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16004. Avila Varshini, R.; Kanagappan, M. (2016): A study on the diversity of odonate larvae in a permanent pond Melpalai at Melpuram in Kanyakumari district, Tamil Nadu, India. *International Journal of Applied Research* 2(3): 592-598. (in English) ["The present study gives an overview of data on the habitat diversity of odonate larvae occurring in a permanent pond Melpalai in Melpuram, Kanyakumari District (Tamil Nadu), India, during August 2013-July 2014. The survey of the permanent pond Melpalai revealed the occurrence of 21 species of Odonata. Libellulidae dominated all the other families, while the family Coenagrionidae occupied the second position. The physicochemical parameters (temperature 22-31.5 °C; pH 6.8-7.13; Total dissolved solids 110-143 ppm; Dissolved oxygen 4.1- 5.1 ml/l; Electric conductivity 58-105) of this pond were more or less ideal for the abundance and distribution of odonate larvae. Various diversity indices were calculated for premonsoon, monsoon and post monsoon seasons and the results indicated that maximum diversity and distribution were occurred during the monsoon season followed by the postmonsoon season and minimum diversity was recorded during the premonsoon season." (Authors)] Address: Avila Varshini, R., Dept of Zoology & Research Centre, Scott Christian College (Autonomous), Nagercoil. 629003, India

16005. Baird, I.R.C.; Burgin, S. (2016): Conservation of a groundwater-dependent mire-dwelling dragonfly: implications of multiple threatening processes. *Journal of Insect Conservation* 20(2): 165-178. (in English) ["Groundwater-dependent ecosystems and their dependent species are under increasing threat globally. Petalurid dragonflies are one such group. This review highlights processes that threaten the groundwater-dependent mire habitats of *Petalura gigantea*, a dragonfly with long-lived fossorial larvae. The species is reliant for successful reproduction on areas of emergent seepage, or at least, on a water table that is sufficiently high to cause saturation of the peaty substrate. These microhabitat characteristics are critical for successful oviposition and larval burrow establishment, making the species particularly

vulnerable to any lowering of water tables. The effect of any lowering of water tables, due to groundwater abstraction or longwall coal mining, for example, will be compounded by the effects of more intense fire regimes in these mires and by projected climate change. These threatening processes act in conjunction with a range of other anthropogenic threats and are mirrored globally in threats to other groundwater-dependent mire ecosystems and their dependent species, including other petalurid dragonflies." (Authors)] Address: Baird, I.R.C., 3 Waimea Street, Katoomba, NSW 2780, Australia. E-mail: petalurids@gmail.com

16006. Baumann, K. (2016): Veränderungen von Höhenverbreitung und Abundanz von *Somatochlora alpestris* und *Somatochlora arctica* im Harz unter dem Einfluss des Klimawandels (Odonata: Corduliidae). *Libellula* 35(1/2): 43-64. (in German, with English summary) ["Shifts of the altitudinal range and abundance of *S. alpestris* and *S. arctica* in the Harz within the impact of climate change (Odonata: Corduliidae) – From 2000–2015, the abundances of *S. alpestris* and *S. arctica* have been researched on the bogs of the Harz Mountains based on collected exuviae. In raised bogs below 850 m a.s.l. the number of *S. alpestris* has noticeably decreased recently, whereas in the highest locations of about 1,000 m a.s.l. their abundance has increased. On the whole, the proportion of the abundances of *S. alpestris* and *S. arctica* has shifted in favour of *S. arctica* in the raised bogs. In slope located soligenous bogs (which are microclimatically cooler) the abundance of *S. alpestris* has not decreased, not even in the lowest elevations of 650–700 m a.s.l. Meanwhile *S. arctica* has spread its area into the highest located bogs, though its frequency there is still smaller than that of *S. alpestris*. Most probably these processes are caused by the global climate change. Limiting factors for the cryophilic *S. alpestris* are assumed to be too high temperatures or too much fluctuation of the temperatures in the pools (increased larval mortality) and perhaps too high air temperatures (inhibition of the adults' activity). In the case of progressing global warming, very unfavourable conditions for *S. alpestris* in the raised bogs in the Harz Mountains must be forecast. By contrast, the less cold resistant *S. arctica* profits by global warming

and will predictably become the dominant dragonfly in the raised bogs at all elevations in the medium term." (Authors)] Address: Baumann, Katrin, ALNUS GbR, Lärchenweg 15a, 38667 Bad Harzburg, Germany. E-mail: alnus-k.baumann-@t-online.de

16007. Bechev, D.N. (2016): New localities of *Sympetrum pedemontanum* (Insecta: Odonata) in Bulgaria. Bulletin of the Natural History Museum - Plovdiv 1: 35-36. (in English) ["Two new localities of *S. pedemontanum* and distributional map of the species in Bulgaria are reported.] Address: Bechev, D.N., University of Plovdiv "P. Hilendarski", Dept Zool., 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. E-mail: dbechev@abv.bg

16008. Bennett, A.M.; Longhi, J.N.; Chin, E.H.; Burness, G.; Kerr L.R.; Murray, D.L. (2016): Acute changes in whole body corticosterone in response to perceived predation risk: A mechanism for anti-predator behavior in anurans? Gen. Comp. Endocrinol. 229: 62-66. (in English) ["Anuran larvae exhibit behavioral and morphological plasticity in response to perceived predation risk, although response type and magnitude varies through ontogeny. Increased baseline corticosterone is related to morphological response to predation risk, whereas the mechanism behind behavioral plasticity remains enigmatic. Since tadpoles alter behavioral responses to risk immediately upon exposure to predator cues, we characterized changes in whole body corticosterone at an acute (<1h post-exposure) timescale. Tadpoles (*Lithobates sylvaticus*) at Gosner stage (GS) 25 (free-swimming, feeding larvae) increased corticosterone levels to a peak at 10-20min post-exposure to predator cues, paralleling the acute stress response observed among other taxa. Tadpoles reared for 3 weeks (mean GS29) with predation risk (caged, fed Aeshnid dragonfly nymph) had lower corticosterone levels at 10-20min post-exposure to dragonfly cues than predator-naïve controls, suggesting habituation, although the magnitude of increase was markedly diminished when compared to younger tadpoles (GS25). These experiments represent the first assessment of tadpole hormonal responses to predation risk at the acute timescale. Further research is required to establish causality between hormonal responses and behavioral changes, and to examine how and why responsiveness changes over ontogeny and with chronic exposure to risk." (Authors)] Address: Bennett, A.M., Environ. & Life Sc. Grad. Prog., Trent Univ., 1600 West Bank Drive, Peterborough, Ontario K9J 7B8, Canada. E-mail: abennett@trentu.ca

16009. Bhandari, R.; Sharma, J.; Shukla, A.; Rai, S. (2016): Assessment of water pollution using bioindicator (Odonata and Mollusca) in Narmada basin at Jabalpur: A developing smart city. Int. J. Pure App. Biosci. 4(5): 72-77. (in English) ["The smart city mission with "Clean Narmada, Green Jabalpur" intends to promote adoption in environment with basic infrastructure to give a decent quality of life. A clean and sustainable environment of Jabalpur using bio indicators species such as Mollusca and Odonata will be applicable as smart solution where environment disturbed through anthropogenic activities. Odonata and Mollusca are biological indicators so with-

out using chemicals we aimed to know the pollution intensity of river Narmada basin. Benthos assemblage from Narmada basin in Jabalpur has been investigated. A total of 37 species of Odonata and 13 species of Mollusca were sampled." (Authors)] Address: Shukla, A., Research Scholar, Dept Zoology, Govt. Model Science College, Jabalpur (M.P.) India. E-mail: arjunshukla37@gmail.com

16010. Bhaumik, S.; Gupta, S.K. (2016): A study of mites associated with insect orders (Lepidoptera, Coeloptera, Hemiptera, Odonata) from Kolkata and its neighbourhood. IJSR - International Journal of Scientific Research 5(7): 75-77. (in English) [Arrenurus congener infested *Crocothemis* sp., Haripal, November 2015] Address: Subhrajit Bhaumik Post graduate Dept Zool., Vidyasagar college (University of Calcutta) Salt lake city, Kolkata 700091

16011. Borisov, S.N.; Borisov, A.S. (2016): Dragonflies (Odonata) in ornithological trap in the Baikal Nature Reserve, South-Eastern Baikal area of Russia. Eurasian Entomological Journal 15(2): 127-131. (in Russian, with English summary) [11 anisopteran species "were found in ornithological trap of Rybachinsky' type mounted in the Baikal Nature Reserve (51°38'35.5" N. 105°31'19.0" E) in August 2015. Usage of ornithological traps in faunal and ecological studies of dragonflies is discussed." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

16012. Borkenstein, A.; Schröter, A.; Jödicke, R. (2016): *Aeshna viridis* is an early bird – matutinal matings in a crepuscular species (Odonata: Aeshnidae). Odonatologica 45(1/2): 37-56. (in English) ["The hitherto unknown mating activities of *Aeshna viridis* at dawn are described and photographically documented. At first morning light both sexes arrived at the breeding pond flying over dense stands of *Stratiotes aloides*. Their flight style was of two types: the well-known feeding flight and a slow, low, linear and non-aggressive cruising flight. Cruising individuals sometimes formed mating wheels and the couples left the pond. Shortly before sunrise numerous males started to search for receptive females in the tall herbaceous vegetation near the pond. This non-aggressive flight mode was slow and at knee-height, characterised by intrusion into dense thickets; we term it searching flight. It ceased within a period of 45–70 min after sunrise. We assume that the terrestrial vegetation represents the main rendezvous site and that searching flight leads to the majority of matings. One male was recorded grasping a resting female. Wheel formation was completed while perching without further flight, resulting in a distinctive twisted wheel position. Further observations confirmed that such twisted wheels found in the morning are typical. There are also records of occasional matings during the period from noon until late afternoon. The restriction of most mating activities to the period around sunrise rejects the myth of *A. viridis* being a late riser. The mating behaviour of this species with its combination of mainly sunrise-limited searching flight and wheel formation with resting mates seems to be unique in Odonata. In referring

to twilight activities – at dawn and dusk – we use the term ‘crepuscular’ in the general sense and eschew the term ‘eocrepuscular’, making a distinction between morning and evening with the terms ‘matutinal’ (at dawn) and ‘vespertine’ (at dusk).” (Authors)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

16013. Borkenstein, A.; Jödicke, R. (2016): Crepuscular collective flight of *Aeshna viridis* in Central Europe (Odonata: Aeshnidae). *Not. Odonat.* 8(8): 297-307. (in English) [“Crepuscular flight activity was studied in *A. viridis* at a woodland pond in NW Germany that harboured an isolated, relatively small breeding population. We observed twilight behaviour in 2014 and 2015 during 14 evenings and four mornings from early July until early September. In twilight, under a clear sky always before sunrise and after sunset, a substantial part of the population gathered at the breeding pond and performed a collective flight over *Water Soldier Stratiotes aloides*, the plant species which also served as habitat for diurnal oviposition and patrol flight. The collective flight usually started with hunting mosquitoes (feeding flight) but within few minutes it gradually changed to a linear and slow flight style performed densely above *Stratiotes* (cruising flight). Only feeding individuals in a higher abundance at dusk gave the impression of swarming. Cruising individuals occasionally formed mating wheels but exclusively at dawn. Generally, males prevailed during the collective flight. We attempt to offer first answers to the question why *A. viridis* regularly performs collective flight and discuss its relation to the vespertine mass swarms reported from Finland and western Siberia.” (Authors)] Address: Borkenstein, A., Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

16014. Bouwman, J.H.; Ketelaar, R.; Ruiter, E.J. (2016): The Norfolk Damselfly (*Coenagrion armatum*) in the Netherlands: a balance fifteen years after its rediscovery. *Brachytron* 18(1): 3-15. (in Dutch, with English summary) [“*C. armatum* was rediscovered in the Netherlands in 1999. The Dutch population is located at the Weerribben and is one of the very few populations of this species in North-West Europe. Since its rediscovery *C. armatum* has been studied intensively in the Netherlands but also in Scandinavia and Germany. Although other nature reserves were intensively investigated, the species was not found outside the Weerribben, even where suitable habitat seems to be present. The habitat where the *C. armatum* is found in the Netherlands and in countries nearby is very specific with an open helophyte vegetation in shallow water. The structure of the vegetation appears to be more important than the plant species that form it. The situation in the Netherlands is fragile with only one large population. Specific management is required, aimed at maintaining current habitat locations and creating new ones.” (Authors)] Address: Bouwman, J.H.. E-mail: j.bouwman@bosgroepen.nl

16015. Brouwer, P. (2016): *Trithemis kirbyi* near the Spanish-French border. *Boletín Rola* 8: 5-8. (in English, with Spanish summary) [“Two sightings of *T. kirbyi* are reported from the province of Huesca and located south of the Pirenees. Those

records are the most northernmost for the species so far.” (Author)] Address: Brouwer, P. E-mail: p.brouwer4@upcmail.nl

16016. Burbach, K.; Schiel, F.-J. (2016): Verbreitung und Bestandssituation von *Sympetrum depressiusculum* im Südteil des Regierungsbezirks Schwaben, Südwestbayern. *Mercuriale* 16: 9-23. (in German, with English summary) [“Distribution and population size of *S. depressiusculum* in the southwestern prealpine area of Bavaria (Suevia) - In 2012, we recorded *S. depressiusculum* at 20 out of 24 investigated sites in the western part of the prealpine area of Bavaria between Lake Constance and the river Lech (district of Schwaben = Suevia). At 8 sites successful reproduction was evident, at another 4 sites very probable. At 8 sites we observed only single or few individuals and we assume *S. depressiusculum* not to have reproduced there due to a lack of suitable waterbodies. Because of the high water levels during summer, we suppose that 2012 was a very suitable year for successful development of this highly endangered species. At five sites we recorded more than 100 specimens per visit. We estimated population sizes of several hundred individuals per site. We consider the populations of the reed zones of Lake Constance and the Forggensee, a reservoir filled with water of the river Lech and two smaller rivers during the summer, to be essential for the continued existence of *S. depressiusculum* in this part of the Bavarian prealpine region. For conservation purposes, the typical water regime with low water levels during winter and high levels from late spring/early summer to late summer/autumn is to be preserved. Furthermore, annual mowing of reed vegetation is important to keep vegetation density low and to prevent succession of high growing reed plants such as *Phragmites australis*, woody succession of willows (*Salix* spp.) and neophytes.” (Authors)] Address: Burbach, K., Am Bachwinkel 3, 85417 Marzling, Germany. E-mail: k-burbach@web.de

16017. Butler, S.G.; Steinhoff, P.O.M.; Dow, R.A. (2016): Description of the final instar larva of *Acrogomphus jubilaris* Lieftinck, 1964 (Odonata, Gomphidae), with information on the distribution of *Acrogomphus* in Borneo. *Zootaxa* 4184(2): 367-375. (in English) [“The final instar larva of *A. jubilaris*, is described and figured for the first time based on exuviae from four male and one female larvae collected in Sarawak, Malaysian Borneo. The adults of *A. jubilaris* are very rarely encountered. The larvae, however, are surprisingly common in forest streams in Borneo. It is compared with *A. malayanus* Laidlaw, 1925 and *A. walshae* Lieftinck, 1935, and notes on behaviour, distribution and habitat are included. A map including all known records of *A. jubilaris* is provided.” (Authors)] Address: Butler, S.G., Red Willow, All Stretton, SY6 6HN Shropshire, UK. E-Mail: sgbutler15@btopenworld.com

16018. Campos, V.C. de (2016): Estudo comparativo sobre a dieta do *Galbula ruficauda* (Aves, Galbulidae) no Brasil central. Dissertação (Mestrado em Zoologia), Universidade de Brasília, Instituto de Ciências Biológicas, Departamento de Zoologia, Programa de Pós Graduação em Zoologia: 31 pp. (in Portuguese, with English summary) [“This study compares the diet of the *Galbula ruficauda* between sexes, seasons (rainy season and dry season) and two locations relatively

close to each other along a gallery forest of the Maranhão River and one of its tributaries in central Brazil. Additional comparisons involving the results obtained in this study with data on the diet of this bird in another site in Central Brazil and a forest site in Costa Rica were also carried out. Insects attacked and consumed by wild birds in central Brazil belong to seven orders including: Hymenoptera, Diptera, Lepidoptera, Odonata, Coleoptera, Orthoptera and Mantodea. Small insects like Diptera and micro-Hymenoptera constituted the most abundant items in the diet of this bird, followed by relatively large Hymenoptera (especially wasps), Lepidoptera, Odonata, Coleoptera, Orthoptera and Mantodea. Comparisons involving the proportion of these items in the birds' diet showed no significant differences between sexes, but showed strong differences between seasons. Comparisons involving different locations in Central Brazil showed significant differences in some cases but not in others. Comparisons involving locations in central Brazil and data obtained in Costa Rica also furnished strong significant differences between them." (Author)] Address: not stated

16019. Cardona-Rivera, G.A.; Ramírez, A. (2016): Predation of *Telebasis vulnerata* (Odonata: Coenagrionidae) eggs by detritivorous caddisfly larva, *Phylloicus pulchrus* (Trichoptera: Calamoceratidae). *International Journal of Odonatology* 19(4): 253-256. (in English) ["After observing the presence of *P. pulchrus* and tadpoles of *Leptodactylus albilabris* (Anura: Leptodactylidae) on submerged leaves with recently laid eggs of *T. vulnerata*, we set up an experiment to determine if they were consuming Odonata eggs. We collected leaves from the stream, where consumers were positioned over egg masses, and designed an experiment to expose *T. vulnerata* eggs for two days to consumers. Observations indicated that tadpoles did not harm *T. vulnerata* eggs. In contrast, *P. pulchrus* completely scraped eggs from leaves, with little damage to the leaf tissue itself. *P. pulchrus* is detritivorous insect that consume leaf tissue, but it is capable of consuming *T. vulnerata* eggs, potentially as a supplementary food resource." (Authors)] Address: Ramirez, A., Dept Biology, Univ. of Puerto Rico, Mayaguez, Puerto Rico. E-mail: aramirez@ramirezlab.net

16020. Catling, P.M. (2016): Climate warming as an explanation for the recent northward range extension of two dragonflies, *Pachydiplax longipennis* and *Perithemis tenera*, into the Ottawa valley, Eastern Ontario. *The Canadian Fieldnaturalist* 130(2): 122-132. (in English) ["Climate warming is accepted as an explanation for the recent appearance of *P. longipennis*, and *P. tenera*, in the Ottawa region, as this range expansion meets 6 criteria: (1) the climate in the newly occupied territory has warmed sufficiently to allow colonization; (2) a new range expectation based on the amount of climate warming is met; (3) other factors potentially promoting spread are excluded; (4) the possibility that range extension is a result of difficulty of observation and/or insufficient fieldwork in earlier times is excluded; (5) there is ample evidence for establishment; and (6) spread has been in the direction of the warmer territory or within it. By 2000, the mean daily temperature in the Ottawa region had increased by about 2°C

since 1880 and about 1.1°C since 1960. This would allow new zonal boundaries and the prediction of expansion from a well-defined and long-occupied area into the Ottawa Valley. The two species entered this region in 2008–2012 and, subsequently, became well established." (Author)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

16021. Chaudhry, M.T.; Mohsin, A.; Shaheen, F.S.; Arshad, M.; Zia, A. (2016): Dragonflies (Odonata: Anisoptera) of Pakistan. *Pakistan J. Zool.* 48(6): 1957-1962. (in English) [Existing information on Anisoptera fauna of the country is updated by extensive field surveys during 2006-2011. 68 – including 7 - anisopteran species are reported. A detailed checklist of dragonflies of Pakistan has also been presented in this paper.] Address: Chaudhry, M.T., Barani Agricultural Training Institute, Dahgal, Rawalpindi, Pakistan

16022. Chelmick, D.; Luck, J. (2016): Emerald Damselflies (Family Lestidae) in the Weald. *Journal of the British Dragonfly Society* 32(1): 26-38. (in English) ["The Weald is a geologically isolated region in south-east England. All four species of Lestidae recorded in the UK have been observed here. *Lestes sponsa* is a locally common resident, *L. dryas* has been shown to be breeding in the High Weald after many years of absence, while *L. barbarus* remains a vagrant but breeding colonies may exist. Finally, *Chalcolestes viridis* is now known to breed and is probably under recorded. The Wealden Dragonfly Group was created to coordinate recording in this region." (Authors)] Address: Chelmick, D., Macromia Scientific, 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK

16023. Choong, C.Y.; Izzat-Husna, M.; Amirrudin, B.A. (2016): Odonata (Insecta) fauna of Tasek Bera Ramsar Site, Pahang, Peninsular Malaysia. *Journal of Wildlife and Parks* 31: 39-48. (in English) ["Records of Odonata collected at several sites in Tasek Berar Ramsar Site, Pahang on 13th – 19th August 2014 are presented. A total of 64 species from 7 families were recorded of which 16 species are new records for Tasek Bera. These records are combined with the existing records from Tasek Bera in previous literature to produce an updated checklist of the Odonata known to Tasek Bera. At present it consists of 92 species from 12 families." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

16024. Choong, C.Y. (2016): *Leptogomphus tioman* sp. nov. (Odonata: Anisoptera: Gomphidea) from Tioman Island, Peninsular Malaysia. *Zootaxa* 4171(2): 382 -388. (in English) ["A new species *L. tioman* is described based on male specimens collected from Tioman Island, Peninsular Malaysia. It is close to *L. risi* Laidlaw in thoracic markings but is readily distinguished by its anal appendages and accessory genitalia." (Author)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

16025. Chovanec, A.; Spira, Y. (2016): Bewertung der Renaturierungsmaßnahmen in den Unterläufen und Mündungsbereichen von Leitenbach und Sandbach sowie an der Aschach (Oberösterreich) aus libellenkundlicher Sicht (Insecta: Odonata). Beiträge zur Entomofaunistik 17: 1-29. (in German, with English summary) ["River restoration at Leitenbach, Sandbach and Aschach in Upper Austria: assessment by dragonfly surveys (Insecta: Odonata). – The ecological status (with special reference to morphological aspects) of the restored lower courses and mouths of Leitenbach and Sandbach as well as of the restored Aschach in this area was assessed by an investigation of the dragonfly fauna. The Dragonfly Association Index was used to compare rivertype-specific reference conditions with the status quo – this procedure is in line with the requirements of the EU Water Framework Directive. 25 species were recorded, which corresponds to 32 % of the species inventory of Austria; 21 species were autochthonous. At the Leitenbach 23 species were found (20 of them autochthonous), at the Sandbach 16 (14), and at the Aschach 16 (11). The three river sections were colonised by a high number of rheophilic species: *Calopteryx splendens*, *C. virgo*, *Platynemis pennipes*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, and *Orthetrum brunneum*. *G. vulgatissimus*, *O. cecilia*, and *O. forcipatus* are "endangered" according to the Austrian Red List. *O. cecilia* is listed in the Appendices II and IV of the EU Fauna-Flora-Habitat-Directive. Due to the species spectrum found, the three river sections were classified as "high ecological status." (Authors)] Address: Chovanec, A., Umweltbundesamt, Spittelauer Lände 5, 1090 Wien, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

16026. Clavijo-Calderón, C.A.; Cázares-Rodríguez, M.E. (2016): Odonatos como bioindicadores de la calidad de agua en Surutato, Sinaloa. Bol. Soc. Mex. Ento. (n. s.) Número especial 2: 1-5. (in Spanish, with English summary) ["Odonata as bioindicators of water quality in Surutato, Sinaloa: A study was conducted along the banks of Surutato stream and dam Helladius Serrano in the town of Surutato, Badiraguato, Sinaloa to compare species of Odonata near affected areas and unaffected in this region and observe their possible use as bio-indicators of quality of the water. Sampling was conducted during 23, 24 and 25 September and on 18, 19 and 20 November 2015. 8 species of Anisoptera and 18 of Zygoptera, found along identified 1.5 km. sampling, including 3 new records for the state were found and the conclusion is proposed to develop more studies in this city of 2 species according to the observations we believe that could be candidates for biomarkers." (Authors)] Address: Clavijo-Calderón, C.A., Unidad Académica Escuela de Biología, Univ. Autónoma de Sinaloa, Ciudad Universitaria, Av. Universitarios s/n. Col. Universitarios, Culiacán Rosales, Sinaloa. C. P. 80030, México. E-mail: carlosclavijo57@gmail.com

16027. Cleary, D.F.R. (2016): Diversity and composition of plants, butterflies and odonates in an Imperata cylindrica grassland landscape in East Kalimantan, Indonesia. Journal of Tropical Ecology 32: 555-560. (in English) ["In Indonesia and elsewhere, Imperata cylindrica grassland now

covers millions of hectares of land previously covered by rain forest. In the present study, shrubs, trees and climbers were recorded in sixteen 10 × 20-m plots and herb cover (ferns, grasses and herbaceous dicots) estimated in nested 2 × 2-m subplots. Butterflies and odonates were netted along 300-m transects. All plots and transects were randomly allocated to a 450 ha, I. cylindrica-dominated landscape. A total of 43 shrub, tree and climber, 16 herb, 67 butterfly and 30 odonate species were recorded. Shrubs, trees and climbers were present throughout the study area, but basal area was very low and mainly consisted of invasive species. Imperata cylindrica covered an estimated 65% of the area with other plant species or bare soil covering the remainder. Butterfly and odonate communities mainly consisted of species with large geographic distributions, but some recorded species had more limited distributions. The latter were, however, species known to associate with perturbed forest environments. Variation in the composition of butterflies and odonates was also related to variation in habitat structure (e.g. altitude and slope) and plant composition. Plant composition in particular appeared to structure both butterfly and odonate communities." (Author)] Address: Cleary, D.F.R., Dept Biol., CESAM, Univ. de Aveiro, Campus Univ. de Santiago, 3810-193 Aveiro, Portugal. E-mail: cleary@ua.pt or dfrcleary@gmail.com

16028. Corbi, J.J.; Abrahão, D.P.; Mello, J.L.S.; Gorni, G.R. (2016): Record of epibiont ciliates (Ciliophora: Peritrichia) living on larvae of Odonata from Brazil. Brazilian Journal of Biology 77(2): 1-3. (in English) ["Here, we report a first record of epibiont ciliates (Ciliophora: Peritrichia) living on larvae of Coenagrionidae (Odonata) in Brazil (see Figure 1). The organisms were collected in September 2015, from the Monjolinho Reservoir, using a "D" aquatic net, during a survey of benthic macroinvertebrates. This reservoir is located in the campus of the Federal University of São Carlos (São Paulo, Brazil) in a subtropical region (47°53'W and 22°01'S). The Odonata were identified using the special identification key (Hamada et al., 2014; Mugnai et al., 2010). We recorded the occurrence of epibiont ciliates (Protozoa: Ciliophora) living on larvae of Coenagrionidae (Odonata). The epibiont ciliates were found attached to some body part of the Odonata larvae, but most usually located on the head and on the pronotum and mesonotum (thorax) (see Figure 1). The presence of epibionts mostly on the head and on the pronotum and mesonotum (thorax) of the Odonata can bring some feed difficulties for these predator aquatic organism. On the other hand, as pointed by Henebry and Ridgeway (1979) since peritrichs primarily consume bacteria, their location on the body of the host is indifferent. However, adhesion to appendages is probably inadequate because epibionts may be lost with the attrition caused by movements and, according to Green (1974), the frequent perturbation by the antenna of the host interrupts the feeding of peritrichs, causing zooid contraction. On the other hand, Regali-Selegim and Godinho (2004) consider that bigger organisms are easier targets for the epibionts than smaller ones. Consequently, our observations may be related to epibiont preference for these aquatic organisms or to the presence of a comparatively larger adhesion surface

offered by each Odonata individual." (Authors)] Address: Corbi, J.J., Laboratório de Ecologia de Ambientes Aquáticos – LEEA, Departamento de Hidráulica e Saneamento – SHS, Universidade de São Paulo – USP, Avenida Trabalhador São-carlense, 400, CEP 13566-590, São Carlos, SP, Brazil. E-mail: julianocorbi@usp.br

16029. Cuéllar-Cardozo, J.A.; Arteaga-Guzmán, E.; Bernal-Arriero, L.; Campo-Garnica, A.; Capera, D.; Ocampo, C.; Ortiz-Ruiz, M.; Rincón-Aceldas, S.; Sánchez, F. (2016): Composición y riqueza de odonatos en tres humedales artificiales suburbanos en Cajicá, Cundinamarca, Colombia. *Rev. Biodivers. Neotrop.* 6(2): 164-170. (in Spanish, with English summary) ["Odonata composition and richness in three artificial, suburban wetlands in Cajicá, Cundinamarca, Colombia. The Sabana de Bogotá landscape has been highly modified and there are artificial wetlands that have been created for different purposes. Very little is known about the biodiversity of these wetlands. Objective: To compare the composition and species richness of Odonata in three artificial wetlands on the Universidad Militar Nueva Granada campus in Cajicá, Cundinamarca, Colombia. Methodology: Adults were captured using entomological nets during March and April, 2015. Three sites were sampled: 1. A wetland near the Bogotá river, 2. A temporary wetland surrounded by grassland, and 3. A wetland bordered by buildings and grassland and with the bottom covered with geomembrane. Results: 817 individuals belonging to the following species were collected: *Rhionaeschna marchali*, *Enallagma civile*, *Ischnura cruzi*, *Ischnura* sp. *Mesamphiagrion laterale* and *Erythrodiplax fusca*. The riverine and temporary wetlands shared four species and showed greater similarity between them than with the geomembrane wetland. There was an association between the frequency of species of Odonata and each of the wetlands; for example; a species was unique to the riverine wetland (*R. marchali*) and another was exclusive to the temporary wetland (*Ischnura* sp.). There were no differences in estimated species richness between the riverine and temporary wetlands, and both had greater richness than the geomembrane wetland. Conclusion: Our results suggest that the differences between the wetlands affected the composition, frequency and richness of Odonata. Increasing the abundance and diversity of macrophytes should help to maintain the diversity of Odonata on campus." (Authors)] Address: Cuéllar-Cardozo, J.A., Programa de Biología Aplicada, Fac. Ciencias Básicas y Aplicadas, Univ. Militar Nueva Granada, Cajicá, Colombia. e-mail: josecuellar1094@gmail.com

16030. Cuellar-Cardozo, J.A.; Castro-Rebolledo, M.I. (2016): Biomasa de odonatos en un humedal artificial suburbano, Cajica (Cundinamarca-Colombia). *Rev. Intropica* 11: 97-103. (in English, with Spanish summary) ["The wetlands from Sabana of Bogota have ecological alterations caused by the impact of anthropogenic activities. Second productivity particularly in macroinvertebrates like the odonates, is the most important aspect that can precisely define the conservation degree of wetlands. This study aimed to characterize the Odonata assembly through taxonomic identification, density and

biomass quantification, and to evaluate an allometric relation between the growth of the cephalic amplitude and the dry weight of *Rhionaeschna marchali* (larvae), present in a suburban wetland from Nueva Granada Military University (Cajicá, Cundinamarca). In total seven weekly samplings were made in the period between August and October 2014. Data were obtained in relation to the density, biomass and a linear regression model between the dry mass and cephalic amplitude for *R. marchali* naiads ($R^2 = 0.61$), the others regressions were not significant. *Mesamphiagrion laterale* showed the highest density of adult individuals (0.14 ind m²) and *R. marchali* (200 ind m²) had the highest density of larvae." (Authors)] Address: Cuellar-Cardozo, J.A., Programa de Biología Aplicada. Facultad de Ciencias Básicas y Aplicadas. Universidad Militar Nueva Granada. Km 2 vía Cajicá-Zipacquirá, Colombia. E-mail: josecuellar1094@gmail.com

16031. Das, S.M. (2016): Diversity of Odonata in and around the Vivekananda Kendra Vidyalaya (NEC), Baragolai, Margherita, Tinsukia district of Assam (India). *International Journal of Scientific and Research Publications* 6(8): 406-410. (in English) ["A total of 39 species of Odonates, including 28 species of Anisoptera and 11 species of Zygoptera were recorded in and around the Vivekananda Kendra Vidyalaya (NEC) Baragolai, Margherita, Tinsukia district of Assam (India) between March, 2015 to June, 2016. From the sub-order Anisoptera, Libellulidae was the richest family with 25 species and from the sub-order Zygoptera, Coenagrionidae is the richest family with 9 species. A detail list of odonates recorded from the study area is presented." (Author)] Address: Das, S.M., Department of Biology, Guru Teg Bahadur Academy, Tinsukia, Assam, India

16032. David, S.; Funken, J.; Potthast, W.; Blanke, A. (2016): Musculoskeletal modelling under an evolutionary perspective: deciphering the role of single muscle regions in closely related insects. *Journal of The Royal Society Interface*: 13 (123): 9 pp. (in English) ["Insects show a remarkable diversity of muscle configurations, yet the factors leading to this functional diversity are poorly understood. Here, we use musculoskeletal modelling to understand the spatio-temporal activity of an insect muscle in several dragonfly species and to reveal potential mechanical factors leading to a particular muscle configuration. Bite characteristics potentially show systematic signal, but absolute bite force is not correlated with size. Muscle configuration and inverse dynamics show that the wider relative area of muscle attachment and the higher activity of subapical muscle groups are responsible for this high bite force. This wider attachment area is, however, not an evolutionary trend within dragonflies. Our inverse dynamic data, furthermore, show that maximum bite forces most probably do not reflect maximal muscle force production capability in all studied species. The thin head capsule and the attachment areas of muscles most probably limit the maximum force output of the mandibular muscles." (Authors)] Address: David, Sina, Institute of Biomechanics and Orthopaedics, German Sport University Cologne, Cologne 50933, Germany

16033. Dawn, P.; Chandra, K. (2016): Ten new records of Odonata from Chhattisgarh state, India (Odonata: Coenagrionidae, Platycnemididae, Aeshnidae, Macromiidae, Libellulidae). *Notulae odonatologicae* 8(7): 218-221. (in English) ["A field survey in Chhattisgarh during 2012–2014 resulted in ten Odonata species new to the state. These are *Brachydiplax chalybea*, *Hydrobasileus croceus*, *Onychothemis testacea*, *Orthetrum chrysis*, *Tetrathemis platyptera*, *Epopthalmia frontalis*, *Aciagrion olympicum*, *Caconeura ramburi*, *Prodasineura cf. verticalis*, and one unidentified *Gynacantha* sp. These records increase the number of odonate taxa known from Chhattisgarh state to 95." (Authors)] Address: Dawn, P., Prani Vigyan Bhavan, Zoological Survey of India, M-Block, New Alipore, Kolkata 700053, India. E-mail: prosenjit.dawn@gmail.com

