occurred is a natural process of colonisation by a Critically Endangered population which was confined to a single known site. In addition to several inaccuracies contained in the paper, I will demonstrate that the work was inappropriate and question the adopted methodology that may imperil the type population of *U. edwardsii*. I urge for the translocation initiative to be discontinued and discuss other safe approaches that may benefit the newly expanding population." (Author)] Address: Samraoui, B., Dept of Biology, University of Annaba, Annaba, Algeria

16593. Sanmartín-Villar, I.; Zhang, H.; Cordero-Rivera, A. (2017): Ontogenetic colour changes and male polymorphism in *Mnais andersoni* (Odonata: Calopterygidae). International Journal of Odonatology 20(2): 53-61. (in English) ["Colour-based traits are widespread in flying species due to the importance of visual perception in their communication. Ontogenetic colour changes and reversible physiological colours occur in some species and are used as communication signals to conspecifics. The genus *Mnais* (Zygoptera: Calopterygidae) shows both genetic colour polymorphism and age-related colour changes, making challenging even the identification of species. Here we study three Chinese populations of *M. andersoni* during one month by mark-resighting methods. We describe the ontogenetic body and wing colour changes

of male morphs (orange-winged and hyaline-winged) and females. With maturity, thoracic colour changes from metallic green to copper. The initially transparent wings of the hyaline winged males and females became light amber with age, while the orange-winged males show this colour since emergence to maturity. Whitish pruinosity covered all thorax in orange-winged males, while it remained limited to the ventral part of the thorax in hyaline-winged males and females. Hyaline-winged males presented less abdominal pruinosity than the rest of individuals. Our observations suggest that male morphs of *M. andersoni* are analogous to other species of the genus." (Authors)] Address: Sanmartín-Villar, I., ECOEVO Lab, Universidade de Vigo, Escola de Enxeñaría Forestal, Campus A Xunqueira, 36005 Pontevedra, Galiza, Spain.

16594. Sanmartín-Villar, I.; Rivas-Torres, A.; Gabela-Flores, M.V.; Encalada, A.C.; Cordero-Rivera, A. (2017): Female polymorphism and colour variability in *Argia oculata* (Coenagrionidae: Zygoptera). *Neotropical Biodiversity* 3(1): 203-211. (in English) ["Body colouration frequently possesses a communicative function, particularly in species with colour polymorphism and developed visual systems as odonates, and also affects the conspicuousness of animals in relation to the background. Therefore, these factors can influence colour evolution and its development. The ecology and ethology of *A. oculata* were studied in three populations with different degrees of habitat alteration. Three different sources of colour variability were found: female polymorphism, female ontogenetic change and daily change in both sexes. All males observed presented the same blue thoracic colouration pattern, without ontogenetic changes. Some of them (6–48%, variable between populations) showed a darkening of the thorax colouration in the afternoon. The frequency of androchrome females (male-like thoracic colouration) showed a negative relationship with human habitat disturbance. These females changed their body colour from bluish to brownish at old ages. Gynochrome females started their adult life with sky-blue thorax, which turned to olive green and finally to brown with sexual maturation. One gynochrome female returned to the immature colouration in late hours of the day. Colour changes were apparently not associated to sunlight intensity or temperature. Behavioural observations suggest that colour variability in females might contribute to reduce or avoid male harassment. We contextualise our findings in the *Argia* literature and propose physiological and evolutionary mechanisms for their explanation." (Authors)] Address: Sanmartín-Villar, I., ECOEVO Lab, Univ. de Vigo, Escola de Enxeñaría Forestal, Campus A Xunqueira, Pontevedra, Spain. E-mail: sviago@gmail.com

16595. Sasamoto, A.; Futahashi, R. (2017): What are Bartenov's (1930) forgotten Japanese species »*Gomphus acutus*« and »*Gomphus excavatus*« (Odonata: Gomphidae)? *Notulae odonatologicae* 8(9): 319-325. (in English) ["The true identities of *G. acutus* and *G. excavatus*, two forgotten taxa named from Japan, are discussed. *G. acutus* is ranked as a junior synonym of *Trigomphus melampus* (Selys, 1869) (syn. nov.). The earlier proposed synonymy of *G. excavatus* with *Asiagomphus pryori* (Selys, 1883) is confirmed." (Authors)] Address:

Sasamoto, A., 1 531-3 Oh Tawaramoto-cho, Shiki-gun, Nara pref. 636-0345 Japan. E-mail: akssmt@sea.plala.or.jp

16596. Savard, M.; Larochelle, M.; Perron, J.-M. (2017): Découverte de la cordulie tricoteuse (*Somatochlora filosa*) au Canada et reconsidération de la cordulie linéaire (*Somatochlora linearis*) au Québec, deux espèces rhéophiles de libellules. *Le Naturaliste canadien* 141(2): 42-52. ["The collection of a nymph of *S. filosa* on September 7, 2016 in Sainte-Catherine-de-Hatley, in the Estrie region of Québec, provides the first record of this species for Canada. The breeding habitat of *S. filosa* in North America is poorly known, and is reported here for only the second time. The unexpected discovery of a relic population, 575 km north of its previously known range, raises questions concerning the original composition of the odonatological fauna of the hardwood forest subzone of Québec – an ecosystem that has been considerably altered since human colonization of the area and the exploitation of natural resources. In addition, during the present study, *S. linearis* specimen collected by Léon Provancher in Saint-Hyacinthe in 1877 was authenticated, and the species reinstated to the list of Odonata of Québec. Finally, it is suggested that 3 other rheophilic emerald species could inhabit forest springs and streams in the southern part of the province." (Authors)] Address: Michel Savard. E-mail: michel.savard@ssss.gouv.qc.ca

16597. Schädel, M.; Lechner, T.S. (2017): Two new dragonflies (Odonata: Anisoptera) from the Miocene of Carinthia (Austria). *Zootaxa* 4243(1): 153-164. (in English) ["Two new species of fossil dragonflies from the Middle Miocene fossil site Schafbach (Carinthia, Austria) are described. The presence of *Gomphaeschna carinthiae* sp. nov. and *Ictinogomphus hassleri* sp. nov. in the fossil record of Central Europe confirms the scenario of a more widespread distribution of the represented genera in the Miocene in contrast to their Recent distribution." (Authors)] Address: Schädel, M., Dept of Evolutionary Biology of Invertebrates, Univ. of Tübingen, Auf der Morgenstelle 28E, 72076 Tübingen, Germany. E-mail: mario.schaedel@student.uni-tuebingen.de

16598. Schiel, F.-J.; Hunger, H. (2017): Ausbreitung von *Aeshna isoeles* in der südlichen Oberrheinebene (Odonata; Aeshnidae). *Mercuriale* 17: 37-46. (in German, with English summary) ["Expansion of *A. isoeles* into the southern part of the Upper Rhine valley: We report an apparent range expansion of *A. isoeles* in the German part of a 150 km long section of the Upper Rhine valley ranging from Rastatt in the north to Basel in the south. Only five records of this species are documented from the whole 20th century. Since 2006, however, the species has been reported from 34 waters. *A. isoeles* reproduced in at least eight of these waters. We compare our data with the development in the German land of Baden-Württemberg and in Germany and discuss the findings shortly in the context of current climate warming.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

16599. Schiel, F.-J.; Salcher, M.; Förschler, M. (2017): Libellen im Nationalpark Schwarzwald (Odonata). *Mercuriale* 17: 27-36. (in German, with English summary) ["Odonata in the Black Forest National Park - The Black Forest National Park is situated in the northern Black Forest between the cities of Baden-Baden and Freudenstadt. It was founded in 2014. Altitudes in the Park range from 470 to 1,151 m a.s.l. with an average altitude above 800 m a.s.l. The Park area is characterized by extensive forests growing on poor soils that have developed mainly on red sandstone formations. With a mean annual temperature of 5°C and a mean precipitation of 2,200 mm, the climate in this part of the Black Forest is rough and wet. 25 species of Odonata have been recorded in the National Park area so far, with 20 of them being resident. Six species are confined to small and fish-free peat bog water bodies: *Coenagrion hastulatum*, *Aeshna juncea*, *A. subarctica*, *Somatochlora alpestris*, *Leucorrhinia dubia* and *Sympetrum danae*. *Somatochlora alpestris* is restricted to small semipermanent water bodies in the wet heathlands called "Grinden". These evolved on the mountain ridges since the Middle Ages through grazing with cattle, sheep and goats. In southwestern Germany, *S. alpestris* occurs exclusively in the Black Forest at altitudes from about 1,000 m a.s.l. One of its distribution centres is in the young National Park. The most common kind of water body in the Park are streams and rivulets that are inhabited by both *Cordulegaster bidentata* and *C. boltonii*. Population densities of both species are low due to the rough climate, the very dynamic runoff and the nutrient-poor, acidic bedrock in the area." (Authors)] Address: Förschler, M., Nationalparkverwaltung Schwarzwald, Kniebisstr. 67, 77740 Bad Peterstal-Griesbach, marc.foerschler@nlp.bwl.de