16034. Dawn, P.; Chandra, K. (2016): Description of the larva of *Gynacantha millardi* Selys, 1891 (Odonata: Aeshnidae) from Chhattisgarh, India. *Zootaxa* 4132(2): 290-294. (in English) ["The larva of *G. millardi* is described here from female larvae and male and female exuviae collected from Chhattisgarh, India. Unlike other *Gynacantha* larvae known so far, *G. millardi* has 7 palpal setae almost equal in length; in other species, the palpal setae are of different lengths. The larvae lack a tooth on each side of the median cleft and have a distinct blunt tooth on the inner margin corner of each labial palp. The larvae were found in a semi-stagnant forest pool with enormous growth of aquatic vegetation." (Authors)] Address: Dawn, P., Zoological Survey of India, M - Block, New Alipore, Kolkata - 700053, India. E-mail: prosenjit.dawn@gmail.com

16035. De Knijf, G.; Sparrow, D.J.; Dimitriou, A.C.; Kent, R.; Kent, H.; Siedle, K.; Lewis, J.; Crossley, L. (2016): Distribution, ecology and status of a threatened species *Ischnura intermedia* (Insecta: Odonata), new for Europe. *International Journal of Odonatology* 19(4): 257-274. (in English) ["The dragonfly genus *Ischnura* has been the subject of numerous studies and is well studied in Europe and the Middle East. Nevertheless, information on the ecology, habitat preferences and phylogenetic relationships of some species is deficient. One species lacking such data is *Ischnura intermedia*, a near endemic species of the Middle East, found for the first time in Europe on Cyprus in 2013, where it occurs in five river valleys. In this study, we monitored *I. intermedia* in Cyprus where the species has a long flight period from the end of March until mid-November. Our results show that it has two and possibly even three generations a year, with the males of the first generation having reduced blue coloration on abdominal segments 8 and 9. *Ischnura intermedia* is confined to small secondary channels adjacent to streams and rivulets where the current slows and water is retained. It appears that populations can only become established at sites that have permanent water. It is therefore anticipated that the species will be under severe pressure within its range. We suggest listing this species as "Endangered" in Europe and globally as "Vulnerable" following the IUCN Red List Categories and Criteria and to prepare a species action plan for the European population of *Ischnura intermedia* on Cyprus. Two partial DNA fragments,

mtDNA cytochrome b (Cytb) and cytochrome oxidase subunit I (COI) were used to gain insights into the phylogenetic position within *Ischnura*, especially within the *I. pumilio* clade. We demonstrate that *I. intermedia* is clearly separated from *I. pumilio*, but closely related to *I. forcipata*." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

16036. Deacon, C.; Samways, M.J. (2016): Larva of one of the world's rarest and most threatened damselflies: *Spesbona angusta* (Odonata: Platycnemididae). *Odonatologica* 45(3/4): 225-234. (in English) ["*S. angusta* is Red Listed as Endangered and a conservation plan for it is urgently required. Quantifying population levels of its larva is part of that plan, yet the larval morphology is poorly known. Four final instar larvae were collected from the only known site in Western Cape, South Africa, in August 2015 and are described here in detail for the first time. The larval morphology is further compared with other South African platycnemidids and its Oriental sister genus *Copera*. Some biological notes are also given." (Authors)] Address: Deacon, C., Department of Conservation Ecology and Entomology, Stellenbosch University, Matieland, South Africa. E-mail: charldeacon@sun.ac.za

16037. Debecker, S.; Sanmartin-Villar, I.; de Guinea-Luengo, M.; Cordero-Rivera, A.; Stoks, R. (2016): Integrating the pace-of-life syndrome across species, sexes and individuals: covariation of life history and personality under pesticide exposure. *Journal of Animal Ecology* 85(3): 726-738. (in English) ["(1.) The pace-of-life syndrome (POLS) hypothesis integrates covariation of life-history traits along a fast–slow continuum and covariation of behavioural traits along a proactive–reactive personality continuum. Few studies have investigated these predicted life-history/personality associations among species and between sexes. Furthermore, whether and how contaminants interfere with POLS patterns remains unexplored. (2.) We tested for covariation patterns in life history and in behaviour, and for life-history/personality covariation among species, among individuals within species and between sexes. Moreover, we investigated whether pesticide exposure affects covariation between life history and behaviour and whether species and sexes with a faster POLS strategy have a higher sensitivity to pesticides. (3.) We reared larvae of four species of *Ischnura* damselflies (*I. elegans*, *I. genei*, *I. graellsii* and *I. pumilio*) in a common garden experiment with an insecticide treatment (chlorpyrifos absent/present) in the final instar. We measured four life-history traits (larval growth rate during the pesticide treatment, larval development time, adult mass and life span) and two behavioural traits (larval feeding activity and boldness, each before and after the pesticide treatment). (4.) At the individual level, life-history traits and behavioural traits aligned along a fast–slow and a proactive–reactive continuum, respectively. Species-specific differences in life history, with fast-lived species having a faster larval growth and development, a lower mass at emergence and a shorter life span, suggested that time constraints in the larval stage were predictably driving life-history evolution both in the larval stage

and across metamorphosis in the adult stage. Across species, females were consistently more slow-lived than males, reflecting that a large body size and a long life span are generally more important for females. In contrast to the POLS hypothesis, there was only little evidence for the expected positive coupling between life-history pace and proactivity. Pesticide exposure decreased larval growth rate and affected life-history/personality covariation in the most fast-lived species. (5.) Our study supports the existence of life-history and behavioural continua with limited support for life-history/personality covariation. Variation in digestive physiology may explain this decoupling of life history and behaviour and provide valuable mechanistic insights to understand and predict the occurrence of life-history/personality covariation patterns." (Authors)] Address: Debecker, Sara, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Charles Deberiotstraat 32, bus 2439, 3000 Leuven, Belgium. E-mail: sara.debecker@bio.kuleuven.be

16038. Degabriele, G. (2016): Notes on behaviour and morphology of some species of Odonata in the Maltese Islands. *Bull. ent. soc. Malta* 8: 96-100. (in English) ["The Maltese Islands have limited availability of freshwater, so the local species of Odonata may adopt behavioural strategies which they may not use elsewhere where water is readily available. Moreover, since local species of Odonata tend to be the more common, hardy and adaptable species found in neighbouring countries, their behavioural strategies and morphological features may be relatively less studied than species which are rarer and perhaps more vulnerable. Between September 2012 and September 2013, behavioural strategies and morphological features of Odonata were observed along four valleys (Wied Qlejgha, Fiddien, Wied ta' Ghajn Rihana, and Wied Hesri) and a saltmarsh (Is-Simar) in Malta." (Author)] Address: Degabriele, G., Dept of Biology, Junior College, University of Malta, Msida MSD 1252, Malta. E-mail: godwin.degabriele@um.edu.mt

16039. Dehghani, R.; Atharizadeh, M.; Moghadam, V.K.; Hadei, M. (2016): Study on biting bugs encountered in the aquatic environments in Kashan, Isfahan Province, Iran. *Journal of Coastal Life Medicine* 4(11): 852-855. (in English) ["Summary: Objective: To determine biting bugs of Hemiptera families presenting in the county of Kashan. Methods: For this descriptive study, samples were collected from 17 locations of lentic and lotic waters, 3 times for each. These specimens were identified by using a stereo microscope and morphological keys. Results: Out of 5 535 specimens collected in three times of samplings, 3 024 specimens (54.6%) belonged to order Diptera, 701 specimens (12.7%) belonged to Crustaceans, 691 specimens (12.5%) belonged to Trichoptera, 468 specimens (8.4%) belonged to Hemiptera, 303 specimens (5.5%) belonged to Ephemeroptera, 133 specimens (2.4%) belonged to Odonata, 104 specimens (1.9%) belonged to Coleoptera, 98 specimens (1.8%) belonged to Hydrocarina and 13 specimens (0.2%) belonged to Plecoptera. In this study, Families Corixidae, Notonectidae, Gerriidae and Nepidae from Hemiptera order were identified 45.9%, 26.9%, 25.0% and 2.2%, respectively. Conclusions: These

results lead to the conclusion that Hemiptera fauna is relatively rich in Kashan. More studies by entomologists and biologists are recommended to determine the benefits and damages of these insects on the environment." (Authors)] Address: Dehghani, R. Social Determinants of Health Research Center, Department of Environmental Health, State College of Health, Kashan University of Medical Sciences, Kashan, Isfahan Province, Iran

16040. del Palacio, A.; Muzón, J. (2016): Redescription of *Erythrodiplax pallida* (Needham, 1904) (Odonata: Libellulidae). *International Journal of Odonatology* 19(1-2): 23-30. (in English) ["A redescription of both sexes of *E. pallida* is provided based on specimens collected in shallow wetlands associated with flood plains from small streams to large rivers in Corrientes and Buenos Aires provinces, Argentina. The vesica spermalis morphology resembles those of the *basalis* and *nigricans* groups due to the presence of median and posterior lobes and the lack of paired lobes. *E. pallida* is easily distinguished from the other congeners by the white frons." (Authors)] Address: del Palacio, A., Univ. Nacional de Avellaneda, Depto de Ambiente y Turismo, BioGeA, Mario Bravo 1460 CP 1870, Piñeyro, BA, Argentina. E-mail: adelpalacio87@gmail.com

16041. Denloye, A.A.; Alafia, O.A.; Ajelara, K.O.; Babalola, O.O.; Dosunmu, O.A.; Owodeinde, F.G.; Solomon, O.O. (2016): Occurrence of *Orthetrum abbotti* Calvert (1892) (Odonata, Libellulidae) and intraguild predation on *Clarias gariepinus* Burchell, 1822 (Suliformes, Clariidae) and *Oreochromis niloticus* L., 1758 (Perciformes, Cichlidae) fries in Lagos fish farms. *Int. J. Aquat. Biol.* 4(5): 325-329. (in English) ["Intraguild predation occurs when species competing for the same resource prey upon or parasitize one another. This may result in economic losses under commercial circumstances. A survey of the insect species of fish farms in Badagry and Ojo Areas of Lagos State, Nigeria was carried out followed by an evaluation of the predatory ability of *Orthetrum abbotti* nymphs on fish fries. Nymph predation was evaluated in the laboratory against fries of *Clarias gariepinus* and *Oreochromis niloticus*. Samples of insects were randomly collected from 10 earthen ponds, 10 concrete ponds and the vegetation surrounding the ponds and identified over a period of 12 weeks from three study fish farms. Six species of insects belonging to four orders namely *Notonecta unifasciata*, *Gerris remigis*, *O. abbotti*, *Aedes aegypti*, *Dysticus marginalis* and *Acentria ephemerella* syn. *niveus* were collected from the ponds. Studies on feeding preference of 5th nymphal instar of *O. abbotti* on fries of *C. gariepinus* and *O. niloticus* over other food types revealed that the dragonfly preferred to feed more on *C. gariepinus* fry than on *O. niloticus* although there was no significant difference in the number of *O. niloticus* and *C. gariepinus* fries preyed upon by *O. abbotti* nymphs." (Authors)] Address: Denloye, A.A., Dept Zool. & Environmental Biology, Fac. Science, Lagos State Univ., Ojo, Lagos, Nigeria. E-mail: bio_denloye@yahoo.com

16042. Deviche, P.; Endersby, I. (2016): First confirmed record of Black-headed Skimmer, *Crocothemis nigrifrons*, in

Victoria. *Victorian Entomologist* 46(3): 58-59. (in English) [Australia; "On 29-XII-2015 and while surveying odonates at Waurn Ponds (lat. 38° 11' 56" S; long. 144° 17' 39" E; 58 m asl), on the grounds of Deakin University, the first author found and photographed a single male *C. nigrifrons* at one of the pond. No individual of this species was observed during previous or subsequent visits to the same site. To our knowledge, this observation provides the first documented record of this species in Victoria." (Authors)] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

16043. Dijkstra, K.-D. B. (2016): Restore our sense of species. *Nature* 533: 172-174. (in English) ["Klaas-Douwe B. has named a new dragonfly after David Attenborough to mark the broadcaster's 90th birthday — and to honour the importance of knowing the natural world." (Publisher)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

16044. Ding, Y.; Rong, N.; Shan, B. (2016): Impact of extreme oxygen consumption by pollutants on macroinvertebrate assemblages in plain rivers of the Ziya River Basin, north China. *Environmental Science and Pollution Research* 23(14): 14147-14156. (in English) ["The aim of the study was to estimate the impact of oxygen depletion on macroinvertebrate community structure in benthic space. Macroinvertebrate assemblages and potential of dissolved oxygen (DO) consumption were investigated simultaneously in the plain rivers of the Ziya River Basin. The degree of DO depletion was represented by sediment oxygen demand (SOD) and DO, chemical oxygen demand (CODCr), and ammonia nitrogen (NH₄⁺-N) in the overlying water. The results showed an all-around hypoxia environment formed, and the values of DO, SOD, CODCr, and NH₄⁺-N were separately 0.11–4.03 mg L⁻¹, 0.41–2.60 g m⁻² day⁻¹, 27.50–410.00 mg L⁻¹, and 1.79–101.41 mg L⁻¹. There was an abnormal macroinvertebrate assemblage, and only 3 classes, Insecta, Gastropoda, and Oligochaeta, were found, which included 9 orders, 30 families, and 54 genera. The biodiversity was at a low level, and Shannon-Wiener index was 0.00–1.72. SOD, and NH₄⁺-N had major impact on the macroinvertebrate community, and the former had negative effect on most taxa, for instance, Nais, Branchiura, Paraleptophlebia, etc., which were sensitive or had a moderate-high tolerance to pollution. NH₄⁺-N had both positive and negative impacts on benthic animals, for instance, Dicrotendipes, Gomphus, Cricotopus, etc., for the former, and Procladius, Limnodrilus, Hippeutis, etc., for the latter. They all had a moderate-high tolerance to pollution. It is significant to improve DO condition and macroinvertebrate diversity in river harnessing and management." (Authors)] Address: Shan, B., State Key Laboratory on Environmental Aquatic Chemistry, Research Center for Eco-Environmental Science, Chinese Academy of Science, Beijing, 100085, People's Republic of China

16045. Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2016): Records of Odonata from Perlis, Malaysia in August 2015, with a checklist of species recorded from the state. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 16: 1-22. (in English, with Bahasa Melayu abstract) ["The results of a short collecting trip to Perlis in the north-west of Peninsular Malaysia are reported. Eighty three species were collected, at least 61 of these are new records for the state, and three species are recorded from Malaysia for the first time: *Euphaea masoni* Selys, 1879, *Archibasis oscillans* (Selys, 1877) and *Paracercion calamorum* (Ris, 1916). A checklist of the Odonata recorded from Perlis is given in an appendix." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

16046. Dow, R.A. (2016): Revision of the genus *Coeliccia* Kirby in Borneo part II: Two new species from the membrani-pes-group, with a redescription of *C. macrostigma* Laidlaw (Odonata: Zygoptera: Platynemididae). *Zootaxa* 4184(1): 79-103. (in English) ["*Coeliccia matok* sp. nov. (holotype ♂ from Borneo, Sarawak, Samarahan Division, peat swamp forest at old UNIMAS campus, 25 ii 2008, to be deposited in BMNH) and *Coeliccia paludensis* sp. nov. (holotype ♂ from Borneo, Kalimantan Tengah, peat swamp forest in ex Mega Rice Project Block E, 18 vi 2012, in RMNH) are described from Borneo. The two new species are apparently confined to peat swamp forest (*C. paludensis*) or largely confined to peat swamp forest and related forest formations (*C. matok*). *Coeliccia macrostigma* Laidlaw is redescribed and all available information on it is summarised. Additional terminology for characters of the prothorax in *Coeliccia* species is introduced. Distribution maps are given for all three species considered." (Author)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

16047. Du, C.-p.; Xu, J.-x.; Zheng, Y. (2016): Application of iterative learning tuning to a dragonfly-like flapping wing micro aerial vehicle. *Chinese Control and Decision Conference (CCDC)*, 28-30 May 2016, Yinchuan, China: 4215-4220. (in English) ["The flight control design of a dragonfly-like flapping wing micro aerial vehicle (FWMAV) is studied in this paper. The main contribution of this work is to design an appropriate flight controller by incorporating a linear-quadratic regulator (LQR) method and an iterative learning tuning (ILT). The linear model of dragonfly-like FWMAV is developed at the equilibrium point. Then a linear-quadratic regulator approach is applied to design the flight controller of FWMAV. However the flight controller performance of FWMAV is sensitive to the input weighting matrix of LQR. In order to improve the flight controller, an iterative learning tuning is developed to optimize the input weighting matrix of LQR problem due to unknown constraints and relations between the state and the control input. Numerical simulation results show that the effectiveness and convergence performance of the flight controller of FWMAV are obtained.] Address: Du, C.-p., School of Aeronautics and Astronautics, Zhejiang University, Hangzhou, 310027, China

16048. DuBois, R.B.; Smith, W.A. (2016): Pre-emergent movements and survival of F-0 larvae of *Ophiogomphus rupinsulensis* (Odonata: Gomphidae) in a northern Wisconsin river. *International Journal of Odonatology* 19(1-2): 83-93. (in English) ["We marked and released 276 F-0 larvae of *O. rupinsulensis* in the fall of 2008 in a 99-m riffle (marking riffle) of a small, serially discontinuous, northern Wisconsin river (USA). We then recovered marked exuviae via exhaustive collecting on the banks of a 272-m sampling reach in which the marking riffle was located during spring of 2009. We collected 6054 exuviae of *O. rupinsulensis* along the sampling reach, including 3829 exuviae along the marking riffle (19.3 exuviae m⁻¹). Mark retention was complete and our ability to recover marked exuviae in the field was high (92%). We recovered 38 marked exuviae which provided a minimum estimate of survival (14%) for F-0 larvae from late September to the following June. The density of F-0 larvae in the marking riffle in late September was estimated at 22.6 larvae m⁻². Nearly all F-0 larvae made small downstream movements (97% moved <60 m) at some time during the 36 weeks before emergence, but they did not make substantial longitudinal movements. These results affirmed the premise that locations of found exuviae of *O. rupinsulensis* along a small river are in close proximity to the habitats where the larvae developed." (Authors)] (Address: DuBois, R., Dept of Natural Resources, Bureau of Natural Heritage Conservation, Superior, WI, USA. E-mail: robert.dubois@wisconsin.gov

16049. Dumont, H.J.; Chevalier, F. (2016): *Trithemis kirbyi* colonizes the Atlantic Sahara. *Notulae odonatologicae* 8(8): 308-313. (in English) ["We report *Trithemis kirbyi* from the environs of Dakhla in the Atlantic (western) Sahara, currently an extension of South Morocco. In view of the peculiar distribution of this species in west and north-west Africa, and the recent changes in the desert environment brought about by man, we hypothesize that, as in the Iberian Peninsula, such change in distribution was triggered by recent habitat changes and that the origin of the invasion was more likely the Moroccan than the Sahelian populations. Further extension towards the south (the Senegal basin) is expected in the years ahead." (Authors)] (Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

16050. Dumont, H.J. (2016): The dragonfly fauna of South Mauretania: 40 years later. *Brachytron* 18(1): 57-67. (in Dutch, with English summary) ["In February 2016, I observed 11 species of dragonflies in the Tagant plateau and Senegal valley. The Tagant area is relatively rich in permanent water, being situated at the transition of Sahara desert and Sahel. I re-visited several water points seen and sampled forty years earlier (1975 and 1976). A comparison with the current situation revealed incisive changes: in many places, new human settlements have appeared, leading to the privatization (fencing) of large parts of oases and other desert areas, a huge proliferation of cattle, and the use of detergents (and presumably, but not observed) of pesticides. *Agriocnemis zerafica*, of which one population north of the Senegal River was known from the oasis of El Houseiniye, had disappeared, and

most other species had decreased in abundance. I was also struck by some biogeographic anomalies: at least two Afro-tropical species that are currently common in Morocco and expanding into the Iberian Peninsula, are not or scarcely found in Mauretania and Senegal. Other species, common in these two countries, have relict populations in the central Sahara (mainly in Algeria and Libya) but are lacking in the western desert and do not reach the Maghreb. The reasons behind this pattern are unknown, but are likely of an ecological (species interaction?) nature. *Hemianax ephippiger* was present but not abundant and did not (yet?) migrate. *Lestes pallidus* was found to associate with *Acacia* trees, abundantly in the Senegal valley, but isolated occurrences were noted up to 100 km from the river. The dynamics of this association tree-dragonfly deserves closer attention. Possibly it is neutral, but it is not excluded that it might be a mutualistic relationship, the first to involve a dragonfly." (Author)] (Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

16051. Dutmer, G. (2016): Discovery of a population of *Nehalennia speciosa* in the eastern part of the Netherlands. *Brachytron* 18(1): 16-22. (in Dutch, with English summary) ["*N. speciosa* has always been a very rare species in the Netherlands and was regarded as extinct, with only two reliable records, from 1899 and 1912. In June 2015, a population was found in the eastern part of the Netherlands. Between June 11 and July 31 a maximum of 40 individuals per day, including copulae and teneral were seen. The flight period is from the beginning of June till the end of July. The population was visited regularly and their ecology and behaviour was observed. Although the habitat corresponds with the description in the literature the individuals were only seen on land. The origin of this population is unclear. Possibly it survived the excavations in the early 20th century. The nearest known population is located 200 kilometres away in Germany. Possibly more populations are to be discovered in the border area between the Netherlands and Germany." (Author)] (Address: Gerard Dutmer. E-mail: gerarddutmer@hotmail.com

16052. Ehrsam, M.; Knutie, S.A.; Rohr, J.R. (2016): The herbicide atrazine induces hyperactivity and compromises tadpole detection of predator chemical cues. *Environmental Toxicology & Chemistry* 35(9): 2239-2244. (in English) ["The ability to detect chemical cues is often critical for freshwater organisms to avoid predation and find food and mates. In particular, reduced activity and avoidance of chemical cues signaling predation risk are generally adaptive behaviors that reduce prey encounter rates with predators. The present study examined the effects of the common herbicide atrazine on the ability of Cuban tree frog (*Osteopilus septentrionalis*) tadpoles to detect and respond to chemical cues from larval dragonfly (*Libellulidae* sp.) predators. Tadpoles exposed to an estimated environmental concentration of atrazine (calculated using US Environmental Protection Agency software; measured concentration, 178 µg/L) were significantly hyperactive relative to those exposed to solvent control. In addition, control tadpoles significantly avoided predator chemical cues, but tadpoles exposed to atrazine did not. These

results are consistent with previous studies that have demonstrated that ecologically relevant concentrations of atrazine can induce hyperactivity and impair the olfactory abilities of other freshwater vertebrates. The authors call for additional studies examining the role of chemical contaminants in disrupting chemical communication and the quantification of subsequent impacts on the fitness and population dynamics of wildlife." (Authors)] Address: Ehram, M., Dept of Integrative Biology, University of South Florida, Tampa, Florida, USA

16053. Emiliyamma, K.G.; Palot, M.J. (2016): A new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from Western Ghats, Kerala, India. *Journal of Threatened Taxa* 8(14): 9648-9652. (in English) ["A new species of *Protosticta* Selys, 1885 from Kerala part of Western Ghats is described and illustrated. The holotype male and paratype female is distinguished from other *Protosticta* species based on its complete black dorsal surface of abdomen, 7th and 8th abdominal segment without yellow or blue colour dorsally and its distinct anal appendages. The new species, *P. monticola* sp. nov. was collected from shola forests of Idukki District, Kerala, southern Western Ghats. A key is also provided for the identification of all described species of *Protosticta* known from the Western Ghats." (Authors)] Address: Emiliyamma, K.G., Zool. Survey of India, Western Ghat Regional Centre, Kozhikode, Kerala 673006, India. E-mail: kgemily@gmail.com

16054. Escoriza, D.; Hassine, J.B.; Sala, J.; Boix, D. (2016): Zoophagy in the larvae of Ibero-Maghrebian Spade-foot Toads. *Herpetologica* 72(4): 281-287. (in English, with French summary) ["The ecological role of anuran larvae is usually defined as a primary consumer. Recent studies have shown, however, that some grazing-rasping species consume animal matter on a regular basis. We investigated zoophagy in two species of Spade-foot Toads (*Pelobates cultripes* and *P. varaldii*). The larvae of both species showed no specific morphological adaptations for macrophagy but are very large and inhabit invertebrate-rich ponds under prolonged summer drought conditions. We hypothesized that both species would consume animals having high nutritional value, and that there would be no difference between the two species in terms of the animals consumed, because tadpoles are broad dietary generalists. We also hypothesized that the consumption of animals would vary during development based on the size limitations of the oral cavity. Examination of the intestinal contents of *P. varaldii* and *P. cultripes* indicated that they had consumed a wide range of invertebrates, as predicted. Differences in the composition of animals between the two species might be attributable to variability in the composition of invertebrate assemblages among ponds. We provide the first evidence of consumption by taxa within *Pelobates* of aquatic species of Insecta (Coleoptera, Diptera, Ephemeroptera, and Odonata), Collembola (*Sminthuridae* and *Poduridae*), large Branchiopoda (*Anostraca*, *Notostraca*, and *Spinicaudata*), and Gastropoda (*Physidae* and *Planorbidae*). We also found a correlation between the diversity of animals consumed and the ontogenetic variation in size in both *Pelobates* species. These findings support the hypothesis that grazing-rasping tadpoles have an omnivorous role in aquatic

trophy webs." (Authors)] Address: Escoriza, D., GRECO, Institute of Aquatic Ecology, Univ. of Girona, Girona 17003, Spain. E-mail: daniel_escoriza@hotmail.com

16055. Evangelio Pinach, J.M.; Sendra Pérez, P.; Díaz Martínez, C. (2016): Primera cita de *Libellula quadrimaculata* Linnaeus, 1758 (Odonata: Libellulidae) y *Lestes sponsa* (Hansemann, 1823) (Odonata: Lestidae) para la provincia de Cuenca (este de España). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 59: 291-292. (in Spanish, with English summary) [*L. quadrimaculata*: 14-V-2011, 11:30 h., Laguna de Talayuelas (Serranía baja, Cuenca) (ETRS89, UTM 30SXX5008, 895 m s.n.m.); *L. sponsa*: 15-VII-2013, 11:15 h., Salvacañete (Serranía baja, Cuenca) (ETRS89, UTM 30TXK3141, 1340 m s.n.m.)] Address: Evangelio Pinach, J.M., Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjevanach@hotmail.com

16056. Evangelio Pinach, J.M. (2016): Primera cita de *Symptetrum sanguineum* (Müller, 1764) (Odonata: Libellulidae) para la provincia de Valencia (Comunidad Valenciana, este de España). *Boln. S.E.A.* 59: 291-292. (in Spanish, with English summary) ["The first record of *S. sanguineum* from Valencia province (Comunidad Valenciana, eastern Spain) is reported: 25-IX-2016, Castielfabib (Rincón de Ademuz, UTM datum ETRS89 X: 641072, Y: 4441361. 1125 m)." (Authors)] Address: Evangelio Pinach, J.M., Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjevanach@hotmail.com

16057. Farkas, A.; Danyik, T.; Móra, A. (2016): Riverine dragonflies (Odonata: Gomphidae) of the rivers of Körös-Maros National Park. *Crisicum* 9: 133-164. (in Hungarian, with English summary) ["In 2013 and 2014 systematic collections of Gomphidae exuviae were carried out at altogether 89 sampling sites in the Natura 2000 areas along the rivers of Körös-Maros National Park (Maros, Sebes-Körös, Fehér-Körös, Fekete-Körös, Kettos-Körös, Hármaskörös and Hortobágy-Berettyó). The sampling sites were visited during the emergence periods of gomphid species. Besides Gomphidae, exuviae of other species were also collected, and observational data on adult specimens were occasionally recorded. During our work 8296 exuviae (from which 7323 were exuviae of Gomphidae) were collected and 1854 adults were observed. A total of 26 species were found (18 as exuviae and 23 as adults). In the Maros, Fehér-, Fekete-, Kettos- and Sebes-Körös the co-occurrence of the four Hungarian gomphid species was detected, although only a single exuvia of *O. cecilia* and a single exuvia of *O. forcipatus* was found in the Sebes-Körös and the Maros respectively. In the Hármaskörös and the Hortobágy-Berettyó only the two Gomphus species occurred, but while larger populations exist in the Hármaskörös, their occurrence in the Hortobágy-Berettyó is very sporadic. Furthermore, our collections resulted in several new localities for gomphid species, which was especially evident for *O. cecilia* and *O. forcipatus* and therefore their

distributional areas were remarkably expanded. Comparing the studied rivers, apparently the Maros was the most favourable for gomphids: mean number of exuviae was much higher here than at the other rivers. Except the Hortobágy-Berettyó, stable and viable populations of Gomphidae exist along the studied rivers with great significance in terms of nature conservation. Accordingly, either the studied reaches of the rivers or their Gomphidae populations deserve protection." (Authors)] Address: Farkas Anna, Park u. 2., 1223 Budapest, Hungaria

16058. Feindt, W.; Osigus, H.-J.; Herzog, R.; Mason, C.E.; Hadrys, H. (2016): The complete mitochondrial genome of the neotropical helicopter damselfly *Megaloprepus caerulatus* (Odonata: Zygoptera) assembled from next generation sequencing data. *Mitochondrial DNA Part B: Resources* 1(1): 497-499. (in English) ["Odonata is a small order at the base of flying insects (Pterygota). Resolving family-level phylogenetic relationships within this order receives great attention. Hereby, genetic data already resulted in various changes, which are however still under discussion. Mitochondrial genomes may further enhance such phylogenies. This study presents the complete mitochondrial genome of the Neotropical damselfly *M. caerulatus* based on next generation sequencing (NGS) data on total genomic DNA. The total length comprises 16,094 bp and includes the standard metazoan set of 37 genes together with a 1376 p long A+T rich (control) region. Gene content, gene arrangement and base frequency are consistent with other odonate mitochondrial genomes. It further contains four intergenic spacer regions, indicating a possible family specific feature for the Coenagrionidae and its close relatives." (Authors)] Address: Feindt, Wiebke, ITZ, Division of Ecology & Evolution, Univ. of Veterinary Medicine Hannover, Bünteweg 17d, Hannover 30559, Germany. E-mail: wiebke.feindt@ecolevol.de

16059. Feindt, W.; Herzog, R.; Osigus, H.-J.; Schierwater, B.; Hadrys, H. (2016): Short read sequencing assembly revealed the complete mitochondrial genome of *Ischnura elegans* Vander Linden, 1820 (Odonata: Zygoptera). *Mitochondrial DNA Part B* 1(1): 574-576. (in English) ["Damselflies of the genus *Ischnura* emerge as organisms with high potential in ecological, evolutionary and developmental research at the base of flying insects. *Ischnura elegans* and *Ischnura hastata* are for example one of the few odonate species where a complete life cycle over generations can be reared under laboratory conditions. We here report the complete mitochondrial genome of *Ischnura elegans* as a valuable genomic resource for future eco-evo-devo studies at the base of flying insects. The genome has a total length of 15,962 bp and displays all typical features of Odonata mitochondrial genomes in gene content and order as well as A + T content. Start and stop codons of all protein-coding genes are consistent. Most interestingly, we found four intergenic spacer regions and a long A + T rich (control) region of 1196 bp, which is almost double the size of the close relative *Ischnura pumilio*. We assume that the adequate insert size and iterative mapping may be more efficient in assembling this duplicated and repetitive region." (Authors)] Address:

Hadrys, Heike, ITZ – Forschungsstätte 'Alter Bahnhof Schapen' Braunschweig, University of Veterinary Medicine Hannover, Hannover/Braunschweig, Germany. E-mail: Heike.-Hadrys@ecolevol.de

16060. Feitosa, M.C.B.; Querino, R.B.; Hamada, N. (2016): Association of *Anagrus amazonensis* Triapitsyn, Querino & Feitosa (Hymenoptera, Mymaridae) with aquatic insects in upland streams and floodplain lakes in central Amazonia, Brazil. *Revista Brasileira de Entomologia* 60(3): 267-269. (in English) ["*Anagrus amazonensis* Triapitsyn, Querino & Feitosa (Hymenoptera, Mymaridae) is a parasitoid that uses aquatic insect eggs as a host for the development of its immature stages. The objectives of this study are to record the interaction between *A. amazonensis* and its hosts and the aquatic plants used by these hosts to lay their eggs. Field work was conducted in floodplain lakes and upland (terra firme) streams, in four municipalities in Amazonas State, Brazil, where aquatic plants were scanned for the presence of aquatic insect eggs. In the laboratory, eggs were maintained in plastic containers with water until the emergence of the parasitoid or of the first instar insect. A total of 1223 adults of *A. amazonensis* emerged from eggs of Hemiptera, Lepidoptera and Odonata; these eggs were collected on 12 species of aquatic plants." (Authors)] Address: Feitosa, M.C.B., Instituto Nacional de Pesquisas da Amazônia, Coordenac, ão de Biodiversidade, Curso de pós-graduac, ão em Entomologia, Manaus, AM, Brazil

16061. Feriwibisono, B.; Marsoedi; Leksono, A.S. (2016): The model of odonate diversity relationship with environmental factors based on path analysis. *El-Hayah* 6(1): 7-14. (in English) ["This study aims to analyze and describe the relationship between altitude, aerial variables (temperature, light intensity, humidity), water qualities (water temperature, pH, BOD, COD, DO, TOM, and water velocity), and vegetation with the diversity of Odonate assemblages. Odonate samplings were conducted at six survey sites based on altitude and vegetation characteristics. Measurement of altitude, aerial variables, water qualities and vegetation characteristics were replicate in the first day and third day. Analysis of correlations of all environmental factors with the odonate diversity was done through structural equation model using Partial Least Squares (PLS), Open source Smart Software and Microsoft Excel. The aerial variables and water qualities affected indirectly on odonate diversity. The aerial variables directly or with interaction to other factor affected the water qualities and vegetation characteristics. The vegetation characteristics directly influenced to odonate diversity. Water flow affected water quality, light intensity affected the aerial, while morning period observation affected the odonate diversity. Predictive relevance (Q²) for a model designed amounted to 99.95%, while the rest of 0.05% are explained by other variables." (Authors)] Address: Feriwibisono, B., Dept of Biology, Fac. of Mathematic and Natural Sciences, Brawijaya University, Jl Veteran Malang, Indonesia. Email: amin28@ub.ac.id

16062. Ferreras-Romero, M.; Márquez-Rodríguez, J.; Fernández-Delgado, C. (2016): Long-time effect of an invasive fish on the Odonata assemblage in a Mediterranean lake and

early response after rotenone treatment. *Odonatologica* 45(1/2): 7-21. (in English) ["Over a thirty year period from 1977 to 2007, 16 Odonata species were recorded in the Nature Reserve "Laguna de Zóñar", Cordova, Andalusia, Spain. Thermophilic dragonflies with wide distribution in the African continent were dominant in recent years. In 1985, Common carp *Cyprinus carpio* L., 1758 were introduced in an uncontrolled and illegal action, and aquatic macrophytes and benthonic macroinvertebrates of the lake practically disappeared within ten years. One of the most successful tools for controlling and eradicating invasive fish is the use of chemical compounds such as rotenone. This compound adversely affects aquatic organisms with gill respiration by inhibiting oxygen intake at the cell level. Here, we analyse the effect on the Odonata assemblage of this lake after treatment with rotenone intended to eradicate the carp population. During the first year after treatment, nine Odonata species were recorded, and at least six of them obviously had completed their life cycle in the lake. We also carried out the determination of the five last growth stadia in *Orthetrum cancellatum* larvae, and we propose that, in the southern Iberian Peninsula, this species has a univoltine life cycle with asynchronous emergence." (Authors)] Address: Ferreras-Romero, M., Dept of Physical, Chemical & Natural Systems, Univ. Pablo de Olavide, A376 km 1, 41013 Sevilla, Spain. E-mail: mferrom@upo.es

16063. Foglini, C. (2016): Odonata next-door: an updated check-list of two parks in the Northern Milan outskirts (Lombardy, Italy). *Natural History Sciences. Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano* 3(2): 35-40. (in English, with Italian summary) ["Odonata are usually regarded as bioindicators and model organisms in many studies and are subjected to increasing threats worldwide. Such insects populate freshwater ecosystems at both natural and urban landscapes and they are also well-known by common people. This work is aimed at summarizing and updating the current knowledge concerning Odonata species inhabiting two parks located at the northern boundary of the Milan outskirts (Italy, Lombardy). Occupancy status for odonate species were obtained merging the field data of surveys conducted during 2014 and 2015 with spare information from specialistic websites and forums, grey literature, and pictures collected at the same sites by occasional observers. The total number of species found in both parks showed an increase of species richness when compared with two previous studies. Moreover, Odonata communities of the two parks showed a common chorological composition and similarity in the species assemblages. This work had also a positive impact about the perception of urban biodiversity: some of the untrained observers, who shared their pictures for species identification, rapidly acquired sufficient knowledge to easily recognize the most common species present in both parks." (Authors)] Address: Foglini, C., Via Leon Battista Alberti 8/A, 20092 Cinisello Balsamo (MI), Italia. E-mail: clafogli@libero.it

16064. Gabela Flores, M.V. (2016): Demography and territorial behavior of three species of the genus *Hetaerina* (Odonata: Calopterygidae) along three tropical stream ecosystems. Tesis (Licenciada en Biología), Universidad San

Francisco de Quito, Colegio de Ciencias Biológicas y Ambientales; Quito, Ecuador: 52 pp. ["We studied the demography and territorial behavior of three damselfly species of the *Hetaerina* genus (*H. fuscoguttata*, *H. aurora* and *H. caja*) along three lowland stream ecosystems in western Ecuador. Throughout a Capture-Mark-Recapture (CMR) methodology, we estimated the daily survival rates, sex ratio and longevity of the most abundant species on each location, as well as the respective population size. Overall, we captured more males than females and we found male biased sex ratios in all three studied populations. Throughout focal observations, we analyzed male territorial behavior as well as male and female reproductive behavior of the three *Hetaerina* species. We registered a low number of reproductive events in all populations. Conversely, we registered a higher number of male-male interactions of this territorial genus. However, we did not find evidence that certain morphological characters are related to a male's territorial role." (Author)] Address: not stated

16065. Galasso, P., Curcuraci, N., Marletta, A. (2016): First record of *Brachytron pratense* (Müller, 1764) in Sicily (Odonata Aeshnidae). *Biodiversity Journal* 7(1): 51-54. (in English) ["During the spring 2015, some specimens of *B. pratense* were observed and photographed for the first time at the swamp lake "Pantano Cuba", in the southeast coast of Sicily, near to Pachino (Syracuse). This record represents now the southernmost Italian locality for this species." (Authors)] Address: Galasso, P., Stiftung Pro Artenvielfalt, Meisenstr. 65, 33607 Bielefeld, Germany. E-mail: paolo_galasso@hotmail.com

16066. Gallesi, M.M.; Mobili, S.; Cigognini, R.; Hardersen, S.; Sacchi, R. (2016): Season matters: differential variation of wing shape between sexes of *Calopteryx splendens* (Odonata: Calopterygidae). *Zoomorphology* 135(3): 313-322. (in English) ["Insects adapt commonly to seasonally changing habitats and reproductive contexts. Individuals that mature at different times during the year can show patterns of life cycle or morphological variation, possibly associated with changes in reproductive behaviour. Concerning mating strategies of flying insects, wing morphology may be related both to the outcome of male-male contests and to the ability in acquiring females. Therefore, different mating strategies (territorial vs. non-territorial) may have different flight morphology optima that increase fitness in their context. Males of *C. splendens* are mainly territorial early in the season, but with the advancing season and with increasing competition, more and more males adopt a non-territorial pursuing strategy. Given that different mating tactics have different wing morphologies, here we test whether the wing shape of males shifts from a "territorial" to a "non-territorial morphology" during the season. So, early in the season males show highly sexually dimorphic wings, which allow for high manoeuvrability and larger spots, while late in the season wing shapes of males become less sexually dimorphic and more suitable when pursuing females. Additionally, we studied the seasonal variation of other flight related traits, specifically wing lengths, abdomen length and weight. We found that these latter

traits decreased along the season in both sexes without altering sexual dimorphism. However, wing shape, which resulted sexually dimorphic, showed a seasonal variation, decreasing the level of sexual dimorphism. The most probable determinant of this change is phenotypic plasticity triggered by environmental cues, but other explanations of the observed pattern are discussed." (Authors)] Address: Galesi, M.M., Dipto di Scienze della Terra e dell'Ambiente, Univ. Pavia, viale Taramelli 24, 27100, Pavia, Italy. E-mail: marco.galesi@unipv.it

16067. Gangadoo, S.; Helliö, C.; Power, A.; Chandra, S.; Watson, G.; Watson, J.; Green, D.W.; Chapman, J. (2016): Biomimetics for early stage biofouling prevention: Templates from insect cuticles. *Journal of Materials Chemistry B, Materials for biology and medicine* 4: 5747-5754. (in English) ["A biomimetic antifouling material study was carried out utilising superhydrophobic cicada and dragonfly wings replicated with a polymer (epoxy resin). They were tested in a marine biofouling study for up to 1 week in addition to biofouling assays of protein, carbohydrate and DNA absorption. The materials were compared against a commercial antifouling paint and a polymeric smooth surface constituting a control sample. The replicated surfaces demonstrated superior antifouling properties in comparison to the control and similar efficiency in DNA (10% reduction), protein and carbohydrate adsorption (15%) to the commercial anti-fouling paint. As the fabricated surfaces have roughness at the nano metre scale it is probable that the low adsorption properties, at least at the early stages, may be related to air trapped at the surface. Interestingly the most disordered replicated surface (dragonfly wing replicate) demonstrated the lowest values of absorption." (Authors)] Address: Gangadoo, S., School of Medical and Applied Sciences, CQUniversity, Australia. E-mail: j.chapman@cqu.edu.au

16068. Garzón Gutiérrez, J.; van Hoof, B.A. (2016): Ampliación de la distribución conocida del anisóptero *Oxygastra curtisii* (Dale 1834) (Odonata: Corduliidae) en la Península Ibérica: nueva especie para Cantabria. *Boln. S.E.A.* 59: 301-302. (in Spanish, with English summary) ["A new record of the endangered dragonfly *O. curtisii* is given, based on specimens from two 100km² squares of the UTM grid situated in Cantabria (northern Spain). The number of Odonata species known to occur in Cantabria is raised to 45, as this constitutes the first record of the species from the region. Also, the Iberian distribution of the dragonfly is briefly discussed, focusing on nearby populations." (Authors)] Address: Gutiérrez, J.G., Barrio de la Iglesia 18 'La Cabaña'. 39722 Liérganes, Cantabria, Spain. E-mail: jorge.garzon@asociacionalas.org

16069. Gassmann, D.; Richards, S.J.; Polhemus, D.A. (2016): *Idiocnemis schorri* sp. nov., a new damselfly species from southern Papua New Guinea (Odonata: Platycnemididae). *Zootaxa* 4171(3): 491-504. (in English) ["*I. schorri* sp. nov. is described from the Hindenburg and Muller Ranges and the Kikori River Basin of southern Papua New Guinea. The new species differs from all congeners by, among other characters, a unique colour pattern on the thorax. Characters of males

and females are illustrated and compared to those of similar species from the *Idiocnemis bidentata* group. The new species is found along small, shallow rainforest streams and is currently known only from the Trans-Fly Foreland and Papuan Gulf Foreland areas of endemism." (Authors)] Address: Gassmann, D., Arachnida Section, Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany

16070. Gassmann, D.; Richards, S.J. (2016): *Pseudagrion woodlarkensis* sp. nov., a new damselfly species from Woodlark Island, Papua New Guinea (Odonata: Coenagrionidae). *International Journal of Odonatology* 19(1-2): 31-39. (in English) ["*P. woodlarkensis* sp. nov., a new damselfly species from Woodlark Island, Papua New Guinea, is described and male and female characters are illustrated. The new species differs from all regional congeners by having a predominantly yellow thorax with bold black stripes, and males can be clearly distinguished from all Papuan *Pseudagrion* species by the complex and characteristic cerci which bear an inner process that is oriented obliquely upwards and directed posteriorly. Description of this species brings the number of *Pseudagrion* species currently known from the Papuan biogeographic subregion to 17." (Authors)] Address: Gassmann, D., Inst. Evol. & Ecol. Sciences, Leiden Univ., c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nm.nl

16071. Geraeds, R.P.G. (2016): Hibernation Common Winter Damselflies at the Driestruik Nature Reserve. *Natuurhistorisch Maandblad* 105(1): 244-246. (in Dutch, with English summary) ["For several years, *Sympecma fusca* were observed until late autumn along the edge of a forest at the Driestruik nature reserve during surveys of Common lizards (*Zootoca vivipara*). Unlike most European dragonfly species, Common winter damselflies hibernate in the adult stage, rather than as eggs or larvae. For a long time, little was known about the hibernation of this species. Recent research in the Netherlands has shown that at least some of the animals hibernate freely suspended in the vegetation. As of the winter of 2012, the forest edge has been searched annually for hibernating damselflies. None were found during the first two winters, but in the winter of 2014-15 two hibernating animals were found, and three in the winter of 2015-16. Four of the five specimens were found in vegetation, at heights of 10 to 40 cm above the ground. The fifth animal was found in a narrow slit in a fence post. While hibernating, the animals are still active during warmer periods. They can cover short distances by crawling through the vegetation." (Author)] Address: Geraeds, R.P.G., Rijksweg Noord 280, 6136 AH Sitard, Netherlands. E-mail: rob.geraeds@kpnplanet.nl

16072. Gitarama, A.M.; Krisanti, M.; Agungpriyono, D.R. (2016): Macrozoobenthic Communities and Accumulation of Chromium in Cimanuk Lama River, West Java. *Jurnal Ilmu Pertanian Indonesia* 21(1): 48-55. (in Indonesian, with English summary) ["The residue of human activities and batik industrial waste water surrounding the river will be able to increase the accumulation of chromium and to disrupt macrozoobenthic communities in the river. The aims of this

study was to assess the impact of human activities surrounding the river to the macrozoobenthic communities and the accumulation of chromium in Cimanuk Lama River, Indramayu District, West-Java. The study has been conducted from April/May 2015 based on three times sampling at three different sampling stations. The result of this study shows that the chromium accumulated in the waters of all station still meet the standard quality ranging from 0,010 to 0,016 mg/l, but only station 1 fulfills the standard quality for chromium accumulated in the river sediment with the range of all stations was about 11,72 to 46,63 mg/kg. The results also show that the community index analysis describes the change of macrozoobenthic community at all stations caused by environmental pressure, especially at the station 2 which is indicated by the highest score of Family Biotic Index. The accumulation of the chromium in the waters and the change of macrozoobenthic community structure are mostly influenced by the use of the Cimanuk Lama river long for agricultural and fisheries activities, and also batik home industry." (Authors)] Address: Gitarama, Arbi Mei, Departemen Manajemen Sumber Daya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor, Kampus IPB Darmaga, Bogor 16680. E-mail: arbirama@gmail.com

16073. Gladysz, M.; Dolezych, B.; Cuber, P.; Karcz, J.; Laszczyca, P.; Miszta, A. (2016): Mud sediments on anal pyramids of *Libellula quadrimaculata* larvae – accidental phenomenon or bioindicator of heavy metal pollution? (Odonata: Libellulidae). *Odonatologica* 45(3/4): 179-189. (in English) ["The morphology and morphometry of 1089 *L. quadrimaculata* exuviae, collected at three selected sites in Upper Silesia (Poland), were examined with regard to their potential use as bioindicators of habitat quality. The biometric parameters of exuviae were only weakly linked to water quality, i.e., to heavy metal contamination. However, terminal thickenings on the anal pyramid, which were originally thought to be teratogenic, were finally identified as sediments that had been deposited on the anal appendages. These modifications were observed in ca 12 % of the exuviae that had been collected from a site on which river contamination by metals had reached extreme values, thus probably having caused a long-lasting and complex change of the water habitat." (Authors)] Address: Gladysz, M., STB Innovation Centre, Skarszewska 23, 83-110 Tczew, Poland. E-mail: marcin.gladysz@gmail.com

16074. Gliwa, B.; Petraska, A.; Svitra, G.; Uselis, V. (2016): Data on one new and 23 rare to Lithuanian fauna species of dragonflies (Odonata) recorded in 2015–2016. New and rare for Lithuania insect species 28: 5-18. (in English, with Lithuanian summary) [*Chalcolestes viridis*; *Lestes barbarus*; *Sympetma paedisca*; *S. fusca*; *Coenagrion lunulatum*; *Erythromma viridulum*; *Nehalennia speciosa*; *Aeshna viridis*; *A. affinis*; *Anax parthenope*; *Cordulegaster boltonii*; *Gomphus flavipes*; *Ophiogomphus cecilia*; *Somatochlora arctica*; *Orthetrum coerulescens*; *O. brunneum*; *O. albistylum*; *Leucorrhinia albifrons*; *L. pectoralis*; *L. caudalis*; *Sympetrum pedemontanum*; *S. fonscolombii*.] Address: Gliwa, B., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: bermdgliwa@yahoo.de

16075. Golfieri, B.; Surian, N.; Hardersen, S.; Maiolini, B. (2016): How to comprehensively evaluate river corridor conditions? A comparison of different biotic and morphological indices in northern Italy. EGU General Assembly 2016, held 17-22 April, 2016 in Vienna Austria: 7059. (in English) [Verbatim: The assessment of river conditions is crucial for planning appropriate management actions. The European Water Framework Directive 2000/60/EC (WFD) requires the assessment of biological, physical-chemical and hydromorphological elements to define the ecological status of rivers. The WFD suggests the use of different bioindicators (i.e. benthic macroinvertebrates, diatoms, aquatic macrophytes and fish), the so called "biological quality elements" (BQEs). However, recent studies showed that BQEs-based indices have two main limitations: (i) their standard application is limited to flowing channels and (ii) they are not sensitive to hydromorphological alteration. Hydromorphological conditions are usually evaluated applying methods for physical habitat assessment (i.e. the River Habitat Survey or derived methods) that consist in site-scale inventories of river forms and anthropic structures. The lack of consideration of wider spatial (i.e. reach or catchment scale) and temporal scales (e.g. channel evolution over the last 50-100 years) make such methods inadequate for a sound diagnosis of morphological alterations. The Morphological Quality Index (MQI) and the dragonfly-based Odonate River Index (ORI) were developed in the recent years to overcome the above-mentioned limitations and to assess the condition of the whole river corridor (i.e. the channel and its adjacent floodplain) at reach scale. In this study we correlated the assessments of MQI, ORI and two BQEs-based biotic indices (i.e. STAR_ICMi for benthic macroinvertebrates and ICMi for diatoms) in 15 lowland river reaches in northern Italy. The selected reaches are characterized by a wide range of morphological degradation. MQI and ORI were highly correlated, probably because both methods work at reach scale and consider the integrity of the whole river corridor, either in terms of morphology or considering ecological aspects. In contrast, no significant relationships were found between MQI and ORI and the BQEs-based indices (i.e. ICMi and STAR_ICMi). This can be probably attributed to the differences in spatial scale (i.e. site scale) at which the BQEs-based indices apply and to the human pressure that they were originally designed to detect (i.e. water quality). These results show that MQI and ORI are useful tools to evaluate the integrity of the river corridor, at reach scale. The ORI provides information on the ecological condition of the river not covered by the other biotic indices, thanks to the sampling strategy that considers also secondary channels and ponds. We underline the importance of integrating the assessment of the lateral dimension of the river corridor in the evaluation and the need to choose appropriate indicators. The choice of the indicators must also consider the spatial and temporal scale of their application, in order to detect pressures operating at various scales (e.g. water quality and hydromorphological alteration). Only the integration of reach-scale indicators, such as MQI and ORI, would allow for a comprehensive evaluation of river corridor conditions and to define sound and appropriate management actions.]

- 16076.** Gordon, A.M.; Youngquist, M.B.; Boone, M.D. (2016): The effects of pond drying and predation on Blanchard's Cricket Frogs (*Acris blanchardi*). *Copeia* 104(2): 482-486. (in English) ["Pond hydroperiod and predators play a central role in structuring aquatic communities. Because of predicted changes in precipitation and temperature patterns associated with climate change, pond hydroperiods will likely be altered. Reduced hydroperiods can impact amphibian populations by restricting the amount of time available for larval growth and by altering predatory interactions via increased predator densities. We investigated how pond drying and predation singularly and interactively affected growth and survival of *A. blanchardi*. We reared recently hatched tadpoles through metamorphosis in outdoor mesocosms using a factorial design incorporating three hydroperiods (fast-drying, slow-drying, or constant) and three larval odonate predator treatments (caged, uncaged, or absent). Caged and uncaged predator treatments were implemented to evaluate both consumptive and non-consumptive effects. There were no differences in survival, time to metamorphosis, or size at metamorphosis in response to drying or predation treatments. Although pond drying rates in this study did not induce measurable responses, it is possible that more extreme conditions could impact metamorphosis. The lack of response to odonate predator presence and cues suggests tadpoles of *A. blanchardi* may rely on other behavioral and phenotypic defenses, such as the tail spot, to escape predation. Developing a more comprehensive understanding of how *A. blanchardi* responds to altered hydroperiod, predators, and their potential interactions is important to predict how this species and other amphibians that breed in diverse aquatic habitats may respond to the influence of climate change on aquatic ecosystems." (Authors)] Gordon, Ashley, Nicholas School of Environment, Environment Hall, Duke University, Durham, North Carolina 27708, USA. E-mail: gordona3@miamioh.edu
- 16077.** Guebailia, A.; Khelifa, R.; Bouiedda, N.; Amari, H.; Hadjadj, S.; Zebba, R.; Boualem, M.; Houhamdi, M. (2016): Body size, reproductive behaviour, and microhabitat use of two sympatric *Trithemis* species – what might allow their sympatry? (Odonata: Libellulidae). *Odonatologica* 45(1/2): 23-36. (in English) ["Sympatric territorial species are subject to interference competition when they share the same resources. The interaction becomes stronger when the coexisting species share similar traits, which is often the case in congeners. In this study, we investigated the body size, reproductive behaviour, and microhabitat use of two congeneric dragonflies, *T. annulata* and *T. arteriosa*, in Northeast Algeria from September to November 2012 in order to assess the potential factors that allow their coexistence in the same system. Even though *T. annulata* was larger than *T. arteriosa*, mistaken recognition was often observed. The behavioural sequence of both species exhibited broadly similar patterns in reproductive behaviour but they differed in mate guarding tactics and male-male interference. Copulation duration was shorter in *T. annulata* than in *T. arteriosa*. Oviposition bouts lasted longer in *T. arteriosa* but dipping was faster in *T. annulata*. Analysis of microhabitat choice showed that *T. arteriosa* males preferred vegetated areas to establish their territories while *T. annulata* used a wide array of habitats including terrestrial ones. Our data suggest that, although the two congeneric species are phenotypically similar and demonstrate low interspecific recognition abilities, they can coexist syntopically because they differ slightly in their habitat use and reproductive behaviour." (Authors)] Address: Guebailia, A., Biology Dept, Fac. Exact Sciences & Nature and Life Sciences, University of Mohamed Essadik ben Yahia, Jijel 18000, Algeria. E-mail: aminaguebailia@gmail.com
- 16078.** Günther, A.; Schulze, C. (2016): Erstnachweis von *Orthetrum albistylum* in Brandenburg (Odonata: Libellulidae). *Libellula* 35(3/4): 207-215. (in German, with English summary) ["*O. albistylum* was found in June 2016 in northeastern Germany for the first time. Several mature individuals and one emergence were observed. The records indicate an area expansion from Poland in a westward direction and a new migration path for eastern and south-eastern populations to colonise Germany."] Address: Schulze, Caroline, Meissner Gasse 28, 09599 Freiberg, Germany. E-mail: caroline-schulze@freenet.de
- 16079.** Günther, A.; Möckel, B. (2016): Zum Frühjahrsaspekt der Libellenfauna in Zentralmakedonien, Nordgriechenland (Odonata). *Libellula* 35(3/4): 185-194. (in German, with English summary) ["Early spring records of Odonata in Central Macedonia, Northern Greece – Hitherto knowledge about the beginning of the emergence dates of dragonflies on the Greek mainland has been very limited. A total of eight Odonata species were recorded in Central Macedonia during a short visit from March 27th to April 2nd 2016. For *Ischnura pumilio*, *Aeshna isoceles*, *Brachytron pratense*, and *Libellula depressa* we made the earliest seasonal records for Greece. In terms of dragonfly fauna most notable were the new records of *Sympetma fusca*, *I. pumilio*, and *B. pratense*. No records of *B. pratense* have been published from Central Macedonia since 1999. Furthermore, we observed an unusually strong invasion of *Anax ephippiger* to the Greek mainland." (Authors)] Address: Günther, A., Naturschutzinstitut Freiberg, Bernhard-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@ioez.tu-freiberg.de
- 16080.** Guillermo-Ferreira, R.; Viela, D.S.; Del-Claro, K.; Bispo, P.C. (2016): *Erythrodiplax ana* sp. nov. (Odonata: Libellulidae) from Brazilian palm swamps. *Zootaxa* 4158(2): 292-300. (in English) ["*E. ana* sp. nov. (σ holotype, six male and three female paratypes), collected in Vereda wetlands (a unique Neotropical savanna environment) in Uberlândia (Minas Gerais) and Chapada dos Guimarães (Mato Grosso), Brazil, is described and illustrated. The new species fits in Borror's *Basalis* Group, and can be distinguished from other species by the combination of the following traits: blue pruinosity dorsally on thorax and third to eighth abdominal segments; sides of the thorax olive-green; face ivory or olive-green; wings hyaline with a small apical brown spot on all four wings, well defined in females; male genitalia with sclerotized erectile posterior lobe and inflatable sac-like median process. Last instar larvae were reared in the laboratory, resulting in the description of the larva. We also followed this

population for 13 months and present resulting biological notes and comments on ontogenetic colour change in males, as well as longevity." (Authors)] Address: Guillermo-Ferreira, R., Dept Hydrobiol., Federal Univ. of São Carlos–UFSCar, São Carlos, São Paulo, Brazil. E-mail: rhainerguillermo@gmail.com

16081. Habib, S.; Yousuf, A.R. (2016): Phytophilous macroinvertebrate community of an eutrophic lake in Kashmir Himalayas. *Journal of Entomology and Zoology Studies* 4(5): 318-325. (in English) ["Extensive ecological studies have been carried out on various aspects of Dal Lake, however, the interaction between macrophytes and macroinvertebrates is poorly understood. In order to fill this void a survey of macroinvertebrate community associated with submerged macrophytes was conducted in selected sites of Dal Lake, Kashmir from March to September, 2012. A composite gerking frame box sampler with an inbuilt grappler was used for collection of macrophytes. Altogether 21 invertebrate taxa were collected out of which 18 were identified upto genus level. However, of these only 4 families (Chironomidae, Ceratopogonidae, Planorbidae and Lymnaeidae) showed >75% share on the total abundance. Representatives of some other groups were found occasionally (density ranging from 5-11 individuals per m²) these included Dytiscidae, Pisauridae, Corixidae and Gomphidae. Maximum number of macroinvertebrates were found attached to *Ceratophyllum demersum* (198 individuals per m²), followed by *Potamogeton crispus* (112 individuals per m²), *Hydrilla verticillata* (95 individuals per m²) and least for *Myriophyllum spicatum* (8 individuals per m²)."] (Authors)] Address: Habib, Shazia, Dept Environmental, Science, University of Kashmir, J&K, India-190006

16082. Harisha, M.N. (2016): Assessment of status, diversity and threats of odonates in Komaranahalli Village of Harihar Taluk, Davangere District, Karnataka, India. *International Journal of Plant, Animal and Environmental Sciences* 6(3): 122-127. (in English) ["The present attempt is to analyze the role of aquatic insects especially Odonates diversity in maintaining the status of the Komaranahalli wetland. The study was conducted from November 2012 to October 2013 during which, a total of 33 species of odonates belonging to 6 families have been recorded. Among them Anisoptera were predominant with 24 species, followed by the Zygoptera with 9 species. Among the order-Anisoptera, the family Libellulidae was widely distributed and dominated with high percentage composition followed by the Coenagrionidae among order-Zygoptera i.e., 84%, (n=18) and 67% (n=6) respectively. The status based on the frequency of occurrence shown that 40% were common, 21% were occasional, 18% were very common, 15% 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 of odonate diversity of Davanagere District of Karnataka state for research on their biology and the conservation."] (Author)] Address: Harisha, M.N., Dept of Post Graduate studies and research in Applied Zoology and Wildlife & Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India. E-mail: harishwild@gmail.com

16083. Harisha, M.N. (2016): Evaluation of status and diversity of odonates of Kondajji lake, Kondajji village, Harihar Taluk, Davanagere district, Karnataka, India. *Journal of Entomology and Zoology Studies* 4(4): 384-388. (in English) ["A study on diversity of odonates was conducted at Kondajji Lake of Kondajji Village located in Harihar Taluk, Davanagere District of Karnataka. The study was conducted to explore status, diversity and threats of Odonates during February 2007 to January 2008. The study revealed a total of 34 species of Odonates in 24 genera belonging to 6 families have been reported. Among them Anisoptera dominated with 25 species, followed by the Zygoptera with 9 species. The family Libellulidae dominated with 20 species among the Anisoptera. Among the Zygoptera, Coenagrionidae was found to be the dominant family with 6 species. Based on the frequency of occurrence 35% of the species were common, 23% were very common, 21% were rare, 15% were occasional and 6% were very rare. According to IUCN categorization all the odonate species recorded from the study area comes under 'Least Concern' (LC) category. The study provides the baseline data on Odonates diversity of some major wetland water bodies of Davanagere District of Karnataka state for research on their biology and the conservation."] (Author)] Address: Harisha, M.N., Dept of Post Graduate Studies & Research in Applied Zoology & Wildlife Management, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shimoga, Karnataka, India

16084. Hellmund, M.; Hellmund, W. (2016): Reproduction structures of damselflies (Odonata, Zygoptera): are they trace fossils or not? *Palaeodiversity* 9(1): 89-94. (in English) ["Following a review of relevant mechanisms and structures, we propose to use binary nomenclature for characterizing and naming most fossil egg-sets, clutches and ovipositions of damselflies as trace fossils. We recommend to sharply distinguish between structures caused by insects and adjoining plant tissues. Only the former are trace fossils, the latter are not."] (Authors)] Address: Hellmund, M., Zentralmagazin Naturwissenschaftlicher Sammlungen, Martin-Luther-Universität Halle-Wittenberg, Domplatz 4, 06108 Halle (Saale), Germany. E-Mail : meinolf.hellmund@zns.uni-halle.de

16085. Henze, M.J.; Oakley, T.H. (2016): The dynamic evolutionary history of Pancrustacean eyes and opsins. *Integrative & Comparative Biology* 55(5): 1-13, 25 pp app. (in English) ["Synopsis: Pancrustacea (Hexapoda plus Crustacea) display an enormous diversity of eye designs, including multiple types of compound eyes and single-chambered eyes, often with colour vision and/or polarization vision. Although the eyes of some pancrustaceans are well-studied, there is still much to learn about the evolutionary paths to this amazing visual diversity. Here, we examine the evolutionary history of eyes and opsins across the principle groups of Pancrustacea. First, we review the distribution of lateral and median eyes, which are found in all major pancrustacean clades (Oligostraca, Multicrustacea, and Allotricarida). At the same time, each of those three clades has taxa that lack lateral and/or median eyes. We then compile data on the expression of visual r-opsins (rhabdomeric opsins) in lateral and median eyes across Pancrustacea and find no evidence for

ancient opsin clades expressed in only one type of eye. Instead, opsin clades with eye-specific expression are products of recent gene duplications, indicating a dynamic past, during which opsins often changed expression from one type of eye to another. We also investigate the evolutionary history of peropsins and r-opsins, which are both known to be expressed in eyes of arthropods. By searching published transcriptomes, we discover for the first time crustacean peropsins and suggest that previously reported odonate opsins may also be peropsins. Finally, from analyzing a reconciled, phylogenetic tree of arthropod r-opsins, we infer that the ancestral pancrustacean had four visual opsin genes, which we call LW2, MW1, MW2, and SW. These are the progenitors of opsin clades that later were variously duplicated or lost during pancrustacean evolution. Together, our results reveal a particularly dynamic history, with losses of eyes, duplication and loss of opsin genes, and changes in opsin expression between types of eyes." (Authors)] Address: Oakley, T.H., Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA, USA. E-mail: oakley@lifesci.ucsb.edu

16086. Herzog, R.; Osigus, H.-J.; Feindt, W.; Schierwater, B.; Hadrys, H. (2016): The complete mitochondrial genome of the emperor dragonfly *Anax imperator* LEACH, 1815 (Odonata: Aeshnidae) via NGS sequencing. Mitochondrial DNA Part B 1(1): 783-786. (in English) ["Here we report the complete mitochondrial genome of *A. imperator* as the first of its genus. Data were generated via next generation sequencing (NGS) and assembled using an iterative approach. The typical metazoan set of 37 genes (13 protein-coding genes, 22 tRNA genes, and 2 rRNA genes) was detected in the same gene order as in other odonate mitogenomes. However, only three intergenic spacer regions are present in *A. imperator* lacking the distinct s5 spacer, which was regarded as informative feature of the odonate suborder Anisoptera but absent in Zygoptera. With 16,087 bp, it is the longest anisopteran mitogenome to date, mainly due to the long A+T-rich control region of 1291 bp." (Authors)] Address: Herzog, Rebecca, ITZ, Ecology and Evolution, University of Veterinary Medicine Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: rebecca.herzog@ecolevol.de

16087. Heynen, M.; Fick, J.; Jonsson, M.; Klaminder, J.; Brodin, T. (2016): Effect of bioconcentration and trophic transfer on realized exposure to oxazepam in two predators, the dragonfly larvae (*Aeshna grandis*) and the Eurasian perch (*Perca fluviatilis*). Environmental Toxicology and Chemistry 35(4): 930-937. (in English) ["Psychoactive substances are used worldwide and constitute one of the most common groups of pharmaceutical contaminants in surface waters. While these pharmaceuticals are designed to be efficiently eliminated from the human body, we know very little about their trophic-transfer potential in aquatic wildlife. Therefore, the goal of this study was to quantify and compare uptake of an anxiolytic (oxazepam) from water (bioconcentration) and via the consumption of contaminated diet (trophic transfer) in *P. fluviatilis* and *A. grandis*. We found bioconcentration (BC) and trophic transfer (TT) of oxazepam in both predator species. However, we observed higher BC for perch (bioconcentration factor [BCF]

3.7) than for dragonfly larvae (BCF 0.5). Perch also retained more oxazepam from consumed prey (41%) than dragonfly larvae (10%), whereas the relative contribution via prey consumption was 14% and 42% for perch and dragonflies, respectively. In addition, we found that BC was negatively correlated with perch weight, indicating that exposure levels in natural contaminated environments differ between individuals of different size or between different developmental stages. Hence, TT of pharmaceuticals may indeed occur, and estimates of environmental exposures that do not consider intake via food or size-dependent bioconcentration may therefore lead to wrongful estimations of realized exposure levels in natural contaminated ecosystems." (Authors)] Address: Heynen, Martina, Dept of Ecology & Environmental Science, Umeå University, Sweden. E-mail: martina.heyne@umu.se

16088. Higashikawa, W.; Yoshimura, M.; Yagi, T.; Maeto, K. (2016): Microhabitat use by larvae of the endangered dragonfly *Sympetrum pedemontanum elatum* (Selys) in Japan. Journal of Insect Conservation 20: 407-416. (in English) ["*S. pedemontanum*, which is distributed widely in the Eurasian continent and its neighbouring islands, is listed as a Least Concern species in the International Union for Conservation of Nature Red List (2015). In Japan, however, the population of its subspecies *S. pedemontanum elatum* has been rapidly decreasing since the 1970s. In order to conserve this subspecies, it is important to understand the seasonal microhabitat use by its larvae. However, this has been a difficult task because larvae of *S. pedemontanum elatum* often coexist with those of a common congener, *S. eroticum*, and cannot be morphologically distinguished from the latter. Thus, in this study, we first established a molecular technique based on the polymerase chain reaction to accurately identify each species. In the subsequent field survey in 2015 with its application in the Sakasegawa River, Hyogo Prefecture, we found that *S. pedemontanum elatum* larvae hatch in stagnant water and subsequently advance into weakly flowing water. Our results indicated a change in the microhabitats during the larval developmental process, reflecting the need for a continuous spectrum of stagnant, transitional, and flowing water. Such aquatic environments with a spectrum of water conditions are disappearing in Satoyama, a rural farming area in Japan. This has endangered species such as *S. pedemontanum elatum* and *Oryzias latipes* (Beloniformes: Adrianichthyidae) by depriving them of their favourable habitats. For their conservation, it is necessary to develop methods to recover the traditional aquatic environments in Satoyama." (Authors)] Address: Higashikawa, W., Laboratory of Insect Biodiversity & Ecosystem Science, Graduate School of Agricultural Science, Kobe Univ., Rokkodai-cho 1-1, Nada-ku, Kobe, Hyogo 657-8501, Japan. E-mail: higashi_n34@yahoo.co.jp