16600. Schlemmer Brasil, L.; Vieira, T.B.; Oliveira-Junior, J.M.; Dias-Silva, K.; Juen, L. (2017): Elements of metacommunity structure in Amazonian Zygoptera among streams under different spatial scales and environmental conditions. *Ecology and Evolution* 7(9): 3190-3200. (in English) ["An important aspect of conservation is to understand the founding elements and characteristics of metacommunities in natural environments, and the consequences of anthropogenic disturbance on these patterns. In natural Amazonian environments, the interfluvies of the major rivers play an important role in the formation of areas of endemism through the historical isolation of species and the speciation process. We evaluated elements of metacommunity structure for Zygoptera sampled in 93 Amazonian streams distributed in two distinct biogeographic regions (areas of endemism). Of sampled streams, 43 were considered to have experienced negligible anthropogenic impacts, and 50 were considered impacted by anthropogenic activities. Our hypothesis was that preserved ("negligible impact") streams would present a Clementsian pattern, forming clusters of distinct species, reflecting the biogeographic pattern of the two regions, and that anthropogenic streams would present random patterns of metacommunity, due to the loss of more sensitive species and dominance of more tolerant species, which have higher dispersal ability and environmental tolerance. In negligible impact streams, the Clementsian pattern reflected a strong biogeographic pattern, which we discuss considering the areas of endemism of Amazonian rivers. As for communities in human-

impacted streams, a biotic homogenization was evident, in which rare species were suppressed and the most common species had become hyper-dominant. Understanding the mechanisms that trigger changes in metacommunities is an important issue for conservation, because they can help create mitigation measures for the impacts of anthropogenic activities on biological communities, and so should be expanded to studies using other taxonomic groups in both tropical and temperate systems, and, wherever possible, at multiple spatial scales." (Authors)] Address: Schlemmer Brasil, L., Programa de Pós Graduação em Ecologia e Conservação, Univ.do Estado de Mato Grosso – UNEMAT, CEP 78690-000, Nova Xavantina, MT, Brazil. E-mail: brasil_biologia@hotmail.com

16601. Schneider, T.; Ikemeyer, D.; Ferreira, S.; Müller, O. (2017): *Gomphus kinzelbachi* Schneider, 1984, in Iran: identification, habitat and behaviour (Odonata: Gomphidae). *Zootaxa* 4216(6): 572-584. (in English) ["*G. kinzelbachi* was described on the basis of a single teneral male captured by B. L. Sage on the Alwand River in eastern Iraq. In late April to early May 2016 two of the authors (TS and DI) discovered three individual-rich populations of this species on the large lowland river Karkeh in southwestern Iran (Khuzestān). This is the first report of a breeding population of this species. Based on collected material we confirmed the structural differences of the male secondary genitalia between *G. kinzelbachi* and *G. davidi* on a larger number of animals. The female of the species is described. *G. kinzelbachi* resembles most closely *G. davidi*, compared to all other West-Palearctic Gomphus species. Therefore, a direct comparison of the two species is given, and additionally some differential diagnostic hints for two other Gomphus species reported from Iran is provided. Our observations suggest that *G. kinzelbachi* reproduces on large clean lowland rivers in SE Iraq and SW Iran. In SW Iran only a free flowing stretch of the Karkeh, one of three parallel rivers (Karkeh, Karoon, Dez), seems to be suitable for this species. The other two rivers are affected by dams, dam construction, and increasing salinization. Additional dam constructions are also planned on the Karkeh River, thus, *G. kinzelbachi* may be on the brink of extinction." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de