16089. Hill, M.J.; Ryves, D.B.; White, J.C.; Wood, P.J. (2016): Macroinvertebrate diversity in urban and rural ponds: Implications for freshwater biodiversity conservation. Biological Conservation 201: 50-59. (in English) ["Ponds are among the most biodiverse freshwater ecosystems, yet face significant threats from removal, habitat degradation and a lack of legislative protection globally. Information regarding the

habitat quality and biodiversity of ponds across a range of land uses is vital for the long term conservation and management of ecological resources. In this study we examine the biodiversity and conservation value of macroinvertebrates from 91 lowland ponds across 3 land use types (35 floodplain meadow, 15 arable and 41 urban ponds). A total of 224 macroinvertebrate taxa were recorded across all ponds, with urban ponds and floodplain ponds supporting a greater richness than arable ponds at the landscape scale. However, at the alpha scale, urban ponds supported lower faunal diversity (mean: 22 taxa) than floodplain (mean: 32 taxa) or arable ponds (mean: 30 taxa). Floodplain ponds were found to support taxonomically distinct communities compared to arable and urban ponds. A total of 13 macroinvertebrate taxa with a national conservation designation were recorded across the study area and 12 ponds (11 floodplain and 1 arable pond) supported assemblages of high or very high conservation value. Pond conservation currently relies on the designation of individual ponds based on very high biodiversity or the presence of taxa with specific conservation designations. However, this site specific approach fails to acknowledge the contribution of ponds to freshwater biodiversity at the landscape scale. Ponds are highly appropriate sites outside of protected areas (urban/arable), with which the general public are already familiar, for local and landscape scale conservation of freshwater habitats." (Authors)] Address: Hill, M.J., Inst. Science & the Environment, Univ. of Worcester, Henwick Grove, Worcester WR2 6AJ, UK. E-mail: matthew.hill@worc.ac.uk

16090. Hunger, H. (2016): *Sympetma paedisca* am westlichen Bodensee - weitere neue Beobachtungen zu Bestandsschwankungen und Fortpflanzungshabitaten (Odonata: Lestidae). *Mercuriale* 16: 33-43. (in German, with English summary) ["*S. paedisca* at the westerly Lake Constance - more new findings on population fluctuations and reproduction habitats - New data from surveys carried out in 2015 und 2016 within the shore zones of westerly Lake Constance are presented and compared with the water level fluctuations of Lake Constance between April and September, the period of oviposition, larval development and emergence. The data support the hypothesis presented by Hunger & Schiel (2014) that falling water levels during the summer lead to the death of many larvae in their shallow water habitats. The knowledge about larval habitats of *S. paedisca* remains insufficient, however, findings of exuviae within the nature reserve „Wollmatinger Ried“ can be reported." (Author)] Address: Hunger, H., INULA, Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

16091. Huplalo, K.; Tonczyk, G. (2016): Dragonflies (Odonata) of high mountain habitats. *Kosmos* 65(2): 267-275. (in Polish, with English summary) ["The aim of this article is to characterize the odonatofauna in the mountainous areas and to examine variations in the diversity of Odonata species in different regions of the world. Dragonflies are widespread on all continents except of Antarctica. However, the fossils found in Antarctica suggest that dragonflies were there present 150-200 million years ago. Their diversity reaches its peak in the tropics and in the Oriental regions. Due to the hard environmental

conditions present at high altitudes, dragonflies of high mountain habitats have developed a number of adaptations that enable their development and reproduction even at the height of 5000 m. Dragonflies are merolimnic, so the main factor limiting their occurrence is the lack of water. The highest altitude at which any dragonfly was found was in Himalayas, where at 6300 m a single individual of the common species *Pantala flavescens* was collected. In the distribution of the odonatofauna in high mountain habitats in different world regions there occur both some differences and similarities. On the every continent, with an increase in the altitude the number of species diminishes. However, the diversity of dragonflies occurring at certain heights varies depending on the continent and the mountain chain. So, for example, at the altitude of 3500 m different species are present in the Andes Himalayas, and Cordillera. These differences are mainly due to location of the mountain ranges in different climate zones and on different continents." (Authors)] Address: Hupla, K., Dept of Invertebrate Zoology and Hydrobiology, Faculty of Biology and Environmental Protection, University of Lodz, Banacha 12/16, 90-237 Łódź, Poland. E-mail: hrupeq@gazeta.pl

16092. Hykel, M.; Harabis, F.; Dolny, A. (2016): Assessment of the quality of the terrestrial habitat of the threatened dragonfly, *Sympetrum depressiusculum* (Odonata: Libellulidae). *European Journal of Entomology* 113: 476-481. (in English) ["The majority of the conservation strategies for threatened dragonflies are designed to protect only their aquatic habitats. *S. depressiusculum* is a species threatened not only by the destruction of its aquatic habitats but also by its association with a specific terrestrial environment. In this study, we aimed to identify the key elements of the terrestrial environment of adult *S. depressiusculum*. We used generalized linear mixed models to determine habitat preferences of adults and the particular features of habitat patches, such as vegetation cover, vegetation structure and the availability of potential prey. Our results indicate that *S. depressiusculum* adults preferred mainly riparian vegetation but beyond ponds they utilized only certain terrestrial habitats (abandoned fields, meadows, forest clearings). Adults responded positively to habitat patches with a high cover of vegetation and suitable vegetation structure. Adult abundance was affected also by the distance of patches from the natal site. In an agricultural landscape, the availability of such habitat patches may be limited and could influence the abundance and distribution of this species. We suggest that conservation efforts for this species should not only focus on the larval environment but also include suitable surrounding terrestrial habitats. Effective management around natal sites should concentrate on maintaining a heterogeneous landscape, which is extensively managed (e.g. leaving several fields fallow, maintaining managed hay meadows)." (Authors)] Address: Hykel, M., Dept Biology & Ecology / Institute of Environmental Technologies, Faculty of Science, Univ. of Ostrava, Chittussiho 10, CZ-710 00 Slezská Ostrava, Czech Republic. E-mail: michalhykel@seznam.cz

16093. Inamura, T.; Hirohashi, K (2016): Abstract: M21.00009: Hovering and targeting flight simulations of a dragonfly-like flapping wing-body model by IB-LBM. *Bulletin of*

the American Physical Society 61(20) (69th Annual Meeting of the APS Division of Fluid Dynamics): (in English) [Verbatim: Hovering and targeting flights of the dragonfly-like flapping wing-body model are numerically investigated by using the immersed boundary-lattice Boltzmann method (IB-LBM). 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 between the forewing and the hindwing motions and for various values of the stroke angle that the vertical motion of the model depends on the phase difference angle, 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 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 targeting flight by dynamically changing the stroke angle β .] Address: Dept. Aeronautics and Astronautics, Kyoto University

16094. Iseni, G.; Beadini, N.; Beadini, Sh.; Jordanova, M.; Rebok, K.; Abdija, Xh.; Qoku, L.; Aliu, H.; Iseni, B.; Kuçiniç, M. (2016): New records on *Pyrrhosoma nymphula* (Sulzer, 1776) and *Ischnura pumilio* (Charpentier, 1825) in the region of Lipkovo, Republic of Macedonia (Odonata: Coenagrionidae). UNIVERSI - International Journal of Education, Science, Technology, Innovation, Health and Environment 2(3): 56-62. (in English) ["*P. nymphula* and *I. pumilio* are relatively well investigated. Besides the earlier records, there are many new records for the presence of *I. pumilio* and *P. nymphula* in Macedonia. According to the latest data species *P. nymphula* was identified on 03.06.2008 in the Great River in the village of Klenovec, western Macedonia, and species *I. pumilio* was identified on 03.06.2008 in Prilep Lake in Prilep and Mountain Galiçica in southwestern Macedonia. However, according to current literature records for the the distribution, biology and phenology of these two species in the region of Lipkovo has never been reported. From our research we managed to confirm the presence of these two species near the river Vuksan above the village Mateç in Lipkovo region on these dates: 24.05. and 28.06.2015, 29.05. and 26.06.2016." (Authors)] Address: Iseni, G., Study Program of Biology, Faculty of Mathematical Natural Science, State University of Tetovo, Ilinden pn, 1200 Tetovo, Macedonia

16095. Jacob, S.; Manju, E.K (2016): Potential of odonate (dragonflies and damselflies) diversity as a bioindicator of water quality. International Journal of Science and Research 5(7): 2033-2036. (in English) ["In order to determine whether a relationship existed between water quality and odonate fauna, data were collected from four selected sites of Pala Municipality, Kottayam District, Kerala. The Water Quality Index, Simpson's diversity index and Species abundance values were calculated. The area with highest water quality index shows highest species richness and the area with lowest water quality index shows lowest species richness. The abundance of *Brachythemis contaminata* sp. in the polluted area and

Bradinopyga geminata sp. in the non-polluted area shows their indicator efficiency. A potential exists for Odonata species diversity, numbers of individuals and occurrence of particular species to be used as a bioindicator of water quality. Advantages include, data that reflects a time period rather than a point in time and also low costs." (Authors)] Address: Jacob, Sonia, Dept Zool., Alphonso College, Pala, India

16096. Jawaheri, R.A.; Sahlen, G. (2016): Negative impact of lake liming programmes on the species richness of dragonflies (Odonata): a study from southern Sweden. Hydrobiologia 788: 99-113. (in English) ["Liming programmes aiming to restore fish populations are being implemented in many acidified aquatic systems in northern Europe. We studied Odonata communities in 47 forest lakes in SW Sweden, 13 that are currently being limed, and 8 that have previously been limed. 31 species were recorded, with the highest mean number in untreated lakes, followed by previously treated lakes and currently treated lakes. Species communities differed between untreated and limed lakes, but only few rare species found in the untreated lakes were absent in the treated lakes. Likewise, species known to thrive in acid environments were either rare or showed no preferences. Comparing the number of records of odonate species within a large regional area to the proportion of lakes inhabited in our study, we found that seven of the most commonly observed species occurred less frequently in limed lakes than in the untreated ones, including two of the three most common taxa. Reduced species numbers in limed lakes might be due to conditions on other trophic levels, including fish predation. We argue that Odonata should be considered when developing new biological indices of water quality, although the causes of the observed occurrence patterns need to be studied further." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

16097. Jisha Krishnan, E. K.; Sebastian, C. D. (2016): Analysis of taxonomic relationships and species divergence of Libellulidae (Odonata: Anisoptera) members using Cytochrome Oxidase I gene. International Journal of Advanced Biotechnology and Research 7(2): 545-550. (in English) ["Libellulidae are commonly called 'skimmers' or 'perchers' representing the largest dragonfly family in the world. They are cosmopolitan in distribution and consist of 142 genera and 871 species. This family displays remarkable diversity in behaviour and morphology and consequently focused on studies of comparative population ecology, sexual selection, phylogeography and the evolution of mating behaviour. In the present study we deciphered the phylogenetic relationships of nine Libellulidae members by Neighbour-joining (NJ) and Maximum likelihood methods using partial cytochrome oxidase I gene as the marker. The phylogenetic tree inferred the sister clade relationship of the representing libellulidae members and confirmed the evolutionary divergence in relation with branch length. The averages A+T content of all these species are 62.03 % while G+C content is 37.97 % showing strong A+T bias. The transition/ transversion ratio are found to be 0.858 for purines and 2.533 for pyrimidines indicating

higher mutations are exhibited by the transition of Thymine, Uracil and Cytosine. The present study thus concluded that the mitochondrial cytochrome oxidase subunit I (COI) gene sequence of Libellulidae members demonstrated substantial variation; therefore it can be used for molecular taxonomy and for the phylogenetic studies." (Authors)] Address: Sebastian, C.D., Molecular Biology Lab., Dept of Zoology, University of Calicut, Kerala 673635 India. E-mail: drcdsebastian@gmail.com

16098. Jödicke, R. (2016): Vander Linden's name *Agrion pulchella*: a dating problem and its consequences (Odonata: Coenagrionidae). *Notulae odonologicae* 8(8): 254-260. (in English) ["*Coenagrion pulchellum* (Vander Linden) was originally described in 1825 as *Agrion pulchella*, but most synonymic and systematic catalogues and other publications on Odonata cite 1823 or even 1820. The reason for this discrepancy was an incorrect citation in H.A. Hagens synonymic catalogue of the European Odonata from 1840. He referred to one of P.L. Vander Lindens preceding publications published in 1823, which had an extremely low circulation and were not easily to check but definitively don't include the name *pulchella*. A supposed junior synonym, *C. interruptum* (Charpentier), was also introduced in 1825. Lacking any information about precise imprint dates, both names have to be interpreted as simultaneously published synonyms. It is suggested that E. de Selys Longchamps be accepted as the First Reviser who determined their precedence; he fixed the name *pulchella* as the valid one in a monographic work on European Odonata published in 1840. His nomenclatural act corresponds to the current use." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

16099. Johnson, J. (2016): *Argia agrioides* (California Dancer) new for Idaho. *Argia* 28(4): 24. (in English) ["*A. agrioides*, Bruneau Dunes State Park, Idaho, USA 19 July 2016.] Address: E-mail: jt_johnson@comcast.net

16100. Johnson, J. (2016): An instance of intergeneric copulation between *Archilestes* and *Lestes*. *Argia* 28(4): 21. (in English) [Brush Prairie area of Clark County, Washington, an instance of copulation between a ♂ *A. californicus* and a ♀ *L.* congener was observed and photographed. The date was 19-IX- 2015.] Address: E-mail: jt_johnson@comcast.net

16101. Johnson, J.T. (2016): *Leptobasis linda* sp. nov. from Ecuador (Odonata: Coenagrionidae). *Zootaxa* 4171(2): 373-381. (in English) ["*L. linda* is described from the Pacific lowlands of Ecuador. The coloration of mature individuals is superficially similar to the widespread *L. vacillans*, but structural and colour characteristics differentiate *L. linda* from all congeneric species. The male caudal appendages and the female posterior margin of the prothorax are unique among *Leptobasis*." (Author)] Address: Johnson, J.T., 3003 Unander Ave., Vancouver, WA 98660, USA

16102. Joshi, S.; Kosterin, O.E.; Kunte, K. (2016): New status for Fraser's forgotten *Aciagrion approximans* *krishna*, stat.

nov. (Odonata: Zygoptera: Coenagrionidae) from the Western Ghats of India. *International Journal of Odonatology* 19(1-2): 41-51. (in English) ["*Aciagrion* Selys, 1891 is one of the taxonomically difficult and poorly known genera of Oriental damselflies. *Aciagrion hisopa* race *krishna* Fraser, 1921 was described from Mahabaleshwar, Maharashtra, India. However, later Fraser (1933) doubted the taxonomic necessity of this taxon. His notion of *Aciagrion hisopa* (Selys, 1876) was erroneous, as evidenced by syntypes of this species in Selys' collection, so the ssp. *krishna* is not conspecific with *A. hisopa*. Topotypic specimens of ssp. *krishna* from the Western Ghats were compared to specimens of *Aciagrion approximans* (Selys, 1876) from the Khasi Hills, Meghalaya, which are topotypical because of the recent designation of the neotype of this species in Selys' collection. These two series were found to be very close to each other but differing at the level of subspecies, so we propose a new subspecies status and combination, *Aciagrion approximans* *krishna* Fraser, 1921." (Authors)] Address: Joshi, S., Nat. Centre for Biol. Sciences, Tata Institute of Fundamental Research, Bangalore, India

16103. Kalkman, V.J. (2016): Revision of the genus *Celebargiolestes* Kennedy, 1925 (Odonata: Argiolestidae). *Odonatologica* 45(3/4): 235-269. (in English) ["An overview of the study of the dragonflies of Sulawesi is presented and genera in need of revision are listed. One of those genera, *Celebargiolestes*, is revised, a definition of the genus *Celebargiolestes* is given and the male and female of the only hitherto described species, *C. cincta*, are redescribed. Three species are described as new to science: *Celebargiolestes askewi*, *C. orri* and *C. toli*. A key to the males is presented and habitat and distribution of the genus are discussed." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey / Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: vincent.kalkman@naturalis.nl

16104. Kannagi, A.; Sivakumar, V.; Santhi, V. (2016): Diversity of dragonflies (Insecta: Odonata) in a deciduous forest of Thoothukudi district, Tamil Nadu, South India. *International Journal of Environmental Protection and Policy* 4(3): 58-63. ["The study of Odonata communities along deciduous forest requires the basic understanding of the abundance, distribution and number of species present. As habitat conditions change, they also exhibit changes in their diversity and distribution. The present study was carried out in Kuthiraimozhi theri deciduous forest located in Thoothukudi District, Tamil Nadu, South India during July 2009 to June 2010 to assess the diversity of odonates. The forest is open, sandy, low tree lands with predominance of thorny, usually hard wood species. Observations were carried out twice in a month during morning, and evening times. A total of 958 dragonflies belonging to 20 species (2 species unidentified) belonging to 16 genera and 4 families were recorded. The family Libellulidae (15 species) was found to be dominant in the study region, followed by families Aeshnidae, Chlorogomphidae and Gomphidae, which were represented by a single species. The data was analyzed for Species richness, Shannon's diversity index and Simpson's index. Maximum number (237) of dragonflies was collected during December 2009 and the

highest Species richness (2.35) and Shannon's diversity index (2.08) was recorded during June 2010. This study has shown that, Odonata diversities along the Kuthiraimozhi theri deciduous forest vary hence these populations can be monitored, related and used as indicators of the physical structure of the deciduous forest and its surrounding ecotones. This inventory has served as the baseline for Odonata communities in the deciduous forest hence can be a measure of monitoring in the near future. Finally, there must be an increase in education on the importance of using local insect species as first level indicators of environmental health which when improved upon can save the nation a lot of money otherwise used in the chemical evaluation and monitoring of environment." (Authors)] Address: Kannagi, A., Research Centre of Zoology, Jayaraj Annapackiam College for Women (Autonomous), Periyakulam, Tamil Nadu, India. E-mail: Anitaarul1911@gmail.com

16105. Kanthika, W.A.L.; Kuruppuarachchi, K.A.J.M; Dharmasena, M.C.M.; Cooray, M.G. (2016): Dragonfly (Odonata) species diversity in different land use patterns of lowland tropical wet zone, Colombo District of Sri Lanka. International Forestry and Environment Symposium 21: 30. (in English) [Verbatim: "Many species of Odonates inhabiting in agro-ecosystems, play a crucial role in controlling pest populations and can be considered as a pollution indicator. Damselflies are important bio-control agents especially in the control of mosquito larvae. Individual Odonata species have a wide range of environmental tolerances, and are good indicators of ecosystem health, particularly for wetlands. Odonata are also known to be highly responsive to ecosystem conditions in relation to broad-scale factors such as climate and urbanization. Huge knowledge gap displays in ecology of Odonata species and this preliminary study would provide a considerable knowledge on formulating conservation strategies and ecosystem services of dragonflies. The ecological survey examined the Odonata species diversity and habitat preference in different land use types at low country wet zone of Colombo district, Sri Lanka. Five (05) main land use patterns were selected as sub-urban land set up at Waga Area: a natural forest (Indikada Mukalana), a rubber plantation, a paddy field as an agricultural land use; Urban land setup: The Open university premises (OUSL) at Nawala, Colombo and "Diyatha Uyana" Battaramulla. The ecological survey was carried out with layout of belt transect (100m×2.5) adjacent (5-15 m distance) to selected water ways in each different sampling areas of different land use patterns which adapting purposive random sampling technique. Visual observations will be carried out adapting internationally accepted techniques for sampling of flying insects to identify and quantify of Dragonflies. Oonate species specific parameters were recorded in selected sampling sites. Total number of 26 Odonata species including 9 endemics was recorded in all land using patterns all land use patterns. Species diversity (richness and abundance) measured within study sites using Shannon wiener index indicated that the paddy field (2.185), rubber plantation (1.885), natural forest (0.9507), OUSL along polluted Wellawatte canal (0.6745) and Diyatha Uyana (0.619) respectively. The number of dragonfly species and abundance is

remarkably higher in urban sites while number of damselfly is higher in sub-urban paddy field and rubber plantation. *Neurothemis tulia* and *Rhyothemis variegata* species were recorded at all study sites except natural forest. *Brachythemis contaminata* is the most abundant species which is only recorded in urban sites. A considerable species diversity and variation of Odonata species among study sites were recognized. As a conclusive remark, further studies on find limiting factors for diversity, distribution and abundance of odonate species is recommended." (Authors)] Address: Kanthika, W.A.L., Dept of Botany, The Open Univ. of Sri Lanka, Sri Lanka. E-mail: kajmkuruppu@gmail.com

16106. Karlsson, T.; Bjelke, U. (2016): Inventering av grön flodtrollslända *Ophiogomphus cecilia* 2015 – metodiktest, förstudie och första provtillfälle inom biogeografisk uppföljning. Länsstyrelsen Östergötland, rapport 2016:8. Länsstyrelsen Östergötland, 581 86 Linköping, Sweden. ISBN: 978-91-7488-408-1: 68 pp. (in Swedish, with English summary) ["The member countries in the European Union is obliged to report the conservation status for species listed in Habitat directive every 6th year. To gather information about population sizes and trends for the species in Sweden, the Swedish Environmental Protection Agency funds a monitoring named "Biogeographical monitoring". The County Administrative Board of Östergötland has been assigned to coordinate the biogeographical monitoring of Odonata and diving beetles (Dytiscidae) listed in the Habitat directive in Sweden. As a first step for establishing a monitoring programme for *O. cecilia*, a survey and method test was performed during the summer 2015. This report presents the result from the survey and suggests a strategy for monitoring the species. *O. cecilia* is restricted to the rivers (with tributaries) Råneälven, Kalixälven and Torneälven in the Sweden. These rivers are situated in the northeastern part of Sweden and are large rivers (often >100 meters width), unregulated and mainly surrounded by woodland, but near the coast to some extent also by cultivated land. The species is redlisted as "Near threatened" (NT) in Sweden due to small distribution area. The aim of this study was to test exuviae-search as a survey method and act as a pilot study to receive more information about timescale, costs and practical considerations. If the survey turned out well, it could also serve as a first sample in the monitoring programme. The survey was performed by Tommy Karlsson, the County Administrative Board of Östergötland and Ulf Bjelke, the Species Species Information Centre during the period 20-24 July 2015. A large number of previously known localities for the species were surveyed as well as new, potential localities. The latter category also includes rivers from which the species not was known. In total, 57 localities were surveyed och *O. cecilia* was found at 13 of these (Tab. 1 and Fig. 2). Exuviae were found at all localities, in total 50 exuviae. They were mainly found up to 30 cm height at straws of *Carex* sp. and within 50 cm from the shoreline. However, 15 exuviae were found 100-400 cm from the shoreline. This was probably due to a higher water level when the dragonflies emerged. Adults were found at three localities, in total four individuals, all newly emerged and close to the exuvia. In addition, an adult was found on the roadside during car driving

and wings from an individual, probably predated by a bird, was found at one locality. All visited localities are shortly described and showed in a map in annex 1 (Bilaga 1). Localities where *O. cecilia* were found is also presented with a picture of the habitat. We assess searching for exuviae as the most appropriate method for monitoring *O. cecilia* in Sweden. It is a quick method since the exuviae are easy to find and the risk of mixing up with other dragonflies species is very low. No other species of the family Gomphidae coexist with *O. cecilia* in Sweden, and the other species that you could find exuviae of at localities for *O. cecilia* (*Aeshna* sp. *Somatochlora metallica*, *Cordulegaster boltonii*) are easy to distinguish (Fig. 3-5). Furthermore, big advantages with surveying exuviae compared to adults is that it is not dependent of the weather and that records of exuviae gives information about the reproduction habitat for the species. Searching for exuviae is a common survey method for *O. cecilia* in several other European countries, and the number of observed exuviae during a certain length of a river (e.g. 50 or 100 meters) is often used to estimate status and trend for a population. However, the trend for the Swedish population is assumed to be stable and annual variation, when the surveyed is performed in relation to emergence and variation between surveyors would probably influence the result more than possible trends with the economic resources available for monitoring today. An appropriate strategy for monitoring *O. cecilia* in Sweden is instead to recurring detect occurrence of the species at a selected number of localities. In table 2 and figure 6, 20 localities for monitoring are suggested." (Authors)] Address: Karlsson, T., Länsstyrelsen Östergötland, 581 86 Linköping, Sweden

16107. Karube, H.; Kompier, T. (2016): Occurrence of a new gomphid dragonfly *Anisogomphus neptunus* sp. nov., from northern Vietnam. Tombo 58: 35-39. (in English, with Japanese summary) ["*A. neptunus* is described and illustrated from N. Vietnam. This new species is related to *A. yanagisawai* Sasamoto, 2015, described from N. Thailand." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompiertokyo@yahoo.com

16108. Karube, H. (2016): A second member of the genus *Gomphidictinus* (Odonata: Gomphidae) from northern Vietnam. Tombo 58: 41-45. (in English, with Japanese summary) [*Gomphidictinus kompierei* sp. nov.; "A second member of the genus *Gomphidictinus* is described and figured. This new species, found in N. Vietnam, is easy to separate *G. perakensis* (Laidlaw, 1902) by the shape of its caudal appendages and penile organ and its body maculation." (Author)] Address: Karube, H.; Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

16109. Kasai, A.; Takehiko I.H.; Hitoshi, O.; Kazutaka, S.; Daisuke, H.; Koichi, G. (2016): Fipronil application on rice paddy fields reduces densities of common skimmer and scarlet skimmer. Scientific Reports 6:23055. DOI: 10.1038/srep23055: 10 pp. (in English) ["Several reports suggested that rice seedling nursery-box application of some systemic insecticides (neonicotinoids and fipronil) is the cause of the decline in

dragonfly species noted since the 1990s in Japan. We conducted paddy mesocosm experiments to investigate the effect of the systemic insecticides clothianidin, fipronil and chlorantraniliprole on rice paddy field biological communities. Concentrations of all insecticides in the paddy water were reduced to the limit of detection within 3 months after application. However, residuals of these insecticides in the paddy soil were detected throughout the experimental period. Plankton species were affected by clothianidin and chlorantraniliprole right after the applications, but they recovered after the concentrations decreased. On the other hand, the effects of fipronil treatment, especially on Odonata, were larger than those of any other treatment. The number of adult dragonflies completing eclosion was severely decreased in the fipronil treatment. These results suggest that the accumulation of these insecticides in paddy soil reduces biodiversity by eliminating dragonfly nymphs, which occupy a high trophic level in paddy fields." (Authors)] Address: Kasai, A., National Institute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. E-mail: kasai.atsushi@nies.go.jp

16110. Kastner, F.; Buchwald, R. (2016): Habitate von *Coenagrion mercuriale* am nördlichen Arealrand (Kreis Minden-Lübbecke, NRW, Deutschland) (Odonata: Coenagrionidae). *Libellula* 35(1/2): 23-42. (in German, with English summary) ["Habitats of *C. mercuriale* at the northern range (Minden-Lübbecke district, NRW, Germany) (Odonata: Coenagrionidae) – In North Rhine-Westphalia (Germany) the endangered damselfly *C. mercuriale* occurs in the catchment basins of the rivers Ems, Lippe, Hunte, and Weser and is recorded with several populations in the Minden-Lübbecke district. The reproduction habitats at the northern range are small unshaded ditches and brooks with low to moderate flow rate. The aquatic vegetation is lush with a mean cover of 82 % and dominated by *Berula erecta*, *Phalaris arundinacea*, and *Sparganium* spp. The waters exhibit high oxygen content and relatively high temperatures. They are moderately polluted (water quality class II) to considerably polluted (water quality class II–III) and can be classified as base-rich, calcareous waters. The water type, vegetation as well as temperature and oxygen content correspond with habitat descriptions in the literature. Differences consist in cover and height of vegetation, morphology as well as in physical and chemical characteristics of the waters. The populations in the Minden-Lübbecke district belong to the largest in North Rhine-Westphalia. In some of the small flowing waters the damselfly *C. ornatum* was found as well, these occurrences representing the only ones in North Rhine-Westphalia. The maintenance of these waters has been well adapted to the life cycle of the two species in Minden-Lübbecke but there are some more threat factors like further eutrophication and the occasional desiccation of the waterbodies." (Authors)] Address: Kastner, Friederike, AG Vegetationskunde und Naturschutz, Inst. Biol. & Umweltwissenschaften (IBU), Carl von Ossietzky Univ. Oldenburg, 26111 Oldenburg, Germany. E-mail: friederike.kastner@uni-oldenburg.de

16111. Kaur Walia, G.; Singh Chahal, S.; Babu, R. (2016): Cytogenetic report on *Gynacanthaeschna sikkima* from India (Odonata: Aeshnidae). *Odonatologica* 45(1/2): 87-94.

(in English) ["Spermatogonial and primary spermatocyte chromosomes of *G. sikkima* (Karsch, 1891) collected from Dalhousie (Himachal Pradesh, India) are described cytogenetically for the first time. The species possesses $2n$ (male) = 25 as the chromosome number and X0(male)/XX(female) type sex determining mechanism. The chromosome number is less than the modal number ($2n = 27$) of the family which originates from by the fusion of autosomes. All the autosomal bivalents except m bivalent show terminal C-bands while large autosomal bivalent possesses two interstitial and terminal C-bands. X chromosome shows large C-band only on one side. Similarly, terminal NOR bands are present on the one side of 9 autosomal bivalents including m bivalent while X chromosome possesses large interstitial NOR band." (Authors)] Address: Kaur Walia, Gurinder, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala-147002, Punjab, India. E-mail: gurinderkaur_walia@yahoo.co.in

16112. Khelifa, R.; Mellal, M.K.; Zouaimia, A.; Amari, H.; Zebsa, R.; Bensouilah, S.; Laouar, A.; Houhamdi, M. (2016): On the restoration of the last relict population of a dragonfly *Urothemis edwardsii* Selys (Libellulidae: Odonata) in the Mediterranean. *Journal of Insect Conservation* 20(5): 797-805. (in English) ["The restoration of endangered relict populations is challenging in conservation biology because they require specific environmental conditions within an inhospitable regional climate. *U. edwardsii* is the most endangered dragonfly in the Mediterranean with only one known relict small population (Lac Bleu) left in Northeast Algeria. With the absence of successful (re-)colonization over the last two decades, the restoration of the species became a top priority. To improve the status of the species in Northeast Algeria, we carried out a reintroduction and translocation scheme during 2011–2015 and assessed the changes in distribution and population size. Our restoration plan led to the emergence of three populations of which one was restored (Lac Noir), one resulted from successful translocation (Lac Tonga Northeast), and one established after successful colonization (Lac Tonga Southwest). In three localities (Lac Noir, Lac Tonga Northeast, and Lac Tonga Southwest), signs of population growth were observed, whereas no significant trend in the source population (Lac Bleu) was detected. A new population (El Graeate) was also recorded in 2015, but its origin is uncertain. Capture-mark-recapture on adults conducted in 2015 in two sites (Lac Bleu and Lac Noir) showed low recapture rates and no sign of dispersal between the two sites. Dispersal capacity of the species and conservation implications of adult distribution are discussed. This study highlights the importance of using biological indicators in selecting host habitats for the restoration of critically threatened populations." (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology & Environmental Studies, University of Zürich, Zürich, Switzerland

16113. Khelifa, R.; Mahdjoub, H.; Aouaouche, M.S.; Houhamdi, M. (2016): Reproductive behaviour of a North African endemic damselfly, *Platycnemis subdilatata* (Odonata: Platycnemididae) and probable senescence effects. *International Journal of Odonatology* 19(3): 157-167. (in English) ["Although *P. subdilatata* is widespread in the Maghreb, many aspects

of its reproductive behaviour, biology and ecology are still unstudied. One particular feature of this species is that its coloration pattern continues to change during maturation and afterwards, which makes it a good model for assessing age effects on behavioural and biological components. This study aims first to investigate the reproductive behaviour and choice of oviposition site, and second to assess clutch size and egg deposition rate as a function of age in a natural population located in North-East Algeria during the reproductive season of 2012. Males seized females next to reproductive sites and in foraging sites. Non-receptive females refused to mate with males by raising their abdomen up while perched or by curving the abdomen up while flying; the angle of abdomen elevation when perched was correlated to male persistence (the number of times that a male tried to grasp the female prothorax while flying over her). Copulation lasted about 14 min, the subsequent oviposition 54 min. Field experiments on oviposition site selection showed that the females prefer to lay eggs in *Typha angustifolia* leaves. Clutch size and egg deposition rate pattern through age showed an increase in early mature life followed by a decrease later on." (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology & Environmental Studies, University of Zürich, Zürich, Switzerland

16114. Kiauta, B. (2016): In memoriam Norman Winfrid Moore (1923–2015). *Odonatologica* 45(1/2): 1-6. (in English) ["A short biography of Dr N.W. Moore, the 'Father of global dragonfly conservation', is presented with emphasis on and a brief appreciation of his odonatological work." (Author)] Address: Kiauta, B., Callunastraat 6, 5853 GA Siebengewald/Lb, The Netherlands. E-mail: mbkiauta@gmail.com

16115. Kim, J.-S.; Pi, J.-H.; Jung, T.-J.; Lee, K.-J. (2016): The characteristics of Odonata community according to age and size of pond. *Korean Journal of Environment and Ecology* 28(3): 293-301. (in Korean, with English summary) ["15 artificial ponds in Seoul have been examined to find out the characteristics of Odonata community according to age and size of pond. We found 6 families 36 species of Odonata community, and Libellulidae was the most frequent and 19 Species were observed among Libellulidae. Considering relative importance with frequency of appearance and density, *Ischnura asiatica* and *Orthetrum albistylum* was the most frequent. Also, 16 Species including *Lestes temporalis*, *Sympetrum parvulum*, and *Anax nigrofasciatus* were relatively rare. The result of dominant species tells that *I. asiatica* in 1 ~ 3 year old ponds, *Pantala flavescens*-*Orthetrum albistylum*-*Crocothemis servilla mariannae* in order of mention in 4 ~ 6 year old ponds, *Platycnemis phyllopada*-*Ischnura asiatica* in order of mention in 10 or more year old ponds are the dominant species. Species diversity index regarding age of pond has been researched, and species diversity index in 10 year old pond was higher than that of in 1 ~ 3 year old pond. Having done the analysis of variance for types of spawn, there are many species Endophytic egg-layers and pasting in mud or sand in 10 year old artificial ponds. The wider ponds get, the higher species diversity index gets. And, we suggest that desirable size for making artificial ponds to

increase the species diversity index of Odonata is 100~300m². (Authors)]Address: Pi, J.-H., Dept. of Landscape Architecture, Graduate School, Univ. of Seoul, Seoul 130-743, Korea. E-mail: farmer01@naver.com

16116. Kiyoshi, T.; Katatani, N.; Kompier, T.; Yeh, W.-C. (2016): A new species and additional records of the genus *Sarasaeschna* from Laos and Vietnam (Odonata, Anisoptera, Aeshnidae). *Bull. Natl. Mus. Nat. Sci., Ser. A*, 42(4): 181-188. (in English) ["*Sarasaeschna yoshitomii* sp. nov., collected from the northern regions of Laos (Mt. Phou Samsoum, 1640 m and 1940 m, Xiangkhoang) and Vietnam (Mt. Hoang Lien Son, 1900 m, Lao Cai) is mainly distinguished from *S. lienii* to which it is most similar by having a more robust abdomen with the 3rd segment weakly constricted and 7–9th segments broader, male cerci with no basal but two protuberances, one at middle and the other at the base of apical expansion, and flagella of penis smoothly curved in ventral view. A new species-group, *lieni*-group, is proposed to accommodate these species; it is characterized by the following features of the male penile organ: The 4th segment is elongate with crest-like ventro-basal sclerotized plates; the flagella are slightly twisted and protrude more or less obliquely in relation to the long axis of the 4th segment. New records of both *S. minuta* and *S. gao-fengensis* are reported from Vietnam for the first time." (Authors)] Address: Takuya, K., Dept of Zoology, National Museum of Nature and Science, 4–1–1 Amakubo, Tsukuba, Ibaraki 305–0005, Japan. E-mail: kiyoshi@kahaku.go.jp

16117. Klotz, S.; Settele, J. (2016): Biodiversität. In: Brasseur, G.; Jacob, D.; Schuck-Zöller, S. (Hrsg.) (2016): *Klimawandel in Deutschland Entwicklung. Folgen, Risiken und Perspektiven*. Springer. Spektrum. XX + 348 pp: 151-160. (in German) [Review of climate change effects on biodiversity, including a passing reference to Odonata.]

16118. Kompier, T.; Futahashi, R. (2016): A new subspecies of *Orthetrum melania* from Vietnam (Odonata: Libellulidae). *Tombo* 58: 27-33. (in English, with Japanese summary) ["*O. melania superbum* ssp. nov. is described from Yen Bai Province, northern Vietnam, based on molecular phylogenetic analyses and external morphology. In the new subspecies the pruinosity on the dorsum of the thorax in the mature male is restricted to form two distinct dorsal stripes, which differs from the other known subspecies. This is also the first published record of *O. melania* for Vietnam." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompierintokyo@yahoo.com

16119. Kompier, T. (2016): New species of *Protosticta Selys* from Vietnam with a key to the males of the *P. curiosa* group (Odonata: Platystictidae). *Zootaxa* 4193(2): 347-360. (in English) ["Three new species of *Protosticta Selys*, 1855, are described from Vietnam: *P. proboscis* spec. nov. and *P. albifrons* spec. nov., while *P. satoi* dark form is elevated to specific status as *P. nigra* spec. nov. based on structural and morphological differences. The female of *P. linnaei* is described for the first time and a key provided to the males of

the *P. curiosa* group in Vietnam." (Author)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com

16120. Koshkin, M.; Schröter, A.; Wildermuth, H. (2016): The 'waterfall spectacle' of *Libellula quadrimaculata*-aggregations (Odonata: Libellulidae). *Odonatologica* 45(3/4): 213-224. (in English) ["A hitherto unknown swarming flight behaviour of *L. quadrimaculata* that included spectacular waterfall-like manoeuvres was observed and photographically documented in May and June 2015 in the steppes of the Kazakh Uplands. This unusual flight behaviour was connected to communal roosting aggregation. It is analysed and compared with common hypotheses and literature on communal roosting and swarm dynamics in Odonata and other animals." (Authors)] Address: Koshkin, M., School Environ. Sciences, Univ. East Anglia, Norwich Research Park, Norwich, Norfolk NR4 7TJ, UK. E-mail: makoshkin@gmail.com

16121. Kosterin, O.E. (2016): *Microgomphus alani* (Odonata, Gomphidae) sp. nov. from Cambodia. *Zootaxa* 4114(3): 341-350. (in English) ["*M. alani* sp. nov. is described from two males from the coastal southwestern foothills of the Cardamom Mts. in southwestern Cambodia (type locality: Cambodia, Koh Kong Province, 17 km ENE of Koh Kong, 'Macromia Rivulet', 11°40'17" N, 103°07'28" E, 296 m a.s.l., 3 vi 2014, RMNH). The species is characterised by its small size (hindwing 21–23 mm), cerci with outer angulations, truncated apices and crescent-shaped inner arms sprouting from their middle and not reaching their apices, synthorax with two parallel black lateral stripes and dorsal and collar yellow stripes fused in 7-like manner. Probably females of the same species were earlier reported from Phrae Province in northern Thailand." (Author)] Address: Kosterin, O.E., Inst. of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

16122. Kosterin, O.E. (2016): *Coeliccia poungyi dasha* subsp. nov. (Odonata, Platycnemididae, Calicnemiinae) from eastern Cambodia. *IDF-Report* 97: 1-16. (in English) ["*C. poungyi dasha* is described from the Annamense Mts. in the eastern Cambodia (holotype: Cambodia, Mondulkiri Province, a brook, a left tributary of the main river downstream Buu Sraa Waterfall, 12°34'0119" N 107°24'50"25" 03" E, 416490 m a.s., 15.06. 2014, RMNH). The new subspecies differs from the nominotypical one in coloration of the mesepisternum in males and end of the abdomen in both sexes, as well as in the length of the terminal lobe of the genital ligula." (Authors)] Address: Kosterin, O.E., Inst. of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

16123. Kovacs, T.; Theischinger, G.; Danyik, T. (2016): Odonata from Batanta (Indonesia, West Papua) with description of two new species. *Folia hist. nat. Mus. matraensis* 40: 27-37. (in English) ["Thirty-three taxa of Odonata are reported from Batanta Island (including Arefi and Birie Islands). Two new species are described: *Nososticta dora* sp. n., *Rhyothemis rita* sp. n. The following five species are new to the

Raja Ampat Islands: *Palaiargia charmosyna* Lieftinck, 1932, *Argiocnemis rubescens* Selys, 1877, *Teinobasis superba* (Hagen in Selys, 1877), *Diplacina cf. ismene* Lieftinck, 1933, *Nannophya cf. pygmaea* Rambur, 1842, and eight are new to Batanta: *Argiolestes australis* (Guérin, 1830), *Idiocnemis strumidens* Lieftinck, 1958, *P. charmosyna*, *A. rubescens*, *T. superba*, *D. cf. ismene*, *N. cf. pygmaea*, *Rhyothemis resplendens* Selys, 1878. *Nososticta cf. finisterrae* is deleted from the faunal lists of Odonata of Raja Ampat and Batanta Island. The number of species known to occur on Batanta Island is 47." (Authors)] Address: Kovacs, T., Mátra Museum of Hungarian Natural History Museum, Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. E-mail: koati@t-online.hu

16124. Krajewski, L.; Kurek, P.; Kutera, M.; Swieciak, T. (2016): New recordings of the Banded Darter *Sympetrum pedemontanum* (O. F. Müller in Allioni, 1766) in the Silesia-Cracow Upland (S Poland). *Przegląd Przyrodniczy* 27(2): 103-109. (in Polish, with English summary) ["In August and September 2011 two new sites of *S. pedemontanum* were found in the Silesia-Cracow Upland. Single male imago was observed in Bukowno-Przyimiarki and over a dozen of specimens of both sexes between Krochmalnia and Kolonia Krztynia, where the species is probably breeding nearby. In both cases the species was found close to railways - in a ditch draining railway embankment and on a sunny dirt road along railway (probably site of hunting). At both sites other rare species of reophilous odonates co-occured - *Orthetrum coerulescens* and *Ophiogomphus cecilia*. *S. pedemontanum* is known regionally mainly from historical sites, especially in the central part of the upland with watersheds. It seems that the small and clean streams draining undisturbed spring areas are the most important refuges for the species, sensitive to anthropogenic changes." (Authors)] Address: Krajewski, L., Centrum Ochrony Mokradel, ul. Cieszkowskiego 1/3 lok. 31, 01-636 Warszawa, Poland. E-mail: lukkrajewski@wp.pl

16125. Krieg-Jacquier, R.; Samsault, E. (2016): Développement larvaire et émergences de Cordulégastres en milieu souterrain (Odonata: Cordulegastridae). *Martinia* 32(1): 31-42. (in French, with English summary) ["Larval development of French Cordulegaster in subterranean habitat is discussed from observations made in Indre-et-Loire and Ain departments (France). Though very sporadic, this phenomenon raises questions about the trophic resources in such a peculiar habitat." (Authors)] Address: Krieg-Jacquier, R., Groupe de recherches et de protection des libellules *Sympetrum*, 18 rue de la Maconne, F-73000 Barberaz, France. E-mail: regis.krieg-jacquier@gmail.com

16126. Kucharski, A. (2016): The distribution of Scarce Chaser *Libellula fulva* O.F. MÜLLER, 1764 (Odonata: Libellulidae) in the valley of the upper San River. *Odonatrix* 125: 5 pp. (in Polish, with English summary) ["The sightings were conducted in the Natura 2000 site (PLH 180045) – Sanisko in Bykowce in Podkarpackie Voivodeship, in south-eastern Poland in the region of the oxbow of San River, situated nearby the mouth of Oslawa River. The existence of single female and exuvium of *Libellula fulva* O.F. MÜLLER, 1764 was reported there in

the June 2015. The site presented in the study is situated far more south than the known distribution of scarce chaser in the southern Poland." (Author)] Address: Kucharski, A., Uherce Mineralne 22H/9, Poland. e-mail: and_kuch@op.pl

16127. Kumar Misra, P.; Elangovan, V. (2016): Light and scanning electron microscopic studies on food habit analysis of insectivorous bats. *Advances in Life Sciences* 5(9): 3649-3654. (in English) ["The food habit analysis of eight insectivorous bats such as *Rhinopoma hardwickii*, *R. microphylum*, *Scotophilus heathii*, *S. kuhlii*, *Pipistrellus coromandra*, *Tophozous nudiventris*, *Megaderma lyra* and *Hipposideros fulvus* were studied using light and scanning electron microscopes. The bat guano was collected from unused buildings, historical monuments and caves from 15 districts of Uttar Pradesh. The pellet analysis revealed that the insectivorous bats fed on nocturnal insects belong to orders Coleoptera, Hymenoptera, Odonata, Hemiptera, Neuroptera, Lepidoptera and Diptera over the study period. The insect remnants such as legs, wings, antennae and elytra were commonly observed in the faecal pellets. The results lead to the conclusion that different insectivorous bats selectively fed on nocturnal insects, possibly agricultural pests, thus the conservation of insectivorous bats would facilitate to control agricultural pests and maintain a balanced ecosystem." (Authors)] Address: Dept of Applied Animal Sciences, Babasaheb Bhimrao Ambedkar Univ., Vidya Vihar Raibareli Road, Lucknow-226025, India. E-mail: elango70@yahoo.com

16128. Lanctôt, C.; Wilson, S.P.; Fabbro, L.; Leusch, F.D.L.; Melvin, S.D. (2016): Comparative sensitivity of aquatic invertebrate and vertebrate species to wastewater from an operational coal mine in central Queensland, Australia. *Ecotoxicology and Environmental Safety* 129(7): 1-9. ["Highlights: •Knowledge regarding the toxicity of coal mine wastewater to aquatic biota is limited. •We compared sensitivities of a range of Australian freshwater species. •Acute toxicity was observed in cladocerans and planarians, but not vertebrates. •Condition and hepatosomatic index were reduced in exposed vertebrates. •Tadpoles were generally more sensitive than fish. Abstract: Coal excavation and refinement processes generate substantial volumes of contaminated effluent that may be detrimental to aquatic ecosystems. As such, understanding the impacts of coal mine water releases on aquatic animals and ecosystems is essential for effectively managing and protecting neighbouring environments. Such information will ultimately be applied towards developing ongoing monitoring strategies that are protective of native wildlife. Despite intensive mining operations in Australia, few studies have documented toxicity associated with coal mine wastewater (CMW) on native species. To address existing knowledge gaps, we investigated acute toxicity (48–96 h) using eight native invertebrate species and sub-chronic effects (2 week) using three vertebrate species following exposure to wastewater from two dams (CMW1 and CMW2) located at an open-cut coal mine licensed to discharge into the Fitzroy catchment (Queensland, Australia). Wastewater from these sites is characterized by elevated conductivity, pH, sulfates as well as relatively high total and dissolved metal (loid)s (including As, Al, B, Cu, Mn,

Ni, Se and Zn). Acute exposures revealed cladocerans (*Daphnia carinata*) and planarians (*Dugesia* sp.) to be the most sensitive species, exhibiting significant mortality after 48 and 96 h exposure to CMW2, respectively. Neither wastewater was found to elicit acute toxicity in vertebrates, but a range of sub-lethal morphological effects were observed following the sub-chronic exposures. The overall response pattern was characterized by decreased condition factor and hepatosomatic index in the fish *Hypseleotris compressa* and *Pseudomugil signifier*, and in *Limnodynastes peronii* tadpoles. Tadpoles were generally more sensitive compared to the two fish species. Differences in responses were observed amongst CMW1 and CMW2, which likely relates to differences in physico-chemical properties between sites. Our results have identified several candidate vertebrate and invertebrate species that show promise for ongoing monitoring of water quality and toxicity risk in Central Queensland, Australia." (Authors)] Address: Lanctôt, C., Central Queensland University, School of Medical and Applied Sciences, Gladstone, Qld 4680, Australia. E-mail: c.lanctot@cqu.edu.au

16129. Lara-Contreras, J.-C. (2016): New records of Odonata from a tropical dry forest in the department of Huila, Colombia. *Boletín del Museo de Entomología de la Universidad del Valle* 17(1): 21-25. (in English, with Spanish summary) ["The presence of *Micrathyria aequalis* (Hagen, 1861), *M. marcella* (Selys, 1857), *Lestes forcifera* (Rambur, 1842), and *Acanthagrion inexpectum* (Leonard, 1977) is reported for the first time for the Department of Huila, bringing the total number of Odonata species in this part of Colombia to 29." (Author)] Address: Lara-Contreras, J.-C., Universidad Nacional de Colombia, departamento de Biología, Carrera 30 no. 45-03 AA. 7495. Fundación Natura Colombia, Carrera 21 No. 39-43. Bogotá, Colombia. E-mail: juclaraco@unal.edu.co

16130. Lee, D.E.; Kaulfuss, U.; Conran, J.G.; Bannister, J.M.; Lindqvist, J.K. (2016): Biodiversity and palaeoecology of Foulden Maar: an early Miocene Konservat-Lagerstätte deposit in southern New Zealand. *Alcheringa* 40(4): 525-541. (in English) ["This paper highlights the biodiversity and palaeoecology of the 23 million year old Foulden Maar, the first Konservat-Lagerstätte deposit described from New Zealand and a key site for reconstructing early Miocene Southern Hemisphere terrestrial ecosystems. The 1000-m-diameter, ca 200-m-deep Foulden Maar volcanic crater lake was a closed system with anoxic bottom waters, capturing and preserving in exquisite detail organisms from the lake and adjacent rainforest. The fossils include numerous leaves, flowers with in situ pollen, fruits, seeds, fish and arthropods. Surrounding Foulden Maar was an evergreen, Lauraceae-dominated notophyll vine forest with a diverse understorey, lianes, epiphytes and mistletoes. Diverse pollination and seed dispersal modes are evident. Fish include larval to adult stages of articulated specimens of *Galaxias*, some with preserved soft tissue and a species of eel resembling *Anguilla*. The arthropod fauna comprises ca 20 families in the orders Araneae, Plecoptera, Odonata, Isoptera, Hemiptera, Diptera, Coleoptera, Trichoptera and Hymenoptera, representing faunas typical of soil, leaf litter, forest floor or freshwater habitats. Many fossil taxa have

close relatives in the extant New Zealand biota; others are now locally extinct. Coprolites containing quartz sands sourced from outside the lake indicate the presence of volant birds, presumably waterfowl. The Foulden Maar Lagerstätte is crucial for reconstructing Miocene lake and forest ecosystems in New Zealand, particularly the terrestrial arthropod component." (Authors)] Address: Lee, Daphne, Department of Geology, University of Otago, PO Box 56, Dunedin, New Zealand. E-mail: daphne.lee@otago.ac.nz

16131. Leung, K.K.K.; Hui, W.L.; Fung, T.H. (2016): New dragonfly species for Hong Kong. *Gynacantha ryukyuensis* Asahina, 1962. *Hong Kong Biodiversity* 24: 14-16. (in English) ["*G. ryukyuensis* was found and confirmed to occur in Hong Kong in 2014. *G. ryukyuensis* was first recorded by the AFCD Dragonfly Working Group in Hong Kong's north-east New Territories in 2004, when one male and one female were captured. Two females were then recorded in Tai Lam Country Park and the northeast New Territories in April 2013 and May 2014 respectively (Fig. 18). A male was also captured in Tai Lam Country Park on 6 June 2014 (Fig. 19). All *G. ryukyuensis* recorded in Hong Kong were observed resting in trees during the day in dense woodland with a marsh nearby. In the 2014 record, the female was observed several times chasing prey near a stream with high canopy coverage." (Authors)] Address: not stated

16132. Leung, K.K.K.; Tam, T.W. (2016): Changes/updates to the dragonfly checklist in Hong Kong. *Hong Kong Biodiversity* 24: 16-17. (in English) [*Anax indicus*, *Gynacantha ryukyuensis*, *Matrona basilaris*, *Rhyothemis fuliginosa*, *Stylurus kreyenbergi*, *Sympetrum darwinianum*] Address: not stated

16133. Levis, N.A.; Schooler, M.L.; Johnson, J.R.; Collyer, M.L. (2016): Non-adaptive phenotypic plasticity: the effects of terrestrial and aquatic herbicides on larval salamander morphology and swim speed. *Biological Journal of the Linnean Society* 118(3): 569-581. (in English) ["Phenotypic plasticity, although ubiquitous, may not always be advantageous. Non-adaptive plasticity is likely to occur in response to novel environmental stress. Anthropogenic contaminants, such as herbicides, are novel stressors that are not present in the evolutionary history of most species. We investigated the pattern and consequences of phenotypic plasticity induced by four glyphosate-based herbicides (two terrestrial and two aquatic) in larvae of the spotted salamander, *Ambystoma maculatum*, by determining (1) whether the herbicides induced different morphologies; (2) if different morphologies translated to differences in burst swim performance; and (3) how induced individuals performed relative to non-induced controls. Different herbicide formulations led to the production of significantly different head and tail morphologies, and tail morphology correlated with fastest escape speed. However, escape speed did not vary among treatments. In addition, three out of four herbicide treatments experienced accelerated growth rates, in terms of the lateral size of tails, although the tail shapes were either similar to preliminary controls or intermediate between preliminary and final controls. These observations suggest that herbicide-induced

morphology is a case of non-adaptive phenotypic plasticity, and that there is potentially a trade-off between growth and development for larvae exposed to different formulations. Understanding the functional significance of induced phenotypes is important for determining their importance in shaping an organism's ecological interactions and evolutionary trajectories. Furthermore, under different conditions, the morphological changes that we observed in response to exposure to herbicides might affect salamander fitness and influence population dynamics." (Authors)] Address: Levis, N.A., Dept Biol., Western Kentucky Univ., Bowling Green, KY, 42101, USA. E-mail: nicholasalevis@gmail.com

16134. Li, S.; Zheng, D.-R.; Zhang, Q.; Liao, H.-Y.; Wang, H.; Wang, B.; Wang, J.; Lu, H.-B.; Chang, S.-C.; Zhang, H.-C. (2016): Discovery of the Jehol Biota from the Celaomiao region and discussion of the Lower Cretaceous of the Bayingebi Basin, northwestern China. *Palaeoworld* 25(1): 76-83. (in English) ["Some typical components of the Jehol Biota, including conchostracans *Eosestheria* sp., the mayfly *Ephemeropsis trisetalis* Eichwald, 1864, the aquatic beetle *Coptoclava longipoda* Ping, 1928, and a fragmentary dragonfly, are reported for the first time from the Bayingebi Formation in the Celaomiao region, western Inner Mongolia, China. This discovery indicates that the middle Upper Member of Bayingebi Formation can be correlated with the upper Yixian and the lower Jiufotang formations in western Liaoning Province. Combining it with the radio-isotopic dating result, we further believed that the Upper Member of Bayingebi Formation could be roughly correlated with the Yixian, Jiufotang, and Shaihai formations, and the overlying Suhongtu Formation with the Fuxin Formation in western Liaoning Province. In the major Bayingebi Basin, palaeontological and radio-isotopic dating evidence shows that the Bayingebi Formation has a long depositional history of over 30 Ma: its Upper Member bearing the Jehol Biota and the early Fuxin Biota is probably coeval to the Yixian, Jiufotang and Shaihai formations and has a Barremian–early Albian age; its Lower Member may be Berriasian–Hauterivian in age and could be correlated with the upper Tuchengzi, Zhangjiakou, and Dabeigou formations in northern Hebei Province. This suggests that the Bayingebi Formation should be promoted to the stratigraphic rank of group and subdivided into several secondary units (formations). Unlike the previous result, the Yingen Formation is considered across the Lower Cretaceous–Upper Cretaceous boundary and being late Albian–early Turonian in age." (Authors)] Address: Zhang, H.-C., State Key Lab. of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: hc Zhang@nigpas.ac.cn

16135. Li, X.; Zhang, H.; Pan, B.; Tong, X. (2016): Life history and secondary production of the Chinese endemic damselfly *Euphaea opaca* (Odonata: Euphaeidae). *International Journal of Odonatology* 19(1-2): 75-82. (in English) ["*E. opaca* Selys, 1853 is an endemic damselfly to China, but little is known about its biology and ecology. In this study, we investigated the life history and secondary production of *E. opaca* in a third order subtropical stream of Guangdong, China. Larvae were

collected monthly from October 2010 to September 2011 using a Surber net with six replicates from riffle areas. The results show that *E. opaca* exhibited a univoltine life history in South China with recruitment from August to February of the following year; adults first appeared in late April and ended in early September, the flight period roughly coinciding with the rainy season. The mean nymphal density ranged from 1.85 individuals m⁻² (July) to 81.48 individuals m⁻² (January) during the study period. Estimated annual secondary production was 1240.4 mg DWm⁻² year⁻¹, and annual production/biomass ratio (P/B) was 6.4." (Authors)] Address: Li, X., Dept Entom., College of Agriculture, South China Agricultural Univ., Guangzhou, PRChina

16136. Lorenzo-Carballa, M.O.; Torres-Cambas, Y.; Ferreira, S.; Trapero-Quintana, A.D.; Cordero-Rivera, A. (2016): *Microneura* is a junior synonym of *Protoneura* (Zygoptera, Coenagrionidae). *International Journal of Odonatology* 19(1-2): 13-22. (in English) ["*M. caligata* (Hagen in Selys, 1886) is an endangered damselfly presently known from five localities in the central mountains of Cuba. The precise systematic position of this species within the former Neotropical Protoneuridae has been the subject of debate, with previous results from a phylogenetic analysis based on morphology suggesting that the genus *Microneura* should be placed within the genus *Protoneura*. Here, we used mitochondrial and nuclear DNA sequencing to disentangle the taxonomic status of this species. Our results show that *Microneura* belongs to the *Protoneura* clade, thus making *Microneura* a junior synonym of *Protoneura*. Finally, we provide notes on some observations of emergence and ovipositing behaviour of this species." (Authors)] Address: Torres-Cambas, Y., Departamento de Biología, Facultad de Ciencias Naturales y Exactas, Universidad de Oriente. Patricio Lumumba s/n, Santiago de Cuba, Cuba.

16137. Loureiro, N.; Martins, S. (2016): The status of *Ischnura senegalensis* (Odonata: Coenagrionidae) in Cape Verde. *African Entomology* 24(2): 448-452. (in English) ["The first record of a zygopteran breeding population in the Cape Verde archipelago is presented. A small population of *I. senegalensis* was found living in the lagoon 'Lagoinha', Santiago island, where the species was observed in all seven surveys conducted between May 2014 and June 2015. Reproductive behaviour was repeatedly observed and exuviae were found and collected." (Authors)] Address: Loureiro, N., Centre for Environ. Biol. – ACD, Lisbon, and Univ. do Algarve, FCT - DCTMA, Campus de Gambelas, 8005-139 Faro, Portugal.

16138. Low, V.L.; Sofian-Azirun, M.; Norma-Rashid, Y. (2016): Playing hide-and-seek with the tiny dragonfly: DNA barcoding discriminates multiple lineages of *Nannophya pygmaea* in Asia. *Journal of Insect Conservation* 20(2): 339-343. (in English) ["We examined the utility of DNA barcode data for assessing genetic diversity of the tiny dragonfly *Nannophya pygmaea* Rambur in Asia. Data analyses inferred from the barcode region of cytochrome oxidase subunit I (COI) were performed with Malaysian *N. pygmaea*, along with the existing COI haplotypes distributed in Asia. We applied four

species delimitation analyses [automatic barcode gap discovery (ABGD), generalised mixed yule coalescent (GMYC), poisson tree processes maximum likelihood (PTP_ML) and poisson tree processes simple heuristic solutions (PTP_sh)] to investigate potential lineages in this geographically wide-spread species. Based on our dataset, we provisionally recognize four distinct lineages or operational taxonomic units of *N. pygmaea*, which were represented by the taxa from Japan/Korea, China/Laos/Taiwan, Malaysia and Vietnam, respectively. Phylogenetic analyses showed two well-supported assemblages of *N. pygmaea*: one restricted to the taxa from Malaysia and Vietnam; and the other covering all populations further north (i.e., China, Japan, Korea, Laos and Taiwan). An extraordinarily high degree of genetic distance (up to >12 %) was detected between these two assemblages—suggesting they represent two separate species." (Authors) Address: Low, V.L., Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia

16139. Malnas, K.; Müller, Z.; Szabo, T.; Kiss, B. (2016): Data to the Ephemeroptera, Odonata and Trichoptera fauna of the Kőszeg Mountains. *Folia hist. nat. Mus. matraensis* 40: 39-44. (in English) ["We present occurrence records of 15 Ephemeroptera, 6 Odonata and 20 Trichoptera species from streams of the Kőszeg Mountains." (Authors)] Address: Malnas, K., BioAqua Pro Ltd., Soó Rezső u. 21, H-4032 Debrecen, Hungary. E-mail: malnask@gmail.com

16140. Mañani-Pérez, J.; Cabrero-Sañudo, F.J.; Tapetado, D.G.; Gómez, J.F.; Villalobos Moreno, A. (2016): Primera cita de *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae) para la provincia de Toledo (Castilla-La Mancha, España). *Boln. S.E.A.* 59: 261-262. (in Spanish, with English summary) ["The first record of *B. irene* from Toledo province is presented. This represents a contribution to the knowledge of the Odonata from Toledo, the province of peninsular Spain with the lowest number of records and species of Odonata." (Authors)] Address: Mañani-Pérez, J., Universidad Complutense de Madrid, Depto de Zoología y Antropología Física. Grupo de Seguimiento de Fauna CEI-Campus Moncloa. Madrid, Spain. E-mail de contacto: jmanani3@gmail.com

16141. Mancu, O.O.; Popescu, I.E. (2016): More than fifty years after the last recording of *Leucorhina pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) in Romania. *Travaux du Muséum National d'Histoire Naturelle «Grigore Antipa»* 59(2): 109-113. (in English) ["At 4.5 kilometers from this protected area, within the same period, we found several dozen individuals of *L. pectoralis* in a peat exploit area, called "Turbamin", an example of human activities contributing accidentally to maintain a rare and protected species in nature." (Authors)] Address: Popescu, I.E., Alexandra Ioan Cuza" University, Faculty of Biology. Carol I Blvd. 20A. 700505 Iasi. Romania. E-mail: irinellus@yahoo.com

16142. Manenti, R.; Zanetti, N.; Pennati, R.; Scari, G. (2016): Factors driving semi-aquatic predator occurrence in traditional cattle drinking pools: conservation issues. *Journal of Limnology* 76(1): 34-40. (in English) ["In several cases, human

impact on water bodies and on their freshwater communities is detrimental, but in some cases the human activity may favour and enhance the biodiversity of small water bodies, as traditional cattle drinking pools. Despite their small size, small water bodies may constitute hot spot of biodiversity often representing the only lentic aquatic biotope in landscapes where superficial water lacks or flows in lotic environments like creeks and streams. Predators are good indicators of biodiversity in ponds and give information of food chain web complexity. In particular, semi-aquatic predators like amphibians and dragonflies may account for a substantial percentage of energy flow between aquatic and terrestrial ecosystems. In this study, we evaluated the conservation value of traditional cattle drinking pools building by assessing the factors determining the occurrence and distribution of the semi-aquatic predators. From April to August 2015, we investigated 30 distinct pools recording several abiotic and biotic environmental variables. We detected 4 semi-aquatic predators: *Salamandra salamandra* larvae, *Triturus carnifex*, *Aeshna* sp. larvae and *Libellula* sp. larvae. Abiotic features played a major role in shaping the predator community that resulted linked to stable, with no dryness period, and large drinking pools. Invertebrate prey biomass was not particularly important, while vegetation cover and occurrence of unpalatable tadpoles were the most important biotic features of the pools. Our study provides novel evidence on the importance of cattle drinking pools management to preserve biodiversity especially in areas where traditional pastoral activity is disappearing." (Authors)] Address: Manenti, R., Dipartimento di Bioscienze, Università degli Studi di Milano, Via Celoria 26, 20133 Milano, Italy. E-mail: raoulmanenti@gmail.com

16143. Marinov, M.; Fossati-Gaschnard, O.; Schorr, M. (2016): On a dragonfly collection from Nuku Hiva Island, Marquesas Islands and Paea, Tahiti (French Polynesia) with taxonomic discussion of some Polynesian genera (Insecta: Odonata). *Faunistic Studies in SE Asian and Pacific Island Odonata* 18: 1-12. (in English) ["A small collection of Odonata from Nuku Hiva Island, Marquesas Islands is presented. It adds *Anax guttatus* as a new species to this oceanic group. *Hemicordulia* sp. nov. is reported, but not described because the same species has been sampled before and is pending a formal description. A short taxonomic discussion on observed morphological similarity of male anal appendages in taxa presently assigned to *Amorphostigma*, *Hivaagrion* and *Ischnura* east of New Caledonia is provided. Important considerations for biogeography of the Pacific Odonata are discussed too." (Authors)] Address: Marinov, M., Plant Health & Environment Laboratory, Diagnostic and Surveillance Services, Ministry for Primary Industries, 231 Morrin Rd, 1072 Auckland, New Zealand. E-mail: milen.marinov@mpi.govt.nz

16144. Mangaoang, C.C.; Mohagan, A.B. (2016): Odonata diversity at University of southern Mindanao, Kabacan, Cotabato. *Asian Journal of Biodiversity* 7(1): 112-123. ["Odonata are good biocontrol agents of agricultural pests and vector mosquitoes and even an indicator of environmental changes and health status of ecosystem. Despite, limited studies have been conducted especially lowland ecosystems. The study

was conducted using time constraint with 4 exposure hours and opportunistic sampling protocols. Result of the study revealed 13 species of Odonata belonging to three families, 2 of which are Zygoptera and only one family belonging to Anisoptera with 11 species. Libellulidae dominates the recorded species. 8 species are found in USMARC and 6 species in housing. One Philippine endemic was documented - *Rhinocypha colorata*. Diversity is low in the two sampling sites and high disturbance is found in housing (63%). Similarity index showed that 92% are discordant species. Low species diversity and low endemism of Odonata is an indicator that the area is already disturbed as measured by the high number of common/oriental species and existence of environmental and anthropogenic activities. Thus, a conservation strategy for this important species will be implemented." (Authors)] Address: Cherie Cano Mangaoang, Dept of Biological Sciences, University of Southern Mindanao, Kabacan, Cotabato, Philippines. E-mail: chericano1201@gmail.com

16145. Manger, R.; van der Heijden, A. (2016): *Forcipomyia paludis* (Diptera: Ceratopogonidae), a new dragonfly parasite for the Netherlands. *Brachytron* 18(1): 50-56. (in Dutch, with English summary) ["This article describes the discovery and distribution of *F. paludis* in the Netherlands. *F. paludis* is almost never observed in the field, but later on photographs of dragonflies. In the National Park Weerribben-Wieden in 2008, pictures were taken of some *Leucorrhinia pectoralis* and a female *Crocothemis erythraea* who had *F. paludis* on their wings. *F. paludis* is the only known midge belonging to the Ceratopogonidae in Europe who parasitizes on the wings of dragonflies. *F. paludis* sucks haemolymph from the wing veins. The new findings of *F. paludis* in the Netherlands and Belgium make the Northwest Europe distribution more complete. The species is currently known in the Netherlands of six areas with open stagnant water, located on sand and peat soil. In the Netherlands, dragonflies are favored by an ever increasing group of photographers. That's why it is expected that *F. paludis* will be discovered in new areas in the Netherlands." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

16146. Manolis, T. (2016): Odonate exuviae used for roosts and nests by *Sassacus vitis* and other jumping spiders (Araneae: Salticidae). *Peckhamia* 142: 1-16. (in English) ["I systematically collected dragonfly (Anisoptera) exuviae along the margins of backwater lagoons in the American River floodplain, Sacramento County, California, USA, in five years (2008-2010, 2012-13) to document and monitor secondary use of these structures by arthropods, particularly spiders. Of nearly 400 exuviae examined, 28.1% were occupied, or showed signs of occupancy (e.g., unoccupied retreats). Of these occupied exuviae, 93% contained spiders or evidence of spider occupancy, and at least 50% of these were occupied by *Sassacus vitis* (many unoccupied retreats were probably of that species as well). *S. vitis* showed a significant preference for using the exuviae of sedentary, burrowing dragonfly larvae versus those of active, clasping or sprawling larvae. I found *S. vitis* in exuviae as single males and females, in pairs, and using exuviae for molt retreats and nests. 44 *S. vitis* nests

in exuviae provided data on aspects of the species' breeding biology. In addition, a number of these nests were attacked by hymenopteran egg parasitoids in the genera *Idris* (Platygastridae) and *Gelis* (Ichneumonidae). I also found three other salticid species (*Sitticus palustris*, *Synageles occidentalis*, and *Peckhamia* sp.) in exuviae, all guarding egg sacs. Utilization of dragonfly exuviae by *Sassacus vitis* and other salticids is no doubt more frequent and widespread than previously noticed and deserves further scrutiny." (Author)] Address: Manolis, T., 808 El Encino Way, Sacramento, CA 95864, USA. E-mail: Ylightfoot@aol.com

16147. Marino, N.A.C.; Srivastava, D.S.; MacDonald, A.A.M.; Leal, J.S.; Campos, A.B.A.; Farjalla, V.F. (2016): Rainfall and hydrological stability alters the impact of top-predators on food web structure and function. *Global Change Biology* 23(2): 673-685. (in English) ["Climate change will alter the distribution of rainfall, with potential consequences for the hydrological dynamics of aquatic habitats. Hydrological stability can be an important determinant of diversity in temporary aquatic habitats, affecting species persistence and the importance of predation on community dynamics. As such, prey are not only affected by drought-induced mortality but also the risk of predation (a non-consumptive effect, NCE) and actual consumption by predators (a consumptive effect, CE). Climate-induced changes in rainfall may directly, or via altered hydrological stability, affect predator-prey interactions and their cascading effects on the food web, but this has rarely been explored, especially in natural food webs. To address this question, we performed a field experiment using tank bromeliads and their aquatic food web, composed of predatory damselfly larvae, macroinvertebrate prey and bacteria. We manipulated the presence and consumption ability of damselfly larvae under three rainfall scenarios (ambient, few large rainfall events and several small rainfall events), recorded the hydrological dynamics within bromeliads, and examined the effects on macroinvertebrate colonization, nutrient cycling and bacterial biomass and turnover. Despite our large perturbations of rainfall, rainfall scenario had no effect on the hydrological dynamics of bromeliads. As a result, macroinvertebrate colonization and nutrient cycling depended on the hydrological stability of bromeliads, with no direct effect of rainfall or predation. In contrast, rainfall scenario determined the direction of the indirect effects of predators on bacteria, driven by both predator CEs and NCEs. These results suggest that rainfall and the hydrological stability of bromeliads had indirect effects on the food web through changes in the CEs and NCEs of predators. We suggest that future studies should consider the importance of the variability in hydrological dynamics among habitats as well as the biological mechanisms underlying the ecological responses to climate change." (Authors)] Address: Marino, N.A.C., Lab.de Limnologia, Depto de Ecologia, Inst. Biol., Centro de Ci^encias da Saude, Universidade Federal do Rio de Janeiro, PO Box 68020, Rio de Janeiro, RJ, Brazil. E-mail: nac.marino@gmail.com

16148. Marino Jr., J.A.; Holland, M.P.; Werner, E.E. (2016): Competition and host size mediate larval anuran interactions with trematode parasites. *Freshwater Biology* 61(5):

621-632. (in English) ["1. How parasites influence individual host traits and survival often depends on the ecological context of the host–parasite interaction, such as the presence of competitors or predators and trait variation among hosts. 2. We examined the effects of three key components of ecological context – host density, size structure and predator cue – on interactions between larval frogs and trematode parasites (Digenea: Echinostomatidae) in mesocosms. 3. We found that effects of parasites on host growth could be either negative or positive, depending on host size and overall growth rate, but not on predator presence. A surprising positive effect of parasites on host growth under some conditions could represent an adaptive host life history response, whereby enhanced growth allows escape from a smaller, less tolerant size class that experiences more negative fitness effects of infection. 4. Notably, only host size class was a strong predictor of infection intensity, but not host density or predator cue. 5. Overall, these results suggest that parasitism, competition and host size interact to influence host fitness. Ecological context thus mediates the interactions between parasites and their hosts, with implications for parasite effects in nature." (Authors)] Address: Marino, J.A., Dept Ecol. & Evolutionary Biol., Univ. Michigan, Ann Arbor, MI 48109, U.S.A. E-mail: jamarino@umich.edu

16149. Marinov, M. (2016): A contribution to the dragonfly fauna of Guadalcanal, Solomon Islands (Insecta: Odonata) with description of two new species. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 17: 1-34. (in English) ["New data on Odonata of the Guadalcanal Island, Solomon Islands are provided following a recently completed Rapid Biodiversity Assessment of the Tetena Haiaja ridge. Two new species, *Lieftinckia ulunorum* and *Procordulia valevahalo* are described. The first is a new member of the Solomon Islands endemic genus while the second is a new genus for the country and the second validated species from the *Corduliidae* family known from this Pacific archipelago. As *L. ulunorum* is found to be very closely related to formerly known *L. lairdi* Lieftinck, 1963, which was also collected during the field trip, both are described in detail based on mature adults and teneral specimens. Comparison with *L. salomonis* Kimmins, 1957 (investigated only from figures published in the original species description) and *Salomocnemis gerdae* Lieftinck, 1987 (also sampled during this study) were provided as well. Additional morphological data is given on the following species: *Teinobasis bradleyi* Kimmins, 1957, female is illustrated here for the first time; *Anax* sp. cf. *gibbosulus*, second record of the genus for the country and *Gynacantha amphora* Marinov & Theischinger, 2012, originally described by a single male, here the description of the female is provided. All other species collected during the field trip will be published separately in the final expedition report." (Author)] Address: Marinov, M., Investigation and Diagnostic Centres and Response, Operations Branch, Ministry for Primary Industries, 231 Morrin Rd, Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

16150. Márquez-Rodríguez, J.; Vega-Maqueda, M.A. (2016): Confirmación de la emergencia de *Sympetrum sinaiticum* Dumont, 1977 (Odonata: Libellulidae) y entomofauna termófila acompañante en la provincia de Córdoba (España). *Archivos*

entomológicos 16: 47- 56. (in Spanish, with English summary) ["Confirmation of the emergence of *S. sinaiticum* and thermophilic associated entomofauna in the province of Cordova (Spain). New records of *Orthetrum nitidiverve* in Cordova are reported. New records of this rare species are of faunistic interest, especially because of the scarcity of recent records. This research provides a third population in a very anthropic habitat. The rising of the maximum temperatures in spring has also coincided with the emergence of *S. sinaiticum*, another rare species occurring in Andalusia..." (Authors)] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. 41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

16151. Márquez-Rodríguez, J.; Vega-Maqueda, M.A. (2016): Rarezas odonológicas en un curso afectado por la antropización actual (Insecta: Odonata). *Archivos entomológicos* 16: 285-292. (in Spanish, with English summary) ["Odonatological rarities in a watercourse affected by current anthropization (Insecta: Odonata). Faunistic data on the Odonata from one of the few permanent watercourses from the Sevilian-Cordovan countryside, a less studied biotope due to the low environmental value of farming lands, are provided. Some species observed are considered as vulnerable in the area, in need of legal protection due to the persistent degradation of the stream." (Authors)] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

16152. Martin, K. (2016): Traveling across the toe: riverbank features and their impact on emergence distance of *Gomphus vastus* and *Stylurus spiniceps*. *Bulletin of American Odonatology* 12(1): 1-6. (in English) ["The distance that an emergent dragonfly nymph travels from the water's edge influences its chance of successful eclosion. In many riverine systems, heavy riverbank erosion has led to a variety of bank stabilization methods being applied. In the Turners Falls Reservoir (Massachusetts), bank stabilization methods have included the placement of rocks along the toe of the slope. Dragonflies that travel across these rocks are often exposed to boat wakes, water level changes, and predation. This study investigated how riverbank features (such as rock size, width of riprap zone, slope, and sediment) affected the distance traveled by two species of riverine dragonfly (*Gomphus vastus* and *Stylurus spiniceps*)."] (Author)] Address: E-mail: kirstenmartin@usj.edu

16153. Mastropasqua, F.; Liuzzi, C. (2016): New records of *Coenagrion ornatum* in Italy (Odonata: Coenagrionidae). *Fragmenta entomologica* 48(1): 29-31. (in English) ["*C. ornatum* is a damselfly ranging from northwestern Europe to southwestern Asia. It is highly local, and northwestern populations are experiencing a steep decline. In Europe, *C. ornatum* is a species of conservation interest and is listed as Near Threatened due to habitat loss; it is nearly extinct in Italy. We report the finding of 4 male *C. ornatum* on 3 June 2005 in Apulia, southeastern Italy. This is the only recent record for Italy, and highlights the need for further research on

this species in the country." (Authors)] Address: Mastro-pasqua, F., CSdR- Association "Centro Studi de Romita", c/o Filippo d'Erasmo, Via G. Postiglione 9, I-70126 Bari, Italy. E-mail: fabiomastro77@gmail.com

16154. Matushkina, N.A.; Buy, D.; Lambret, P. (2016): Egg clutch patterning in *Lestes virens* (Odonata, Lestidae) with evolutionary emphasis on endophytic oviposition in lestid dragonflies. *Insect Science* 23: 893-902. (in English) ["Egg deposition within plants is one of the most widely distributed and ancient behaviours in Odonata. The resulting clutch consists of eggs placed in peculiar pattern that can be characteristic for certain groups of Odonata. Despite their importance for paleontological and evolutionary research, data on egg-clutch positioning are missing or insufficient for most species. Here, patterning of egg clutches in *Lestes virens* was measured and described in detail for the first time. The female usually produces a linear row of single eggs directed at an angle rightward or leftward to the longitudinal axis of plant substrate. Less often eggs are arranged in egg-sets consisting of up to four eggs. Apparently, the female insect follows the rigid behaviour stereotypes during oviposition and is unable to easily switch to the alternate stereotypical behaviour of single egg deposition or production of multi-egg sets. Based on a literature review and original data, egg clutch patterning of European Lestidae is overlaid on pre-existing phylogenies. The resulting evolutionary scenario of egg-clutch patterning can be considered in the framework of egg-laying behaviour in Lestidae." (Authors)] Address: Matushkina, Natalia A., Dept of Zoology, Biological Faculty, National Taras Shevchenko Univ. of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonataly@gmail.com

16155. McDevitt-Galles, T. (2016): The ecology of aquatic macroinvertebrates: Understanding interactions among drought, introduced fishes, and parasites. M.Sc. thesis, University of Colorado at Boulder: 87 pp. (in English) ["Aquatic macroinvertebrates play key roles in structuring aquatic communities and provide a key link with the surrounding terrestrial environment through their metamorphosis from aquatic larvae to terrestrial adults. It is therefore important to understand how their distribution across a landscape shifts through time and in response to environmental change, such as prolonged drought. Concurrently, because relatively little is known about the parasites that use pond macroinvertebrates as hosts, I also explored the relative importance of factors affecting infection prevalence and parasite load within common invertebrate host taxa. For each year over four years, I sampled 36 ponds within the Bay Area of California, USA, to characterize the diversity and composition of aquatic macroinvertebrates and quantify the parasites that utilize these organisms as hosts. I specifically aimed to answer the following questions: (1) what are the relative influences of non-native fishes and hydroperiod in structuring communities? (2) How does the magnitude of such filters vary through time? And (3) how do host- and habitat-level factors combine to determine patterns of infection with larval dragonflies and damselflies? My results indicated that while fish play a dominant role in structuring the macroinvertebrate composition and

richness, the strength of this effect was attenuated during a prolonged drought such that, by the last year of the study and the height of California superdrought, fish had no detectable effect on the macroinvertebrate diversity or species composition. The parasite survey revealed six parasite taxa using macroinvertebrates as hosts with the majority infecting members of the Odonata. The hierarchical generalized mixed model results suggested that the majority of variation in both infection prevalence and load was associated with site-level variables, such as water chemistry, and with an interaction between the presence of fish and host suborder. These findings suggest that infection probability for odonates is more closely linked to site-level factors than host-level factors though there are potential interactions between the two levels that must be considered." (Authors)] Address: not stated

16156. Meira Linares, A.; Horta Maciel-Júnior, J.M.; Espírito Santo De Mello, H.; Fortes Leite, F.S. (2016): First report on predation of adult anurans by Odonata larvae. *Salamandra* 52(1): 42-44. (in English) ["On 9-X-2009 at 20:25 h, we recorded three Odonata larvae of the genus *Anax* attacking and consuming two adult males of *Scinax rogerioi* Pugliesi, Baêta & Pombal, 2009 and an adult male of *Dendropsophus minutus* (Peters, 1872), respectively, at a permanent lake in an open disturbed area in the Municipality of Itabirito, Minas Gerais state, southeastern Brazil (20°15'21" S, 43°54'43" W, 1,319 m a.s.l.)."] Address: Meira Linares, A., Programa de Pós-Graduação em Zoologia de Vertebrados, Pontifícia Univ. Católica de Minas Gerais, CEP 30535-610, Belo Horizonte, Minas Gerais, Brazil. E-mail: bioantonio1@yahoo.com.br

16157. Mens, L.P.; Schütte, K.; Stokvis, F.R.; Dijkstra, K.-D.B (2016): Six, not two, species of *Acisoma* pintail dragonfly (Odonata: Libellulidae). *Zootaxa* 4109(2): 153-172. (in English) ["The genus *Acisoma* is revised based on adult male morphology and COI sequence data. Six species are recognised, including the new species *A. attenboroughi* sp. nov. Diagnoses and a key to males of all species and illustrations of all relevant characters are provided. *A. inflatum*, *A. variegatum* and *A. trifidum* are confined to continental Africa, while *A. panoroides* is restricted to Asia. *A. ascalaphoides* is known only from threatened littoral forest fragments on the east coast of Madagascar, while *A. attenboroughi* is widespread across the island. The new species honours Sir David Attenborough on his 90th birthday." (Authors)] Address: Mens, Lotte, Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: lottemens88@gmail.com

16158. Michels, J.; Appel, E.; Gorb, S.N. (2016): Functional diversity of resilin in Arthropoda. *Beilstein J. Nanotechnol.* 7: 1241-1259. (in English) ["Resilin is an elastomeric protein typically occurring in exoskeletons of arthropods. It is composed of randomly orientated coiled polypeptide chains that are covalently cross-linked together at regular intervals by the two unusual amino acids dityrosine and trityrosine forming a stable network with a high degree of flexibility and mobility. As a result of its molecular prerequisites, resilin features exceptional rubber-like properties including a relatively low stiffness, a rather pronounced long-range deformability and a

nearly perfect elastic recovery. Within the exoskeleton structures, resilin commonly forms composites together with other proteins and/or chitin fibres. In the last decades, numerous exoskeleton structures with large proportions of resilin and various resilin functions have been described. Today, resilin is known to be responsible for the generation of deformability and flexibility in membrane and joint systems, the storage of elastic energy in jumping and catapulting systems, the enhancement of adaptability to uneven surfaces in attachment in reproductive, folding and feeding systems and the sealing of wounds in a traumatic reproductive system. In addition, resilin is present in many compound eye lenses and is suggested to be a very suitable material for optical elements because of its transparency and amorphousness. The evolution of this remarkable functional diversity can be assumed to have only been possible because resilin exhibits a unique combination of different outstanding properties." (Authors)] Address: Michels, J., Dept of Functional Morphology & Biomechanics, Institute of Zoology, Christian-Albrechts-Universität zu Kiel, Am Botanischen Garten 1–9, 24118 Kiel, Germany. Email: jmichels@zoologie.uni-kiel.de

16159. Miguélez, D.; García-Tejero, S.; Hernández, A.; Valadares, L.F. (2016): Diet selection of the Aquatic warbler *Acrocephalus paludicola* during its post-nuptial migration stopover in NW Spain. *Ardea* 104(3): 273-282. (in English) ["Food availability and diet are two key issues in understanding the ecological requirements of a migratory species in stopover sites and in taking effective conservation measures. In the case of the globally threatened Aquatic Warbler, there have previously been no studies examining diet selection in the Iberian Peninsula, a key region for their post-nuptial movements. In this context, the availability of arthropods in different habitats (reeds, rushes and grassland), the composition and biomass of prey in faecal samples, and diet selection were all investigated in a wetland in northwest Spain. The results showed a higher total abundance of arthropods in grassland and rushes: habitats which were more similar to each other, in terms of vegetation physiognomy and composition of invertebrates, compared with reeds. In terms of prey abundance, diet was dominated by Araneae, Heteroptera and Homoptera. However, the groups that contributed most to the ingested biomass were Diptera (Tipulidae), Odonata and Orthoptera, followed by Araneae. Prey selection indices showed a preference for these groups, which all contain insects with a large body length. These diet characteristics showed many similarities with studies in other stopover and breeding areas, but differ in that Araneae were the main arthropod prey at this stopover site." (Authors)] Address: Miguélez, D., Univ. of León, Dep.t of Biodiversity & Environmental Management, Campus de Vegazana s/n E-24071 León, Spain. E-mail: biodavid@hotmail.com

16160. Mikolajewski, D.J.; Weißflog, A.; Brauner, O. (2016): Vergleichende Morphologie der Imagines von *Coenagrion lunulatum*, *C. pulchellum* und *C. puella* in einem syntopen Vorkommen (Odonata: Coenagrionidae). *Libellula* 35(3/4): 153-165. (in German, with English summary) ["Comparative adult morphology of *Coenagrion lunulatum*, *C. pulchellum*, and *C.*

puella in a syntopic situation (Odonata: Coenagrionidae) – Interspecific competition among odonate species for food, mating partner etc. is a common phenomenon. Because morphology mediates species' behaviour and microhabitat use, competition is expected to increase with species being more similar in their phenotypes. Here we present data for adult body morphology as well as abundance data of parasitic water mites in syntopically occurring *C. lunulatum*, *C. puella*, and *C. pulchellum* at a pond near Wilmersdorf (Brandenburg, Germany). Whereas all three species differed significantly in overall body size (head, thorax, abdomen, and legs), *C. lunulatum* also differed in their wing morphology from *C. puella* and *C. pulchellum*. No such differences were found in the latter two species. All three species also differed in total abundance of water mites, however those differences were completely attributed to body size differences among the three Coenagrion-species. Based on our results, we discuss potential differences in flight behaviour, hunting mode, and microhabitat use among the three studied species." (Authors)] Address: Mikolajewski, D.J., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Straße 1-3, 14195 Berlin, Germany. E-mail: d.mikolajewski@gmx.de

16161. Mill, P.J. (2016): A review of the role of the abdomen of aeshnid larvae in respiration, jet-propulsive locomotion and prey capture. 1. The digestive, tracheal, muscular and 72-92. (in English) ["The structure of the digestive, tracheal, muscular and nervous systems in the abdomen of aeshnid larvae is reviewed, with particular regard to the role of the abdomen in producing pressure changes that elicit respiration, jet-propulsive swimming and labial mask extension. The musculature of the labial mask is also described." (Author)] Address: Mill, P.J., School of Biology, University of Leeds, Leeds, LS2 9JT, UK

16162. Miyai, K.; Saito, M.; Jinguji, H. (2016): Practice and effectiveness of the program of risk assessment mitigation for Red Dragonflies with farmers' participation. *Transactions of the Japanese society of irrigation, drainage and rural engineering* 84(3): 201-207. (in English Japanese) ["Recently the population of red dragonflies has declined nationwide in Japan. It is pointed out that the change of paddy field-management is one of the main causes for it. In order to mitigate the influence of such changes, it is necessary to introduce a proper management method suitably adaptable to farmland. To examine the effects of difference in cultivation management, we introduced the program of risk assessment mitigation and conducted of census of red dragonfly and cultivation management in paddy fields in Tajiri, Osaki City, Miyagi Prefecture from 2009 until 2013. We investigated the correlation between the emergence status of the red dragonflies and cultivation methods for paddy fields together with local farmers. The husks of red dragonflies were more sparsely found in the paddy fields where dinotefuran were applied. For conservation of red dragonflies, we started to employ the different pesticides with lower effects on red dragonflies and applied the pesticides only in the peripheral zone of each patch and successfully reduced the insecticidal effects on red dragonflies compared to broadcast application over

the entire fields. Each technique was observed that suppress the decrease of red dragonflies." (Authors)] Address: Miyai, K., Graduate School of Food, Agricultural and Environmental Sciences, Miyagi University

16163. Monnerat, M.; Al Dhafer, H.M. (2016): Odonata records from southwestern Saudi Arabia. *Notulae odonatologicae* 8(7): 231-239. (in English) ["Results are presented of a one-week field trip in November 2012 to southwest Saudi Arabia. 19 dragonfly species were collected, observed and photographed at 17 localities in the regions of Makkah, Bahah, 'Asir, and Jizan. A new record of the little known *Trithemis dejouxi* is documented. *Lestes pallidus*, which had not been recorded for decades, is confirmed and new for Jizan. *Anax imperator* and *A. parthenope*, rarely mentioned in literature, were recorded at several localities." (Authors)] Address: Monnerat, C., Faubourg de la Gare 19, 2000 Neuchâtel, Switzerland. E-mail: monnerat.christian@gmail.com

16164. Monteiro, C.d.S.; Esposito, M.C.; Juen, L. (2016): Are the adult odonate species found in a protected area different from those present in the surrounding zone? A case study from eastern Amazonia. *Journal of Insect Conservation* 20(4): 643-652. (in English) ["We studied 30 streams in eastern Amazonia, 17 of which were located within a protected area (PA) and the other 13 in the surrounding zone, with the objective of evaluating the diversity of adult Odonata and if there was a difference between the physical habitat variables of the two environments. We hypothesized that a greater diversity of odonate species would be found in the PA due to a greater complexity of habitats. This hypothesis was rejected, however, due to the greater odonate diversity found in the surrounding zone in comparison with the PA. Differences were also found in the species composition of the two environments. Our results indicate that there are differences between the environmental variables in the areas, and the few alterations observed in the surrounding zone may have contributed to the formation of new conditions and habitats appropriate for species that may have been rare. The PA, despite having reduced species richness and abundance in comparison with the surrounding zone, was nevertheless characterized by a more heterogeneous species composition. A quarter of the species were common to both environments, while 34 % were exclusive to the surrounding zone. In this case, it appears that the combination of the protected area and the surrounding zone, which has a low level of disturbance, conserves a wider range of specialist species than either area on its own. The great challenge in the future is finding a way to identify the disturbance levels that would be acceptable, and to prevent over-exploitation of resources in such areas." (Authors)] Address: Monteiro Jr., C., Graduate Program in Zoology, Universidade Federal do Pará/Museu Paraense Emílio Goeldi, Caixa Postal 399, Belém, Pará CEP 66040-170, Brazil. E-mail: claudiomonteiro80@hotmail.com

16165. Montemayor, S.I.; Melo, M.C.; Scheibler, E.E. (2016): Forecasting the fate of high mountain ponds in the Andean region under future climate change. *Austral Ecology* 41(8): 983-992. (in English) ["The aims of this study are

(i) to identify areas in the Andean region where the climate will remain stable enough for the survival of the study species; (ii) to analyze how climate change will affect these areas under different climate scenarios; (iii) to generate spatially explicit predictive maps of the expansion or retraction of these areas; and (iv) based on this information, to identify areas with priority for conservation. The analysis was performed using presence-only data for 14 Heteroptera and Odonata species. Current and future models were developed to identify areas where the climate would be suitable for small ponds, using Maxent v3.3.3k, with future models based on three different Global Climate Models for the 2050 period (scenarios A2a and B2a). Model performance was evaluated using the jack-knife approach. Climatic niche breadth and climatic niche similarities were calculated through Levin's concentration metrics and the I statistic index (implemented in ENMTools), respectively. Maxent logistic outputs were converted into binary presence/absence maps, based on the 'minimum training presence logistic threshold', and used to build species richness maps for each condition considered (present and future). Current and future models with areas climatically suitable for small ponds were developed. All the study species proved to be narrow specialists and share similar climatic spaces. Our projections suggest that four of the species would not find suitable climate conditions for survival in the future. The priority area for conservation, where most species would find suitable climate conditions, is located between 33–47°S and 73–70°W. We identified future loss of the priority area towards the east and a small gain towards the north and south. The most probable situation for the year 2050 is a negative precipitation–evapotranspiration balance, and small ponds will probably be very short-lived or dry completely during summer, suggesting a drastic change in species assemblages and species richness of the region, which could become a hot-spot of extinction." (Authors)] Address: Montemayor, Sara, División Entomología, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, CONICET, Paseo del Bosque s/n 1900, La Plata, Argentina. E-mail: smontemay@fcnym.unlp.edu.ar

16166. Moore, M.P.; Martin, R.A. (2016): Intrasexual selection favors an immune-correlated color ornament in a dragonfly. *Journal of evolutionary biology* 29(11): 2256-2265. (in English) ["Sexual signaling is predicted to shape the and benefits of ornamentation and the information that ornamentation provides to receivers is necessary to evaluating of a common color ornament in insects, melanin wing ornamentation, using the dragonfly *Pachydiplax longipennis*. We hypothesized that greater ornamentation would improve receive from territorial rivals, but that more ornamented males may have shorter lifespans. Using mark-recapture field observations, we found that more ornamented males had greater territory holding success, and that viability selection did not act on wing melanization. We then compared the aggression of territorial rivals to decoy males before and after experimentally augmenting wing melanization, finding that males significantly reduced aggression following the manipulation. We next hypothesized that wing melanization would signal fighting ability to territorial rivals by reflecting condition

via investment in the costly melanin-synthesis pathway. We observed a positive relationship between ornamentation and the likelihood of winning territorial disputes, suggesting that wing melanization provides information about fighting ability to rivals. We also found a positive relationship between melanin-based immune defense and ornamentation, supporting a link between the signal and condition. We conclude that wing melanization is a condition-related signal of fighting ability, and suggest that this may be a common mechanism promoting the evolution of melanin ornamentation." (Authors)] Address: Moore, M.P., Dept of Biology, Case Western Reserve University, 2080 Adelbert Road, Cleveland, OH 44106, USA. E-mail: mpm116@case.edu

16167. Mukherjee, A.; Dey, S.; Roy, U.S. (2016): An observation on Odonata fauna of Gandheswari river bank and adjoining fields and cultivated lands in Bankura district of West Bengal, India. *Annals of Experimental Biology* 4(1): 17-24. ["The present investigation was undertaken as a pilot study to examine the diversity and occurrence of Odonata from Gandheswari River Bank and adjoining fields and cultivated lands in Bankura District of West Bengal, India during January 2014 to December 2014. A combination of direct search and opportunistic sighting methods were applied during the present study to record 58 different Odonata species comprising of 39 dragonflies and 19 damselflies. Among the dragonflies the most diverse family was Libellulidae represented by 30 species while among damselflies Coenagrionidae was recorded as the most diverse family represented by 13 species. However, increasing pollution in River Gandheswari, conversion of land use pattern along with increasing urbanization is causing fragmentation, degradation and loss of habitat types, may be / are affecting biodiversity and needs serious attention from the concerned authorities most urgently. The present study was the first attempt to make a checklist of Odonates from Gandheswari River bank and adjoining regions and further investigations are needed to portray a comprehensive picture of Odonate diversity from this region." (Authors)] Address: Mukherjee, A., Post Graduate Dept of Biological Sciences, Presidency University, 86/1 College Street, Kolkata, West Bengal, India

16168. Mwedzi, T.; Bere, T.; Mangadze, T. (2016): Macroinvertebrate assemblages in agricultural, mining, and urban tropical streams: implications for conservation and management. *Environmental Science and Pollution Research* 23(11): 11181-11192. (in English) ["The study evaluated the response of macroinvertebrate assemblages to changes in water quality in different land-use settings in Manyame catchment, Zimbabwe. Four land-use categories were identified: forested commercial farming, communal farming, Great Dyke mining (GDM) and urban areas. Macroinvertebrate community structure and physicochemical variables data were collected in two seasons from 41 sites following standard methods. Although not environmentally threatening, urban and GDM areas were characterised by higher conductivity, total dissolved solids, salinity, magnesium and hardness. Chlorides, total phosphates, total nitrogen, calcium, potassium and sodium were significantly highest in urban sites whilst dissolved oxygen (DO)

was significantly higher in the forested commercial farming and GDM sites. Macroinvertebrate communities followed the observed changes in water quality. Macroinvertebrates in urban sites indicated severe pollution (e.g. Chironomidae) whilst those in forested commercial farming sites and GDM sites indicated relatively clean water (e.g. Notonemouridae). Forested watersheds together with good farm management practices are important in mitigating impacts of urbanisation and agriculture. Strategies that reduce oxygen-depleting substances must be devised to protect the health of Zimbabwean streams. The study affirms the wider applicability of the South African Scoring System in different land uses." (Authors)] Address: Mwedzi, T., School of Wildlife, Ecology & Conservation, Chinhoyi Univ. of Technology, Off Harare-Chirundu Rd, P. Bag 7724, Chinhoyi, Zimbabwe. E-mail: mmmwedzi@gmail.com

16169. Myrup, A.R.; Baumann, R.W. (2016): The dragonflies and damselflies (Odonata) of Utha. *Monographs of the Western North American Naturalist* 9: 1-114. (in English, with Spanish summary) ["An updated faunal list containing 94 species of Odonata (60 Anisoptera and 34 Zygoptera) for Utah is presented. Of the 95 Odonata species recorded in past publications as being from Utah, 8 have been removed from the Utah Odonata list, while 7 new state records have been added. Explanations for their removal are provided in the species accounts. The 7 ecoregions found in Utah are briefly described along with their wetland habitats and odonate species. Geographical distribution data by county, drainage, and ecoregion are provided for each species along with information regarding elevation range, flight season, and habitat preferences in Utah. Specific comments relevant to the distribution and abundance of each species are provided. Distribution maps illustrate collection locations against a background of county boundaries and topography. State conservation rankings using methods described by NatureServe are recommended." (Authors)] Address: Myrup, A.R., Science Dept, Timpview High School, Provo, UT 84604. E-mail: alanmy@comcast.net

16170. Nel, A.; Simov, N.; Bozukov, V.; Marinov, M. (2016): New dragonflies and damselflies from Middle Miocene deposits in SW Bulgaria (Insecta: Odonata). *Palaeontologia Electronica* Article number: 19.3.35A: 13 pp. (in English) ["The first fossil Odonata discovered in Bulgaria are described and illustrated, i.e., the aeshnid *Oligaeschna bulgariensis* sp. nov., the sieblosiid *Stenolestes rhodopensis* sp. nov., and the dysagrionid *Primorilestes magnificus* sp. nov. These genera are present in both Western Europe and Siberia in the Neogene. Their fossil discoveries in Bulgaria provide a link between these two regions, which are now disconnected." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16171. Neog, N.; Rajkhowa, S.M. (2016): Dragon fly diversity in two different ecosystems in and around Assam University, Silchar (Ecoforest and Irongmara). *Journal of Entomology and Zoology Studies* 4(4): 184-190. (in English) ["Unlike butterflies, Odonata are till date not properly explored in the northeastern India. In the present investigation a study of dragon fly diversity in two different ecosystems in and

around Assam University – Ecoforest and Irongmara, located in Cachar district of Assam, was carried out. 17 species of dragonflies were identified which belong to family Libellulidae. *Orthetrum* genus was most abundant of all. Among species *O. sabina* was the most abundant one in both study sites. Species Abundance, Diversity, Richness and Evenness were determined in both the Study sites." (Authors)] Address: Neog, N., Dept Zoology, Sibsagar College, Joysagar, Assam, India

16172. Newton, I. (2016): Obituary: Norman Winfrid Moore (1923–2015). *Ibis* 158: 459–461. (in English) [With the death of Norman Moore aged 92, on 21 October 2015, Britain lost one of its most influential conservationists. To ornithologists, Norman was perhaps best known for his work on pesticide impacts on birds. He led the team at Monk's Wood Experimental Station that studied the biological impacts of DDT and other organochlorines in the 1960s. This work eventually contributed to a banning of these chemicals from agricultural use in Britain and elsewhere. However, he was an allround naturalist with a particular interest in birds, dragonflies and butterflies. He became a world authority on dragonflies and their conservation, and was one of the first to appreciate the problems for wildlife of agricultural intensification and habitat fragmentation, and the value of hedgerows in modern farmland. Norman firmly believed in the importance of integrating nature conservation with other landuses, whether agriculture or forestry. He realized that small nature reserves alone could not save biodiversity in a country as highly developed and populated as Britain. He was a founder and first Chairman of the Farming and Wildlife Advisory Group (FWAG). This was a charitable trust which aimed to find practical ways of conserving wildlife on working farms, thus bridging a widening gulf between farmers and conservationists. As a person, Norman was well-informed, charming and modest. With his naturally gentle and thoughtful manner, he became widely regarded as one of conservation's elder statesmen, much loved and respected by all who knew him. Norman was born on 24 February 1923, the son of a doctor, Sir Alan Moore. In 1934 the family moved from Lewes to near Battle in rural Sussex. From boyhood, Norman was a keen naturalist. Birds were his first love, but by his teens butterflies and dragonflies had caught his attention. His first scientific paper, 'Rare Lepidoptera and Odonata in East Sussex', was published in 1939, when he was aged 16. He was educated at Eton College and then Trinity College, Cambridge, where he read Natural Sciences, specializing in zoology. While in Cambridge, he became President of the University Bird Club. Like so many of his generation, his studies were interrupted by war service. He was called up in 1942 and served as a gunnery officer in the Royal Artillery, with active service in Belgium and the Netherlands. When manning observation posts, he kept two notebooks: one with reports on German military activity and the other on wildlife seen at the time. Late in 1944 he suffered a serious leg wound and was captured by German forces. He was one of only four British prisoners in a camp housing 23 000 Russians. Conditions were appalling. On a pint of mangel-wurzel soup per day and one small loaf of bread per week, prisoners were starving, and deaths in the camp numbered more than a hundred per day. On being liberated by the US 7th Armoured

Division in April 1945, more than 9000 men from the camp were hospitalized and de-loused with the new wonder chemical, DDT. After his return to Britain, Norman trained] Address: Ian Newton. E-mail: ine@ceh.ac.uk

16173. Ngiam, R.W.J.; Cheong, L.F. (2016): The dragonflies of Singapore: An updated checklist and revision of the national conservation statuses. *Nature in Singapore* 9: 149–163. (in English) ["Over the past few years, the popularisation of local dragonflies (Odonata) among academics and amateurs has resulted in several new records, rediscoveries, and a better understanding of the distribution and conservation significance. Consequently, the species checklist and conservation status categories based on published materials are outdated and do not accurately reflect the current knowledge. Hence, we have conducted a comprehensive assessment of all species to produce the most updated Singapore checklist and revised national conservation status. The total number of Odonata species ever recorded from Singapore now stands at 131 which are composed of nine Nationally Extinct and 122 extant species. Of the extant species, 14 are of highest conservation importance because they are considered Critically Endangered and Very Rare. This paper supersedes previous checklists and conservation statuses. It will be a useful reference for anyone with an interest in Singapore dragonflies." (Authors)] Address: Ngiam, R.W.J., Nat. Biodiversity Centre, Nat. Parks Bd, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569, Republic of Singapore; Email: ngiam_wen_jiang@nparks.gov.sg

16174. Niederer, W.; Schmidt, B. (2016): Die Sibirische Winterlibelle *Sympecma paedisca* (Brauer, 1877) in Vorarlberg mit besonderer Berücksichtigung des Rheindeltas. *inatura – Forschung online*, Nr. 33: 11pp. (in German, with English summary) ["*S. paedisca*, an endangered damselfly is reported for Vorarlberg and its extension in Vorarlberg is shown. The nature reserve Rhine delta, a marsh and lowland moor habitat mosaic provides many different necessary reproduction sites and habitat structures. Also other rare dragonflies of marshes like *Sympetrum depressiusculum* were reported. Aspects of nature conversation are discussed." (Authors)] Address: Niederer, W., Im Wiesle 12, A-6974 Gaisau, Austria. E-Mail: walter.niederer@rheindelta.org

16175. Ning, X.; Kompier, T.; Yu, X.; Bu, W. (2016): *Paracercion ambiguuum* sp. nov. from Lang Son, Vietnam (Zygoptera: Coenagrionidae). *Zootaxa* 4144(2): 263–275. (in English) ["One new species of *Paracercion* Weekers and Dumont, 2004 (*Paracercion ambiguuum* Kompier & Yu, 2016, holotype ♂, Vietnam, Lang Son province, Huu Lien Nature Reserve, 1-XII-2013, deposited in Institute of Entomology, College of Life Sciences of Nankai University, Tianjin, China) is proposed on the basis of molecular and morphological evidence. A COI gene tree is presented for *Paracercion* species and several morphologically related genera. The species is described and illustrated for both sexes. Diagnostic figures of the genital ligula and caudal appendages are provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompiertintokyo@yahoo.com

16176. Nishizawa, M.; Takada, M.; Watanabe, T.; Hirata, S.; Tanaka, Y.; Matsuura, Y.; Sakuma, D. (2016): List of natural history specimens and records in Minami-Sanriku, Miyagi prefecture during 2012-2014, collected by The Voluntary Biota Survey Group for Minami-Sanriku. *Shizenshi-Kenkyu, Occasional Papers from the Osaka Museum of Natural History* 3(16): 273-292. (in Japanese, with English summary) ["This is a set of records of natural history specimens, which were collected by the activity of The Voluntary Biota Survey Group for Minami-sanriku, during the period from 2012 to 2014 in Minami-sanriku cho, Miyagi prefecture, where was suffered severe Tsunami attack in 2011, and lost all the specimens in Shizugawa Nature Center. This newly collected specimens and records include many rare species occurrence found in surveys of some of the temporal environments formed right after the tsunami, and also many of the lost habitats in reconstruction processes." (Authors) *Ischnura asiatica*, *Coenagrionidae* sp., *Sympetma paedisca*, *Sieboldius albardae*, *Sympetrum frequens*, *S. infuscatum*] Address: Nishizawa, M., Osaka Museum of Natural History, Nagai Park 1-23, Higashi-sumiyoshi-ku, Osaka 546-0034, Japan. E-mail: nishizawa@mus-nh.city.osaka.jp

16177. Nituda, C.J.P.; Nuoeza, O.M. (2016): Diet Composition of two species of swiftlets from caves of Northern Mindanao, Philippines. *Bulletin of Environment, Pharmacology and Life Sciences* 5(5): 48-52. (in English) ["Caves serve as sanctuaries for birds especially swiftlets, the most common cave-dwelling birds. This study was conducted to determine and compare the diet composition of the two species of swiftlets, *Collocalia esculenta* and *Aerodramus vanikorensis*. Examination of the gut contents showed that the two bird species are generally insectivorous and the prey items consisted of insects under Orders Coleoptera, Hymenoptera, Diptera, and damselflies. There was no significant difference in the frequency of occurrence of the prey items between species since both species prefer the same prey items. However, percentage occurrence of the different prey items within the same species was significantly different ($p < 0.05$). Coleopterans were the abundant prey items. The wide diversity of the diet of cave swiftlets suggests that these birds are not particularly selective in their diet and are more probably dependent on the available prey. Results indicate that swiftlets are good insect control agents. Collection of swiftlet nests inside caves appears to be a major threat to cave swiftlets." (Authors)] Address: Nuoeza, Olga, Dept of Biological Sciences, College Science & Mathematics, Mindanao State Univ. – Iligan, Institute of Technology, Iligan City, Philippines. E-mail: olgamuneza@yahoo.com

16178. Novelo-Gutiérrez, R.; Ramírez, A.; Delgado, D. (2016): The larvae of *Epigomphus jannyae* Belle, 1993 and *E. tumefactus* Calvert, 1903 (Insecta: Odonata: Gomphidae). *PeerJ* 4:e2338 <https://doi.org/10.7717/peerj.2338>: 13 pp. (in English) ["The taxonomic knowledge about immature stages of the insect order Odonata is rather limited in tropical America. Here, the larvae of *E. jannyae* and *E. tumefactus* Calvert, 1903 are described, figured, and compared with other described congeners. *E. jannyae* larva is characterized by 3rd antennomere 1.6 times longer than its widest part; ligula very poorly

developed, with ten short, truncate teeth on middle; apical lobe of labial palp rounded and smooth. Lateral margins on abdominal segments (S5–9) serrated, lateral spines on S6–9 small and divergent; male epiproct with a pair of dorsal tubercles at basal 0.66; tips of cerci and paraprocts strongly divergent. The larva of *E. tumefactus* is characterized by 3rd antennomere 2.3 times longer than its widest part, ligula with 6–7 truncate teeth, apical lobe of labial palp acute and finely serrate. Lateral margins of S6–9 serrate, lateral spines on S7–9; male epiproct with a pair of dorsal tubercles at basal 0.50. Differences with other species were found in 3rd antennomere, lateral spines of S7–9, and the caudal appendages. *Epigomphus* larvae inhabit small, shallow creeks (1st order streams) where they live in fine benthic sediments. When mature, the larva leaves the water in shady places, climbing small rocks at the water's edge and metamorphosing horizontally on flat rocks. These new descriptions bring the total number of *Epigomphus* species with known larval stages to eight; only 28% of the species in this genus are known as larva." (Authors)] Address: Novelo-Gutiérrez, R., Depto de Entom., Inst. de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: roldolfo.novelo@inecol.edu.mx

16179. Opaev, A.S.; Panov, E.N. (2016): Variations of space use in males of the banded demoiselle (*Calopteryx splendens*, Zygoptera, Odonata): Alternative tactics or an age-dependent trend? *Entomological Review* 96(5): 525-536. (in English) ["Two spatial tactics are usually distinguished in males of *Calopteryx* damselflies: territorial and nonterritorial. These tactics are believed to underlie two alternative condition-dependent reproductive tactics in these insects, and territorial males are believed to copulate more often. With age, males become weaker, turn nonterritorial, and only occasionally manage to copulate. However, the details of space use by damselflies are poorly known, which hinders the interpretation of the existing empirical data. We describe the space use by individually marked males of the banded demoiselle *C. splendens* studied during three field seasons in Vladimir Province, Russia. Each male on each day of observations was characterized as either territorial or non-territorial, and the sites of encounter were mapped. The probability of being territorial declined with the male's age. The spatial tactics (territorial vs. non-territorial) on a given day strongly influenced the tactics used on the following day. We identified the territorial and non-territorial phases in the life of a male damselfly, which occurred consecutively and had a roughly similar duration. During the territorial phase, the male occupied a certain territory and tried to hold it as long as possible. The male abandoned its territory in two cases: (1) when it was driven onto a different territory as the result of competition with other males, or (2) when it was exhausted and became non-territorial. Thus, the space use by the male changed predictably during its life. Therefore, direct comparison of morphological or other characteristics in territorial vs. non-territorial males, frequently made in the literature, makes little sense. Further progress in studying the so-called "alternative reproductive tactics" in damselflies may be more successfully achieved by comparing individual life trajectories

of different males (e.g. duration of territorial and non-territorial periods, the number of consecutively occupied territories, etc.). We performed correlation analysis and found that the above parameters did not depend on the wing and abdomen length of the males." (Authors) Original Russian Text © A.S. Opaev and E.N. Panov, 2016, published in *Zoologicheskii Zhurnal*, 2016, Vol. 95, No. 4, pp. 417–428.]

16180. Orr, A.G.; Kalkman, V.J. (2016): Two new species of *Papuagrion* Ris, 1913 (Odonata: Coenagrionidae) from New Guinea with a survey of distribution records for the genus. *Zootaxa* 4173(1): 18-28. (in English) ["Two new species of *Papuagrion* Ris, 1913 are described from Papua Province, Indonesia. These are *P. marirobi* sp. nov. from Japen Island and *P. stellimontanum* sp. nov., from the Star Mountains. The new species are, respectively, most closely allied to *P. degeneratum* Lieftinck and *P. digitiferum* Lieftinck. They bring the number of *Papuagrion* species to 28. New locality records of several other species are noted." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

16181. Orr, A.G.; Dow, R.A. (2016): Description of larvae of two species of *Coeliccia* Selys, 1865 from Sarawak, identified using DNA barcoding (Odonata: Platycnemididae). *Odonatologica* 45(1/2): 117-131. (in English) ["The final stadium (F) larva of *Coeliccia flavostriata* Laidlaw, 1918, is described and illustrated based on a mature male specimen, collected at Gunung Serapi, Sarawak, East Malaysia. The larva of *Coeliccia campioni* Laidlaw, 1918, is described from an immature (F-2?) female specimen from Gunung Mulu, Sarawak, East Malaysia. Larvae were identified by matching the mitochondrial marker COI with that of known adult specimens from several localities throughout Sarawak. The specimens presented close matches with all adults in this gene. Despite the disparity in maturity of the specimens several morphological differences, likely to be reflected in the mature larva of *C. campioni*, are identified. Comparisons with known larval descriptions of other *Coeliccia* species are provided. It is concluded that molecular analysis will eventually provide the most reliable practical method of determining the species of larvae of many species from this diverse genus." (Authors)] Address: Orr, A.G., Coop. Research Centre for Tropical Rainforest Ecol. & Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

16182. Ott, J. (2016): Der Kalikokrebs (*Orconectes immunis* (HAGEN, 1870) - eine gravierende Bedrohung für FFH-Libellen- und Amphibien-Arten in der Rheinaue (Crustacea: Decapoda: Cambaridae). *Fauna Flora Rheinland-Pfalz* 13(2): 495-504. (in German, with English summary) ["*O. immunis* – a threat to species of the EC Habitats Directive and to aquatic biotopes of the River Rhine flood plains. The author reports new localities of the invasive calico crayfish in monitoring sites of dragonflies listed in the EC Habitats Directive near Rheinzabern and Sondernheim. Also he reports other localities, where the species was found, as well as of other invasive crayfish-species (signal crayfish and spinycheek crayfish). Because of the negative ecological impact of these

invasive species, in particular of the calico crayfish, on the biocoenosis of aquatic biotopes (amphibians, molluscs, caddisflies, dragonflies) and its high mobility and dispersal power information on the actual range of the species and management measurements for still by the species unimpacted water are demanded." (Authors)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16183. Ott, J. (2016): Ungewöhnlich später Schlupf der Blaugrünen Mosaikjungfer bei Trippstadt / Pfalz. *Polichia Kurier* 32(3): 16-17. (in German) [Late emergence of *Aeshna cyanea* near Trippstadt, Rheinland-Pfalz, Germany, 8. Oktober 2015] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16184. Painkra, N.; Shukla, A.; Rai, S. 3 (2016): Diversity of environmental health markers Odonata and Lepidoptera in Gwarighat region of River Narmada, Jabalpur (M.P.) India. *International Journal of Research - Granthaalayah* 4(4): 124-136. (in English) ["River Narmada is the fifth largest westwards flowing river of India. Biodiversity protection and conservation is a national and international agenda and responsible for sustainable development of a region or a country and secondly Lepidoptera and Odonata are potential bio control agents of many invertebrates. Lepidoptera and Odonata assemblage along with river Narmada bank of Gwarighat region in Jabalpur has been investigated. A total of 41 species have been distributed in two orders Odonata with 22 species and Lepidoptera with 19 species were sampled. Libellulidae with 9 species under order Odonata and Nymphalidae with 9 species under Lepidoptera are the most dominating families while others have fewer representatives. Mostly organisms were aggregated due to habitat specific nature and random distribution indicates availability of resource utilization to survive but, in the urban forest area, high anthropogenic disturbances were observed which creates high biotic pressure on forest. A detailed list of Odonata and Lepidoptera recorded from urban forest area is presented." (Authors)] Address: Painkra, Neelima, Dept Zool., Govt. Model Scien. Coll., Jabalpur (M.P.), India

16185. Parr, A.J. (2016): Species Review 10: *Chalcolestes viridis* (Vander Linden), the Willow Emerald Damselfly. *Journal of the British Dragonfly Society* 32(2): 93. (in English) ["*C. viridis* is a recent colonist to southeast England, having appeared within the last decade. This damselfly is seemingly flourishing and is steadily expanding its breeding range in the UK. The background to its colonisation of Britain is discussed, along with details of the species' biology, behaviour and current distribution." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

16186. Parr, A.J. (2016): Migrant and dispersive dragonflies in Britain during 2015. *Journal of the British Dragonfly Society* 32(2): 49-59. ["Like many of its immediate predecessors, the year 2015 was an eventful one for migrant dragonflies in Britain. During June/July there were large-scale immigrations of *Sympetrum fonscolombii*, with records as far north as east Lothian in Scotland. Later in the summer, four *Aeshna* affinis were unexpectedly recorded away from the recently-

established breeding population around the greater Thames Estuary, presumably as a result of fresh immigration. These sightings mostly involved southern counties (Cornwall, Sussex and Suffolk) but included a female in Lancashire. In addition to these highlights, other notable events included the first sightings of *Sympetrum flaveolum* for several years and further autumn appearances of *Anax ephippiger*. An intriguing series of dragonfly sightings over the Christmas period (unfortunately not all well-documented) probably also refer to migrants. In addition to this news relating to primary immigration, significant developments also affected several of our recent colonist species. Both *Erythromma viridulum* and, more especially, *Chalcolestes viridis* thus showed continuing range expansion. While *Lestes barbarus* and *Coenagrion scitulum* seem not to be spreading at present, their recently-established populations do appear stable. Continued monitoring of all of our recent colonist species would seem desirable." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

16187. Patel, F.; Solanki, D.; Mehta, D.; Shukla, A.; (2016): Diversity of damselfly (Suborder-Zygoptera) in the Victoria Park, reserved forest, Bhavnagar, Gujarat, India. *Journal of Entomology and Zoology Studies* 4(4): 692-965. (in English) ["... Pervasive ecological importance of this charming group of insects makes them valuable to assess disturbance or environmental impact of various kinds in the ecosystem. The central theme of this study is to assay diversity of damselflies in the Victoria Park reserve forest, Bhavnagar city, Gujarat. (21°44'48" N 72°7'54" E) It is a favorable habitat for diversity of damselflies. The seasonal investigation carried out during the period of two years, particularly in monsoon season, 2014 to 2015. During this study total 10 species of damselflies belonging to 3 families and 7 genera were identified and recorded. It is observed that out of the total 10 species, 30% species belongs to genus *Ischnura*, 20% species of genus *Ceriagrion*, while genera like *Agriocnemis*, *Pseudagrion*, *Enallagma*, *Disparoneura*, *Lestes*, each constituting 10% Part. Maximum numbers of diversity were observed during August and September." (Authors)] Address: Patel, Foram, Zoology Department, Sir P.P, Institute of Science, Bhavnagar, Gujarat, India.

16188. Patil, S.R.; Chandra, K.; Bhandari, R.; Talmale, S.S. (2016): Predatory encounters between Orb-Weaver Spiders of genus *Neoscona* Simon, 1864 (Araneae: Araneidae) and some odonates: a case study from Nauradehi Wildlife Sanctuary, Madhya Pradesh, India. *The Indian Forester* 142(11): 1135-1139. (in English) ["Prey and predator encounters are significant for studying predation behaviour of Orb-weaver spiders with reference to flying insects. Predatory encounters are studied between five species of Odonates (prey) and two species of Orb-weaver spiders (predator) of Genus *Neoscona* belonging to family Araneidae based on four observations naturally occurred in the Nauradehi Wildlife Sanctuary, Madhya Pradesh, India during years 2012 and 2013 as different events. Factors involving behaviours of Orb-weaver spider and Odonate have influenced these predatory encounters." (Authors)] Address: Patil, S.R., Zoological Survey of India, Central Zone Regional Centre, Jabalpur (Madhya Pradesh), India

16189. Pavlova, A., Bechev, D. (2016): Faunistic diversity of Vrachanski Balkan Nature Park. *ZooNotes*, Supplement 3: 77-78. (in English, with Bulgarian summary) ["Till now, 8 species of dragonflies are found in Vrachanska Planina Mountains. All data presented here are from Bulgarian Odonata database." (Authors)] Address: Pavlova, Ameliya, Dept of Zoology, University of Plovdiv, 24, Tsar Assen Str., 4000 Plovdiv, Bulgaria. E-mail: aneliapav@abv.bg

16190. Payra, A.; Dash, S.K.; Mishra, A.K.; Palei, H.S., Mishra, R.K.; Rout, S.D. (2016): A preliminary study on Odonata diversity in Athagarh forest division, Odisha, India. *e-planet* 12(2): 43-49 (July 2014) *Forest Division* 43: 43-49. (in English) ["The objective of the present study is to explore the diversity of Odonata in Athagarh Forest Division, Odisha. Odonates were studied from January 2015 to March 2015. In this survey a total of 56 species of odonates were recorded, including 31 species of Anisoptera belonging to 3 families and 25 species of Zygoptera belonging to 5 families. Among these species, Libellulidae and Coenagrionidae were the dominant families with maximum number of species being 26 and 17 respectively." (Authors)] Address: Payra, P.G., Dept of Wildlife & Biodiversity Conservation, North Orissa Univ., Takatpur 757 003, Odisha, India. E-mail: arajushpayra@gmail.com

16191. Payra, A.; Tiple, A.D. (2016): Notes on the occurrence of *Mortonagrion aborense* Laidlaw, 1914 (Odonata: Coenagrionidae) from lower West Bengal, India. *Journal of Threatened Taxa* 8(7): 9038-9041. (in English) ["A new distribution record of an Odonata species from lower West Bengal. *M. aborense* is recorded for the first time from Purba Medinipur district, lower West Bengal. Previously the species was recorded only from north-east India (Mizoram, West Bengal, Assam and Nagaland). Diagnostic characters with photogra identification of this rare damselfly species." (Authors)] Address: Payra, A., P.G. Dept Wildlife & Biodiv. Conservation, North Orissa Univ., Sri Ram Chandra Vihar, Takatpur, Odisha 757003, India. E-mail: arajushpayra@gmail.com

16192. Perez-Gelabert, D.E.; Suriel, F.A. (2016): Primer registro de acaros acuaticos (*Arrenurus* sp.) como ectoparasitos de odonatos en La Hispaniola. *Novitates Caribaeae* 10: 96-99. (in Spanish, with English summary) ["First record of water mites (*Arrenurus* sp.) as ectoparasites of Odonata in Hispaniola. Water mites of the genus *Arrenurus* Dugès odonates in the Dominican Republic and Hispaniola. The report is based on a single individual *Telebasis dominicana* (Selys, 1857) parasitized by multiple individuals of the water mite *Arrenurus* sp." (Authors)] Address: Perez-Gelabert, D.E., Integrated Taxonomic Inform. System (ITIS) & Dept Entom., National Museum of Natural History, Smithsonian Inst., P.O. Box 37012, Washington, DC 20013-7012, USA. perezd@si.edu

16193. Phan, Q.T.; Kompier, T. (2016): Description of two new species of *Coelliccia* from Vietnam (Odonata: Platycnemididae). *Zootaxa* 4196(3): 407-414. (in English) ["*Coelliccia hayashii* sp. nov. (holotype ♂, from Doi waterfall, KaNat, K'Bang district, Gia Lai Province, central Vietnam, deposited in VNMN) and *Coelliccia mattii* sp. nov. (holotype ♂ and

♀ allotype, from Doi Cao, Loc Tan, Bao Lam district, Lam Dong Province, southern Vietnam, deposited in VNMN) are described. The males of both species are characterized by extensive pruinosity on the thorax." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Inst. Res. & Develop., Duy Tan Univ., K7/25 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16194. Pickess, B.P. (2016): *Lestes sponsa* (Hansemann) (Emerald Damselfly) and mixed couplings. *Journal of the British Dragonfly Society* 32(1): 39-43. (in English) ["Details are given of the records involving mixed coupling between male *Lestes sponsa* with six different species of Zygoptera in the UK from 2010 to 2015. A total of 11 couplings are recorded, one with another species of *Lestes*, the other 10 with species from other families - four with single females, three with males and three with pairs. As to why this behaviour occurs is still unclear. Possible reasons for it are discussed." (Authors)] Address: Pickess, B.P., 8 Shaw Drive, Sandford, Wareham, Dorset. BH20 7BT, UK

16195. Pitcher, K.A.; Soluk, D.A. (2016): Inter-patch connectivity and intra-patch structure differentially alter prey consumption by multiple predators. *Ecosphere* 7(11) Article e01598: 14 pp. (in English) ["Structural habitat complexity (SHC) and functional habitat connectivity (FHC) have important effects on predator-prey interactions and exert a strong influence on community structure/dynamics in terrestrial and aquatic ecosystems. Although these factors vary simultaneously in most systems, their interactive effects are poorly understood. Using artificial pond mesocosms and multiple prey types, we manipulated plant density (SHC: low, high) and inter-patch distance (FHC: short, long) in a full factorial design to test for potential interactive effects of these factors on competition and predation by a dragonfly larva (*Anax junius*) and fish predator (*Lepomis cyanellus*). When inter-patch distances (FHC) were short, *A. junius* consumed more amphipods ($36\% \pm 4.6\%$) compared with long treatments ($19\% \pm 4.8\%$). We detected no significant effects of plant density (SHC) on prey consumption by *A. junius*. There were significant interactive effects of FHC and SHC on *L. cyanellus* consumption of amphipods and damselflies. The most counterintuitive of these effects was that sunfish consumed more larval damselflies at high plant density ($64\% \pm 6.0\%$) than at low plant density ($38\% \pm 8.6\%$) but only in short connection treatments. This interactive effect of SHC and FHC on damselfly predation by *L. cyanellus* was likely because damselflies exhibited riskier behaviour at higher SHC. Prey consumption with both predators present was additive, but no significant effect of either SHC or FHC on interspecific predation was detected, suggesting compensatory foraging responses. Structural habitat complexity and FHC interactively influence predator foraging behaviour in complex, non-intuitive ways that are highly dependent on the predator/prey combination in question. Structural habitat complexity and FHC are currently being influenced by anthropogenic factors in multiple ways (e.g., habitat loss, global climate change), and being able to predict the responses of biotic communities to these changes should be an important consideration in restoration and conservation efforts."

(Authors)] Address: Pitcher, K.A., Dept of Biology, University of South Dakota, 414 E. Clark Street, Vermillion, South Dakota 57069 USA. E-mail: kristopher.pitcher@usd.edu

16196. Poliak, T.N. (2016): Population status of the endemic San Francisco damselfly (*Ischnura gemina*). M.Sc. thesis, Biology: Conservation Biology, San Francisco State University: IX + 64 pp. (in English) ["*I. gemina* is endemic to the San Francisco Bay area, and is identified by the International Union for Conservation of Nature as a vulnerable species. Research from the late 1970s through the 1990s indicates a decline in the species' populations. This study completes a comprehensive survey for *I. gemina*, and the closely related species *I. denticollis*, to determine the status of both species in areas previously surveyed. The study also seeks to determine the extent that various habitat variables, such as water chemistry and vegetation structure, predict the presence of *I. gemina*. Data from this study show a dramatic decline in populations of *I. gemina* since the 1980s and 1990s. In addition, results from this study indicate that *I. gemina* persists in sites with cooler temperatures and lower salinity than do other ischnuran or coenagrionid species. Finally, this study considers past research related to species conservation in light of climate change, and assesses the long-term viability of *I. gemina* under climate change. Of key interest is the tolerance for *I. gemina* under increasing temperatures and sea level rise. The goal for this research is to provide information on the current status of *I. gemina* and recommendations for its long-term conservation." (Author)] Address: not stated

16197. Popova, O.N.; Haritonov, A.Yu.; Anishchenko, O.V.; Gladyshev, M.I. (2016): Export of biomass and metals from aquatic to terrestrial ecosystems via the emergence of dragonflies (Insecta: Odonata). *Contemporary Problems of Ecology* 9(4): 458-473. (in English) ["Long-term monitoring of the abundance and spatial distribution of 18 widespread species of Odonata has made it possible to assess their contribution to the export of aquatic productivity that entered the Barabinsk forest-steppe ecosystem. The annual emergence of Odonata varies from 0.8 to 4.9 g/m² of the land area and from 2.3 to 13.3 g/m² of the water area, which is 4–5 times larger than that in Diptera. The total flux of organic matter from water to terrestrial ecosystems remains relatively stable (sixfold inter-annual variability) irrespective of large interannual variations in the abundance of separate species (e.g., 42-fold interannual variability in *Libellula quadrimaculata*). The metal content was determined in nine Odonata species. Export of metals by dragonflies decreases in the series $K > Na > Mg > Ca > Fe > Zn > Cu > Mn > Pb > Ni > Cr > Cd$. Therefore, odonates appear to be quantitatively and qualitatively important providers of aquatic resources to the forest-steppe landscape of Western Siberia." (Authors)] Address: Popova, O.N., Institut Sistematiki i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: popova.olga.nik@gmail.com

16198. Popova, O.N.; Eremina, E.E. (2016): *Sympetrum fonscolombii* (Selys, 1840) (Odonata, Libellulidae) in northernmost areal localities in Chelyabinskaya and Novosibirskaya Oblast's of Russia. *Eurasien Entomological Journal* 15(1):

45-59. (in Russian, with English summary) ["A migrant dragonfly species, *S. fonscolombii*, was recorded in 2010 in the South Urals and in 2013 in West Siberia in the most northern and northeastern localities where emergence of the summer generation was registered. Development of preimaginal stages was elapsed in optional or obligatory temporary water reservoirs. Single specimens and hemi-populations of imago of *S. fonscolombii* found in the region are considered to be in transit (trans-latitude migration). The detailed characteristics of the habitats of *S. fonscolombii* in the southern Urals and West Siberia are given, species composition of dragonfly complexes is characterized." (Authors)] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 639991, Russia. E-mail: popova-2012@yandex.ru.

16199. Pratama, S.S.; Rosalini, R.A. (2016): Dragonflies Inventory (Odonata) in Kota Waringin Village, Puding Besar District – Bangka Island. *Biovalentia* 2(2): 23-32. (in English) ["Odonata is considered an environmental indicator group of freshwater habitats. Thus there is a need to have a good baseline data to use it for monitoring fluvial habitats. However, species composition of Odonata in Kota Waringin Village is poorly known. This study aims to determine the diversity of dragonfly species in the Kota Waringin Village, Puding Besar District – Bangka Island. Data were collected at Three different ecosystems in Kota Waringin Village area (River in Forest, River in oil palm plantations and yard). Location for data collection based on the availability of water resources using purposive sampling method. The species were identified using identification books (Dragonfly of Singapore and Australian Dragonfly). Based on research we revealed 13 species of dragonflies are exist in three sampling locations (*Agrionoptera insignis*, *Brachydiplax chalybea*, *Heliaeschna crassa*, *Ictinogomphus decoratus melaenops*, *Nannophya pygmaea*, *Neurothemis fluctuans*, *N. ramburii*, *N. terminata*, *Orthetrum chrysis*, *O. sabina*, *Rhodothemis rufa*, *Zygomma petiolatum* and *Rhyothemis phyllis*]" (Authors)] Address: Rosalini, R.A., Biology Dept, State Univ. of Jakarta, Indonesia

16200. Priyadarshana, T.S.; Wijewardhane, I.H.; Herath, B.E. (2016): Three new species of the genus *Ceylonosticta* Fraser, 1931 (Odonata: Zygoptera: Platystictidae) from Sri Lanka and the rediscovery of *Ceylonosticta subtropica* (Fraser, 1933). *International Journal of Odonatology* 19(4): 239-252. (in English) ["Three new species of *Ceylonosticta* are described and illustrated: *Ceylonosticta nancyae* sp. nov., *Ceylonosticta rupa-singhe* sp. nov. and *Ceylonosticta alwisi* sp. nov. from Samanala Nature Reserve (Adam's Peak), Kuruwita-Erathna footpath, Ratnapura District, Sri Lanka. *Ceylonosticta subtropica* has been recorded for the first time after 83 years and the first depiction of its genital ligula is provided." (Authors)] Address: Priyadarshana, T.S., Nature Explorations and Education Team, De Soysapura, Moratuwa, Sri Lanka

16201. Prokop, J.; Pecharová, M.; Nel, A. (2016): New Cenozoic dragonflies from the Most Basin and Stredohori Complex volcanic area (Czech Republic, Germany). *Journal of Natural History* 50(37-38): 2311-2326. (in English) ["Discovery

of new dragonflies from Oligocene and Miocene deposits of the Most Basin and Český Stredohori Complex volcanic area in northern Bohemia and Saxony (Germany) is reported. *Aeshna zlatkovaceki* sp. nov. is the first described dragonfly from early Miocene salmon-pink baked clays of Želénky near Duchcov. Its fore wing venation pattern seems to be closely related to that of *A. turoliana* Riou and Nel, 1995, known from late Miocene of La Montagne d'Andance in Ardèche, France, and *Aeshna solida* Scudder, 1890, known from late Eocene of Florissant in Colorado, USA. A new occurrence of a libellulid dragonfly? *Onychothemis rihai* in the Libkovice Member of Most Basin confirms the links to the Cypris Formation in Sokolov and Cheb basins reflecting similar habitats as was already shown on the basis of reconstructed palaeovegetation and shared thermophilous and accessory floristic elements. Other fragmentary fossil material from different localities are discussed." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16202. Prunier, F.; Brochard, C. (2016): A 1966 Iberian record of *Orthetrum trinacria*. *Boletín Rola* 8: 23-28. (in English, with Spanish summary) ["Whilst working on the collections of P-A. Robert, one of the authors (CB) discovered a larval specimen that proved to be *O. trinacria*. This specimen was originally collected in 1966 and pre-dates the rediscovery of this species in Europe from Sardinia by six years. The paper also discusses the early records from Iberia and speculates on the possible reasons of its range expansion." (Author)] Address: Prunier, F., Red de Observadores de Libélulas en Andalucía (ROLA), Córdoba, Spain. E-mail: aeaalbosqueanimado.info@gmail.com

16203. Rachman, H.T.; Rohman, A. (2016): Dragonflies diversity (Odonata) in Menoreh Karst Central Java - Yogyakarta. *Int'l Journal of Advances in Agricultural & Environmental Engg. (IJAAEE)* 3(2): 255-258. (in English) ["This study aims to determine the diversity of dragonfly species and diversity index of dragonfly species due to tourism in the Menoreh Karst Central Java – Yogyakarta. Data were collected at three Banyu Mudal Waterfall and Anjani Waterfall). Location for data collection based on the availability of water resources using purposive sampling method. The species were identified using identification books (Dragonfly of Singapore and Australian Dragonfly). The diversity index is analyzed using Shannon - Weinner diversity index. Based on research we revealed 11 species of dragonflies are exist in three sampling locations (*Leptogomphus lansbergei*, *Orthetrum sabina*, *Pantala flavescens*, *Diplacodes trivialis* and *Potamarcha congener*, *Euphaea variegata*, *Nososticta insignis*, *Drepanosticta sundana*, *D. gazella*, *Vestalis luctosa* and *Coellicia membranipes*). 7 species are vulnerable to water pollution. 3 species are endemic to Javan Island." (Authors)] Address: Rachman, H.T., Dept of Biology Education, Faculty of Mathematics & Science, Yogyakarta State University, Indonesia

16204. Rajabi, H.; Shafiei, A.; Darvizeh, A.; Gorb, S.N. (2016): Resilin microjoints: a smart design strategy to avoid failure in dragonfly wings. *Scientific Reports* 6:39039 DOI:

10.1038/srep39039: 5 pp. (in English) ["Dragonflies are fast and manoeuvrable fliers and this ability is reflected in their unique wing morphology. Due to the specific lightweight structure, with the crossing veins joined by rubber-like resilin patches, wings possess strong deformability but can resist high forces and large deformations during aerial collisions. The computational results demonstrate the strong influence of resilin-containing vein joints on the stress distribution within the wing. The presence of flexible resilin in the contact region of the veins prevents excessive bending of the cross veins and significantly reduces the stress concentration in the joint." (Authors)] Address: Rajabi, H., Inst. of Zoology, Functional Morphology & Biomechanics, Christian-Albrechts-University, Kiel, Germany. E-mail: ed.leik-inu.eigolooz@ibajarh

16205. Rasmussen, N.L.; Rudolf, V.H.W. (2016): Individual and combined effects of two types of phenological shifts on predator-prey interactions. *Ecology* 97(12): 3414-3421. (in English) ["Timing of phenological events varies among years with natural variation in environmental conditions and is also shifting in response to climate change. These phenological shifts likely have many effects on species interactions. Most research on the ecological consequences of phenological shifts has focused on variation in simple metrics such as phenological firsts. However, for a population, a phenological event exhibits a temporal distribution with many attributes that can vary (e.g., mean, variance, skewness), each of which likely has distinct effects on interactions. In this study, we manipulated two attributes of the phenological distribution of a prey species to determine their individual and combined effects on predator-prey interactions. Specifically, we studied how shifts in the mean and variation around the mean (i.e., synchrony) of hatching by tadpoles (*Hyla cinerea*) affected interactions with predatory dragonfly naiads (*Tamea carolina*). At the end of larval development, we quantified survival and growth of predator and prey. We found that both types of shifts altered demographic rates of the prey; that the effects of synchrony shifts, though rarely studied, were at least as strong as those due to mean shifts; and that the combined effects of shifts in synchrony and mean were additive rather than synergistic. By dissecting the roles of two types of shifts, this study represents a significant step toward a comprehensive understanding of the complex effects of phenological shifts on species interactions. Embracing this complexity is critical for predicting how climate change will alter community dynamics." (Authors)] Address: Rasmussen, N.L., Dept Entomology & Nematology, Univ. California, Davis, California 95616 USA. E-mail: solifugae@gmail.com

16206. Rathod, D.; Patel, J.R.; Mistry, V.S.; Parasharya, B.M.; Talmale, S.S. (2016): Odonate diversity of Dang forest, a western Ghat extension of Gujarat, India. *Advances in Life Sciences* 5(12): 5377-5385. (in English) ["Odonate diversity was surveyed in Dang forest, a Western Ghats extension of Gujarat, India during 2014 and 2015. Total 55 species belonging to two suborders, 37 genera under eight families were recorded. 19 species of Zygoptera and 36 species of Anisoptera were recorded. Three species namely, *Potamarcha congener*, *Rhyothemis variegata* and *Tamea basilaris* were previously not reported from Dang district and two species i.e. *Enallagma*

parvum and *Aethriamanta brevipennis* were not reported earlier from Dang forest. Hence, now checklist of the odonate of Dang forest reaches to 58 species and South Gujarat is raised to 62 species." (Authors)] Address: Rathod, D., 4AINP on Agricultural Ornithology, Anand Agricul. Univ., Anand- 388 110, Gujarat, India. E-mail: darshanarathod500@gmail.com

16207. Rathod, D.M.; Dholu, S.G.; Parasharya, B.M.; Mistry, V. (2016): Odonate diversity of a wetland of national importance - Pariej. *Jalaplavit* 6(3): 6-15. (in English) ["Odonate diversity was investigated at Pariej wetland of Gujarat during 2014 to 2015. Total 29 species belonging to five families and 22 genera were recorded. Total 9 species of Zygoptera and 19 species of Anisoptera were recorded. Twelve species were common, 13 were uncommon and 4 were rare." (Authors)] Address: Rathod, Darshana, AINP on Agricultural Ornithology, Anand Agricultural University, Anand-388110, Gujarat, India. E-mail: darshanarathod500@gmail.com

16208. Rathod, D.M.; Parasharya, B.M.; Talmale, S.S. (2016): Odonata (Insecta) diversity of southern Gujarat, India. *Journal of Threatened Taxa* 8(11): 9339-9349. (in English) ["The diversity of the Odonata (dragonflies and damselflies) was studied in seven districts of southern area of Gujarat State in India during 2014 to 2015. A total of 55 species belonging to two suborders and 37 genera under eight families were recorded. A total of 18 species of Zygoptera (damselflies) and 37 species of Anisoptera (dragonflies) were recorded. Dang and Navsari districts were surveyed intensively and a maximum of 47 and 35 species were recorded respectively, whereas the districts that were surveyed less intensively, i.e., Bharuch (26), Valsad (21), Surat (29), Narmada (25) and Tapi (27) had comparatively low species richness. Thirty-two species are being reported for the first time from southern Gujarat, raising the total list of odonates to 60. 15 species namely, *Lestes elatus*; *Elattonura nigerrima*; *Dysphaea ethela*; *Paracercion malayanum*; *Pseudagrion spencei*; *Burmagomphus laidlawi*; *Cyclogomphus ypsilon*; *Microgomphus torquatus*; *Onychogomphus acinaces*; *Hylaeothemis indica*; *Lathrecista*; *Rhodothemis rufa*; *Tamea limbata*; *Trithemis kirbyi* and *Zygomma petiolatum* are recorded for the first time from Gujarat State raising the number of odonates of Gujarat State to 80 species." (Authors)] Address: Rathod, Darshana, AINP on Agricultural Ornithology, Anand Agricultural University, Anand, Gujarat 388110, India. E-mail: darshanarathod500@gmail.com

16209. Remmers, W.; Gameiro, J.; Schaberl, I.; Clausnitzer, V. (2016): Elephant (*Loxodonta africana*) footprints as habitat for aquatic macroinvertebrate communities in Kibale National Park, south-west Uganda. *African journal of ecology* 55(3): 342-351. (in English) ["This is the first study where elephant footprints as habitat for aquatic macroinvertebrate communities were assessed. Preliminary observations during the dry season in Kibale Forest, Uganda, indicated that water-filled footprints constituted the majority of stagnant ponds. Consequently, this study aimed at giving an overview of the diversity and ecology of those habitats and the capacity of elephants as ecosystem engineers. The fauna and abiotic factors (age, size, substrate, organic matter, pH,

canopy cover, temperature, conductivity) of 30 water-filled natural elephant footprints were sampled, resulting in the record of 61 morphospecies among 27 families/orders. Species composition was dominated by Hydrophilidae and Dytiscidae and influenced by environmental variables, such as age and organic matter. To study the colonization process, 18 artificial footprints were created within different distances from the water source. After 5 days, 410 specimens were collected, with higher species richness in artificial footprints closer to a natural water source. We conclude that colonization of water-filled footprints is fast, they constitute important habitats with high diversity and variability, and they act as stepping stones for dispersal and add to the ability of elephants as ecosystem engineers. We emphasize the importance of elephants as a key species in ecosystem dynamics and conservation practice." (Authors) Tetrathemis sp., Coenagrionidae, Hadrothemis coacta] Address: Remmers, W., University of Koblenz-Landau, Universitätsstr. 1, 56070 Koblenz, Germany. E-mail: wremmers@uni-koblenz.de

16210. Renner, S.; Sahlén, G.; Périco, E. (2016): List of Odonates from the Floresta Nacional de São Francisco de Paula (FLONA - SFP), with two new distribution records for Rio Grande do Sul, Brazil. *Biota Neotrop.* 16(3) e20150132: 7 pp. (in English, with Portuguese summary) ["A survey of Odonata was carried out in the National Forest FLONA - SFP, Northeastern region of the Rio Grande do Sul state, Brazil. This conservation unit is mainly covered by Mixed Ombrophilous Forest (MOF), a subtype of Atlantic Forest biome, being also areas covered in planted Pinus, planted Araucaria and open fields. Our sampling efforts were conducted in thirty aquatic environments inside this reserve during the period between January 2014 and November 2014. The sampling sites were selected randomly, comprehending lakes, bogs, small streams and river sections, all inserted in the four vegetation types occurring in the reserve. 64 species of Odonata were collected and grouped into 23 genera and seven families. The dominant families were Coenagrionidae (32%), Libellulidae (32%), Aeshnidae (12%), and Calopterygidae and Lestidae (9%). As expected, the findings revealed the presence of a highly diverse Odonate assemblage, mainly represented by generalist species in the most human disturbed sectors (Pinus and Open fields) and some specialist species in the pristine forest. Two species were registered for the first time in the state of Rio Grande do Sul, Brazil: *Libellula herculea* Karsch, 1889 (Libellulidae) and *Heteragrion luizfelipei* Machado, 2006 (Heteragrionidae)."] (Authors)] Address: Renner, S., Centro Univer. Univates, Rua Avelino Tallini, 171, Lab. Evolução e Ecol., sala 104, Prédio 8, 95900-000, Lajeado, RS, Brazil

16211. Reznickova, P.; Petrovajová, V.; Nerudová, J.; Hadašová, L.; Kopp, R. (2016): The colonization of newly built fishponds by the macroinvertebrate assemblages. *Acta Universitatis Agric. Silv. Mendelianae Brun.* 64(1): 141-149. (in English) ["The succession of standing waters by aquatic macroinvertebrates is a present and insufficiently surveyed topic. This study is addressed to the issue of colonisation of newly created small standing waters. Two fishponds situated in the north of Moravia (Czech Republic) were studied. The aim of this study

was to determine the character and colonisation rate of these ponds by macroinvertebrates, to evaluate the abundance, taxonomic composition and changes in composition of freshwater assemblages as a result of the fish stock influence. Basic abiotic parameters were also measured within the sampling occasions (e.g. water temperature, dissolved oxygen, conductivity, pH, total nitrogen and phosphorus concentrations). Samples of aquatic macroinvertebrates were taken monthly during the years 2012 and 2013, by kick sampling method using the hand net. The character of sampled fishponds was very similar, environmental parameters (e.g. area, substrate, depth etc.) were comparable. The colonisation of both fishponds was very fast. The pioneer colonists were mainly insect larvae (e.g. chironomids). Very low numbers of macroinvertebrates as a result of fish stock influence were recorded on both sites during the observation with the highest abundances in summer season." (Authors)] Address: Reznicková, Ravla, Dept of Zoology, Fisheries, Hydrobiology and Apiculture, Faculty of AgriSciences, Mendel University in Brno, Zemedelská 1, 613 00 Brno, Czech Republic

16212. Rivas, M.; Martinez-Meyer, E.; Munoz, J.; Cordoba-Aquilar, A. (2016): Body temperature regulation is associated with climatic and geographical variables but not wing pigmentation in two rubyspot damselflies (Odonata: Calopterygidae). *Physiological Entomology* 41(2): 132-142. (in English) ["It has been proposed that wing pigmented spots function in temperature control in male calopterygids. Using two rubyspot species *Hetaerina americana* and *H. vulnerata*, the present study investigated whether (i) wing spot size and colour-modified aspect can predict temperature gain after a cooling event; (ii) wing spot size is related to the temperature needed to fly and how long it takes to initiate flight; and (iii) wing spot size is related to seasonality and altitude. The results obtained do not support any of these relationships. The results also indicate that *H. vulnerata* can achieve flight at 8 Å °C less than *H. americana*. The present study further investigates whether the species differ in their latitudinal and geographical distribution, and respond differently to bioclimatic variables. The results obtained provide support for this particular hypothesis, showing that *H. vulnerata* inhabits higher altitudes, and is able to tolerate colder environments compared with *H. americana*. Wing spots in the two *Hetaerina* species do not help in thermoregulation, although both species show different temperature control abilities. This difference in thermoregulatory ability may enable the species to colonize different environments and reduce interspecific competition." (Authors)] Address: Rivas, M., Depto de Ecología Evolutiva, Instituto de Ecología, Univ. Nacional Autónoma de México, México, DF, México,

16213. Rivera-De la Parra, L.; Sarma, S.S.S.; Nandini, S. (2016): Changes in prey preferences of dragonfly naiads of *Rhionaeschna multicolour* (Hagen, 1861) (Odonata: Aeshnidae) in the presence and the absence of macrophytes. *Aquatic insects* 37(3): 241-252. (in English) ["We offered prey consisting of the rotifers, cladocerans, copepods, amphipods, dipterans and ephemeropterans to the pre-starved and sorted in three size groups of naiads of *R. multicolour* in the presence

of the macrophyte *Egeria densa* Planchon and without it. The naiads consumed up to 25 prey items or in terms of biomass (wet weight) up to 7 mg within 2 h. Biomass intake increased with increasing predator's size. Prey consumption was significantly lower in presence of plants. The cladocerans *Ceriodaphnia dubia* Rihcard, 1894, *Daphnia mendotae* (Taylor & Hebert, 1993) and *Ilyocryptus* sp. were consistently preferred by the dragonfly naiads while *Simocephalus vetulus* (Müller, 1776), *Alona guttata* Sars, 1862 and *Scapholeberis kingi* Sars, 1888 were avoided with and without macrophytes. This study suggests that dragonfly naiads structure the zooplankton community by selective feeding." (Authors)] Address: Sama, S.S.S., Laboratorio de Zoología Acuática, División de Investigación y Posgrado, Univ. Nacional Autónoma de México, Campus Iztacala, Tlalnepantla, México. E-mail: sama@unam.mx

16214. Rodrigues, M.E.; Koroiva, R.; Ragalzi-da-Silva, E.; Batista de Moura, E. (2016): *Mecistogaster linearis* (Fabricius) (Odonata: Coenagrionidae): First Record from Mato Grosso do Sul State, Brazil. *EntomoBrasilis* 9 (3): 212-215. (in English, with Portuguese summary) ["Commonly called "helicopter damselflies", *Mecistogaster* species (Coenagrionidae) are recognized by their large body size in comparison with other Odonata species, ability to flap both anterior and posterior wings in opposite directions, and preference for dense forest. These species feed on spiders and require trunks or plants that can accumulate water, like bromeliads, for laying eggs. This relationship with phytotelm environments makes the *Mecistogaster* species sensitive to forest fragmentation and habitat changes. In Brazil, there are records of seven species, mainly in Amazon forest regions. *M. linearis* has a wide distribution reported in the Brazilian states of Acre, Amazonas, Roraima, Para, Rondonia, Mato Grosso, Rio de Janeiro, and Sao Paulo. Herein, we report the first record of *M. linearis* in the state of Mato Grosso do Sul with specimens sampled from the municipality of Corumba, in the Pantanal." (Authors)] Address: Rodrigues, M.E., Universidade Estadual de Mato Grosso do Sul -UEMS, Brasil. E-mail: rodrigues.mbio@gmail.com

16215. Röller, O. (2016): Modern Citizen Science - am Beispiel der Libellenkunde (Odonatologie) in Rheinland-Pfalz. *Mainzer Naturwissenschaftliches Archiv* 53: 151-158. ["Based on the recently published Green Paper Citizen Science Strategy 2020 for Germany (Bonn et al. 2016) we present a definition of Citizen Science. In the field of natural research and nature protection, experience has shown that it makes sense to extend this definition: due to modern and internet based projects of species registration and therefore a participation of a large public the term changes to Modern Citizen Science (Röller 2015). Using the example of the ArtenFinder Rheinland-Palatinate and related to the odonatology in the state of Rhineland-Palatinate/Germany, the characters, the meaning for science as well as the additional benefit of the method of Modern Citizen Science are discussed." (Author)] Address: Röller, O.: E-Mail: kontakt@natur-suedwest.de

16216. Román-Heracleo, J.; Guerrero de la Paz, J.G. (2016): Primer registro de la familia Cordulegastridae Leach,

1815 (Insecta: Odonata) para el estado de Jalisco, México. *Dugesiana* 23(1): 44. (in Spanish) [*Cordulegaster* sp., Reserva de la Biosfera Sierra de Manantlán; no further dates.] Address: Román-Heracleo, J., Escuela de Biología. Univ. de Costa Rica. Ciudad Universitaria Rodrigo Facio Brenes, San Pedro, Costa Rica. E-mail: romanjareth@gmail.com

16217. Ross, A.J.; Coutiño José, M.A.; Nel, A. (2016): The first records of coenagrionid damselflies (Odonata: Zygoptera: Coenagrionidae: *Neoerythromma* sp. and *Nehalennia* sp.) from Mexican Amber (Miocene). *Boletín de la Sociedad Geológica Mexicana* 68(1): 81-86. (in English, with Spanish summary) ["Two specimens of the damselfly (Odonata: Zygoptera) family Coenagrionidae are described from Mexican amber of early Miocene age, identified as *Neoerythromma* sp. and *Nehalennia* sp. They constitute the first records of the family Coenagrionidae from this amber, and the first fossil records of the genera *Neoerythromma* and *Nehalennia*." (Authors)] Address: Ross, A.J., National Museum of Scotland, Chambers Street, Edinburgh, EH1 1JF, Scotland, UK. E-mail: a.ross@nms.ac.uk

16218. Ruf, C.; Gufler, C.; Küry, D. (2016): Populationsentwicklung und Habitatpräferenzen der Westlichen Keiljungfer (*Gomphus pulchellus* Selys, 1840) in der Region Basel (Schweiz) (Odonata: Gomphidae). *Mitteilungen der Naturforschenden Gesellschaften beider Basel* 16: 109-122. (in German, with English summary) ["From 2012 to 2014 an isolated population of *G. pulchellus*, an endangered species of national priority was studied in the Spittelmat Ponds in Riehen (canton Basel-Stadt, Switzerland) and in two other potential breeding sites. The density at emergence was between 34.2 and 50.8 exuviae per 100 meter of shore line while the proportion of male exuviae varied from 42.7 to 54.5 %. The EM50 showed values from 4 to 12 days. The emergence period started when a mean temperature sum of $1'113.8 \pm 69.3$ °C (January 31st until date of first emergence) was reached. Highest densities of exuviae were found on the south eastern shore of the ponds with approximately 80 % of them attached values on plants part like *Rubus* sp. and *Carex* sp. In the nearby gravel pit Käppelin (Weil am Rhein, Germany) only two exuviae were found and in the Entenweiher exuviae were lacking completely. In 2014 only three larvae of *G. pulchellus* were found in mainly sandy sediments covered by detritus. They seemed to have a very patchy distribution. In experiments larvae chose significantly a sandy sediment of a grain size between 0.05 and 0.5 mm. On sediments covered with detritus the larvae buried themselves after 36 minutes compared to 54 minutes without detritus. The Spittelmat ponds seem to be the main habitat of a metapopulation of which actual size and spread are unknown. To conserve and support the population of the *G. pulchellus* it is proposed to restore the ponds in vicinity of the Spittelmat ponds according to its habitat preferences." (Authors)] Address: Ruf, C., Junkerbifangstr. 14, 4800 Zofingen, Switzerland. E-mail: christian_ruf@gmx.ch

16219. Rychla, A. (2016): Occurrence of the Spotted Darter *Sympetrum depressiusculum* (SELYS, 1841) (Odonata: Libellulidae) in western Poland. *Odonatrix* 126: 8 pp. (in Polish,

with English summary) ["*S. depressiusculum* is currently in decline at the European scale and further decrease of species localities has been already predicted for the next years. The situation of the species seems to be stable in Poland, so far. However, there are many regions without any information on the species occurrence. This paper presents 16 new records of *S. depressiusculum* and summarizes its current distribution in western Poland. Further, the habitat types of the species are described and habitat preferences are discussed. The new localities make up 9 % of all known records in Poland. The species was numerous (> 20 individuals) or fairly numerous (6–20 individuals) at 12 new sites. The reproductive behaviour as well as the breeding success were observed at 9 localities, respectively. *S. depressiusculum* was mostly found in fish ponds (37 % of all sites) and in dystrophic peat bogs (37 %). Almost 90 % of all sites were surrounded by forests. The results show that the species is widely distributed in western Poland and clearly prefers two types of habitats: fish ponds and peat bogs. Further investigations of *S. depressiusculum* should, therefore, focus on these habitat types in this region. The common occurrence of *S. depressiusculum* in the second habitat type is somehow unexpected as the species is not the typical faunistic element of peat bogs. The presented records constitute therefore a good basis to monitor the permanency and stability of the population in western Poland, especially in bog-like biotopes." (Author)] Address: Rychla, Anna, 66-016 Ploty, Poland. E-mail: rychlan@op.pl

16220. Rychla, A. (2016): Neue Libellenfunde aus der Niederschlesischen Heide (Bory Dolnoslaskie) in Polen. IDF-Report 100: 1-11. (in German, with English and Polish summaries) ["In this study, the results of the investigation of Odonata, conducted in the years 2015 and 2016 in three boggy protected areas („Zacisze“, „Przygielkowe Moczary“ und „Zurawie Bagno“) of the Lower Silesian Wilderness are presented. A total of 41 species was found. There were eight species new for the investigated area, six of which were of Mediterranean origin. The observation of *Orthetrum albistylum* shows that this species has already reached the western border of Poland and a further expansion to Germany is to be expected. The investigations did not reveal any new findings of *Aeshna subarctica* in the area, so the status of this species is still unclear. Of the rare species the new record of *Leucorrhinia caudalis* in the NSG "Zacisze" was demonstrated. It is the first observation of this species in the Lower Silesian Wilderness and as far as the only one in the southern part of Lubuskie Voivodeship, but the status of the species remains unknown. The study confirms that the biodiversity in the areas is very high. The thermophilous species increase the local diversity in the peat bogs on one hand, but they are also regionally new faunal elements, which may cause strong changes in the bog's dragonfly community on the other hand. Therefore, further systematic research in the peat bogs in this area is necessary." (Author)] Address: Rychla, A., Ul. Osiedlowa 12, Ploty, 66016 Czerwieńsk, Poland. E-mail: an.rychla@gmail.com

16221. Saetung, T.; Boonsoong, B. (2016): Description of the final instar larva of *Pseudagrion pruinum* (Burmeister,

1839) (Odonata: Coenagrionidae) from Thailand. *Zootaxa* 4175(3): 292-300. (in English) ["Herein the final instar larva of *P. pruinum* is described and illustrated for the first time, based on reared specimens from Thailand. When compared with the other known *Pseudagrion* larvae, *P. pruinum* is distinguished by three setae on the labial palp, five teeth on the truncate, denticulate lobe on the distal marginal end of the labial palp, one premental seta and a row of three minute setae on each side of the midline, as well as shape and tracheation of caudal gills." (Authors)] Address: Saetung, T., Animal Systematics and Ecology Speciality Research Unit (ASERU), Dept of Zoology, Faculty of Science, Kasetsart Univ., Bangkok, Thailand 10900. E-mail: fscibtb@ku.ac.th

16222. Saha, S.; Nirwal, S. (2016): Abstract: R20.00002: Viability of long range dragonfly migration across the Indian Ocean: An energetics perspective. *Bulletin of the American Physical Society* 61(20) (69th Annual Meeting of the APS Division of Fluid Dynamics): [Verbatim: Recently *Pantala flavescens* have been reported to migrate in millions from India to Eastern Africa on a multigenerational migratory circuit of length 14000-18000 kms [R Charles Anderson. (*Journal of Tropical Ecology*), 25(04): 347-358, 2009]. We attempt to understand the ability of dragonflies to perform long range migration by examining the energetics using computer simulations. In absence of a theory for long range insect migrations, we resort to the extensive literature on long range bird migration from the energetics perspective. The flight energetics depends upon instantaneous power and velocity. The mechanical flight power is computed from the power curve which is then converted to mass depletion using Brequet's equation. However, the mechanical flight power itself depends upon the instantaneous velocity which can vary depending upon the current mass. In order to predict the range in our simulations, we assume that the insect progressively tries to achieve the maximum range velocity. The results indicate that the migration range is approximately 1260 kms in 70 hours based on the true airspeed. However, our analysis is restricted by the lack of data and certain caveats in drag prediction and basal metabolism rate.]

16223. Saikia, R.; Mishra, H.; Devi, A.; Saikia, D.K. (2016): Biodiversity of odonates in rice eco-system, Titabar, Assam. *Journal of Entomology and Zoology Studies* 4(4): 1376-1381. ["The present study was conducted at Farmers field near Regional Agricultural Research Station, Titabar, main rice bowl of the district Jorhat, Assam. Visual count and catch per unit effort was adopted to record the odonate diversity in the rice field. 68 individuals of odonate belonging to 14 species, equal number of species were recorded from each sub-order, Zygoptera and Anisoptera. The study revealed more number of damselfly population (40) than the dragonfly (28). Vegetative growth of rice crop support more number of Odonates (17 damselfly and 10 dragonfly) followed by reproductive (15 damselfly and 10 dragonfly) and ripening stage (8 damselfly and 8 dragonfly). The most dominant damselfly and dragonfly species were *Ceragrion coromandelianum* and *Diplacodes trivialis* with 11 and 10 individuals respectively. Diversity of damselfly (1.73) was greater than dragonfly (1.42) same as in case of richness and evenness index in vegetative stage. But

dragonfly diversity (1.75) was more than damselfly (1.55) as in richness and evenness index particularly when the crop was at reproductive stage. The ripening stage of rice crop support more or less similar diversity of damselfly (1.32) and dragonfly (1.30) with richness and evenness index (1.44, 1.92 & 0.95, 0.81) respectively." (Authors)] Address: Saikia, Rituraj, Ph. D Scholar Department of Entomology, College of Agriculture, Assam Agricultural University, Jorhat, Assam, India

16224. Salami, E.; Ganesan, P.B.; Ward, T.A.; Viyapuri, R.; Romli, F.I. (2016): Design and mechanical analysis of a 3D-printed biodegradable biomimetic micro air vehicle wing. IOP Conference Series: Materials Science and Engineering 152(1): 7 pp. (in English) ["The biomimetic micro air vehicles (BMAV) are unmanned, micro-scaled aircraft that are bio-inspired from flying organisms to achieve the lift and thrust by flapping their wings. There are still many technological challenges involved with designing the BMAV. One of these is designing the ultra-lightweight materials and structures for the wings that have enough mechanical strength to withstand continuous flapping at high frequencies. Insects achieve this by having chitin-based, wing frame structures that encompass a thin, film membrane. The main objectives of this study are to design a biodegradable BMAV wing (inspired from the dragonfly) and analyze its mechanical properties. The dragonfly-like wing frame structure was bio-mimicked and fabricated using a 3D printer. A chitosan nanocomposite film membrane was applied to the BMAV wing frames through casting method. Its mechanical performance was analyzed using universal testing machine (UTM). This analysis indicates that the tensile strength and Young's modulus of the wing with a membrane is nearly double that of the wing without a membrane, which allow higher wing beat frequencies and deflections that in turn enable a greater lifting performance." (Authors)] Address: Salami, E., Dept of Mechanical Engineering, Faculty of Engineering, Univ. of Malaya, Kuala Lumpur, Malaysia. E-mail: erfansalami@hotmail.com

16225. Samways, M.; Simaika, J. (2016): Manual of freshwater assessment for South Africa: Dragonfly Biotic Index. *Suricata* 2: 224 pp. (in English) ["Overall, freshwater ecosystems are the most threatened ecosystem type in the world. The scarce South African freshwaters are threatened by alien organisms, high volumes of water abstraction, and pollution. Yet some South African freshwaters are being restored to their former condition. It is important to monitor these systems and note whether they are declining or improving. One way to do this is to use the Dragonfly Biotic Index, which is based on dragonfly biogeography, their sensitivity to change, and the degree to which they are threatened. This index is sensitive and robust and is suitable for assessing and monitoring freshwaters across the country. This manual explains how to use and apply the Dragonfly Biotic Index, while also providing guidelines for species identification. Published by the National Botanical Institute (NBI)." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

16226. Sanmartín-Villar, I.; Zhang, H.; Cordero-Rivera, A. (2016): Colour polymorphism and ontogenetic colour changes

in *Ischnura rufostigma* (Odonata: Coenagrionidae). *Odonatologica* 45(1/2): 77-86. (in English) ["We describe female colour morphs and ontogenetic colour changes of *I. rufostigma* in three populations from China. Females showed two colour morphs, one androchrome, identical to males, and one gynochrome, with orange coloration when immature and green to brown thorax when mature. Population frequencies show that gynochrome females are the most common morph (71-97 %). In addition, we found high variability in the extent of the blue coloration on the tip of the abdomen of males and androchrome females. We discuss the possible causes of this colour variation and propose that previously described intraspecific forms of *I. rufostigma annandalei*, solely based on the variation of this blue coloration, have no taxonomic relevance." (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

16227. Satpathi, C.R.; Mondal, A. (2016): Holistic survey on damselfly (Anisoptera [sic]: Odonata) diversity in rice ecosystem of eastern India. *International Research Journal of Natural Sciences* 4(4): 19-34. (in English) ["This study highlights the richness of damselfly (Anisoptera: Odonata) [sic] fauna associated with rice ecosystems in Eastern India. Sampling of the Damselfly community was conducted during 2010-14 to determine species composition, abundance and distribution in 3 different habitats of rice fields which were selected at 60 m (Chakdaha), 600 m (Cooch Behar) and 1250 m (Kalimpong) respectively. Each location was surveyed at a biweekly interval after transplanting of rice plants and about 10 species of damselfly were recorded as insect predators in rice crops of Eastern India. General morphology, biology, ecology, behavior of the damselfly are being highlighted in the present investigation. After comparing different body parts, double branching keys are prepared for their easy identification. The studies of their diversity showed that maximum and minimum value of both Simpson and Shannon-Weiner index were at the flowering and the vegetative stage of crop respectively. The value of Margalef index and Menhinck index also indicated that the highest value in reproductive stage of rice crop. The studies on Evenness index designated that the value of E1, E2 and E3 were influenced by species richness and not evenness. Consequently the influence of fertilizer on the incidence of damselfly in rice ecosystem showed that there was a remarkable increase of population where high doses of nitrogen (120 kg/ha) were applied followed by the use of mix fertilizer (120:60:60 N:P:K). Although the plot receiving high doses of phosphate @ 60 kg/ha exhibited increase in the level of damselfly population but the distribution was least in the field where potassium fertilizer was used in both kharif (rainy) and rabi (winter) season during 2010 to 2014. The sampling of damselfly population on weed, ratoon rice, rice fallow land exhibited that the bund weed provided resting site for damselfly. The colonization and succession of Damselfly species in the rice field habitat showed a uniform pattern in relation to the growth stage of rice crop. At the end of study, the relevance of Damselfly biosystematics in the context on bio diversities has been given in its legitimate status as bio control agent of rice insect

pests in Eastern India." (Authors) [Address: Satpathi, C.R., Dept of Agricultural Entomology Bidhan Chandra Krishi Viswa-vidyalaya (State agricultural University), P.O- Mohanpur, Dist. – Nadia, West Bengal -741252, India

16228. Schad, A.N.; Kennedy, J.H.; Dick, G.O. (2016): Secondary production and seasonal development of the damselfly *Enallagma civile* Hagen, 1861 (Odonata: Coenagrionidae) in a newly constructed urban wetland floodway ecosystem. *Aquatic Insects* 37(2): 159-173. (in English) ["Secondary production and seasonal development of *E. civile* were determined as part of an epiphytic macroinvertebrate study in the Dallas Floodway Extension Trinity River Project Lower Chain of Wetlands, Dallas, TX, USA. These wetlands were constructed to mitigate flooding of the Trinity River, but also provided quality wildlife habitat and removal of wastewater effluent contaminants. Variations in life history were observed between two macrophytes and three different wetlands of varying age, effluent source, and vegetation establishment. Mean annual production of *E. civile* was 1393 mg/m²/year, standing stock biomass was 1376 mg/m²/year, cohort production/biomass (P/B) ratio was 4.30/year, and annual P/B was 10.18/year. These values are in the upper range of known Odonata production values from a lentic system. *E. civile* biomass growth rates were observed to be higher from populations on the better established macrophyte (*Potamogeton nodosus* Poir., 1816) and in the longest established wetland." (Authors)] Address: Schad, A.N., Institute of Applied Science, University of North Texas, Denton, TX, USA

16229. Schiel, F.-J. (2016): Paarungsversuch eines Männchens von *Ischnura pumilio* mit einem Männchen von *Erythromma viridulum* (Odonata: Coenagrionidae). *Mercuriale* 16: 53-55. (in German, with English summary) ["Intergeneric tandem between a male *Ischnura pumilio* and a male *Erythromma viridulum* (Odonata: Coenagrionidae). – On 15-viii-2016, at ca. 14:00 h CEST, I observed a male *I. pumilio*, which tried to copulate with a male of *E. viridulum*. The tandem was observed at a small temporary pond in the Upper Rhine valley close to the City of Baden-Baden, Germany (48°47'12"N, 8°10'54"E, 122 m ü. NHN). The circumstances of the finding are described and shortly discussed." (Author)] Address: Schiel, F.-J., Turenneweg 9, D-77880 Sasbach, Germany. E-mail: franz-josef.schiel@inula.de

16230. Schiel, J.-J.; Buchwald, R. (2016): How to survive the brief water-coverage of vernal ponds? Early hatching date and rapid larval development in *Aeshna affinis* (Odonata: Aeshnidae). *Odonatologica* 45(3/4): 155-177. (in English) ["The objective of our study was to identify mechanisms enabling typical inhabitants of vernal ponds in temperate climate zones to complete their larval development under the time-constrained conditions of temporary larval habitats. We compared both hatching phenology and larval development of *A. affinis* with those of its permanent water congener *A. mixta* under semi-natural conditions and with literature data on other European Aeshnidae. We identified the following traits enabling rapid univoltine development in vernal ponds: i) Seasonally early hatching: *A. affinis* hatched significantly – on average

22 days – earlier than *A. mixta*. ii) Relatively small size difference between the second and the final larval stadium: Second-stadium larvae of *A. affinis* were significantly larger than those of all other European Aeshnidae, but the exuviae are among the smallest of this family in Europe. Therefore, larval growth coefficient and the number of larval stadia are smaller than in any other European Aeshnidae. iii) A low degree-day sum during larval development, being significantly lower than that of *A. mixta*. Although median larval development time of the vernal pond species *A. affinis* was longer than that of *A. mixta*, the first emerged significantly – on average 18 days – earlier than the latter." (Authors)] Address: Schiel, F.-J., INULA, Turenneweg 9, 77880 Sasbach, Germany. E-mail: franz-josef.schiel@inula.de

16231. Schneider, B.; Wildermuth, H. (2016): Pferdeegel *Haemopsis sanguisuga* versucht Kleine Moosjungfer *Leucorrhinia dubia* zu verschlingen (Odonata: Libellulidae; Hirudinea: Haemopidae). *Mercuriale* 16: 5-7. (in German, with English summary) ["Horse-leech *Haemopsis sanguisuga* tries to devour *L. dubia* - An adult *H. sanguisuga* was observed and photographically documented trying to devour a male *L. dubia* of a crashed tandem at a small lake in the Swiss Alps." (Authors)] Address: Schneider, B., Wolfbühlstrasse 34A, 8408 Winterthur beatsch-@bhemail.ch

16232. Schneider, T.; Ikemeyer, D. (2016): Notes on Odonata species in South-West Iran including *Platycnemis kervillei* (Martin, 1909) as a new species for Iran. *Entomologische Zeitschrift* 126(1): 3-8. (in English, with German summary) ["Between 4th and 13th of June 2015, Odonata were inventorized in the southwestern Iranian provinces of Fārs, Kohygilugehva-Boyer Ahmad, Khuzestān, Illām, Kermānshāh, Lorestān, Esfahān, Chahārmahal-va-Bakhtiyāri. Thirty eight taxa were found. *P. kervillei* is new for Iran. Nearly one half (18) of the records are new for Iranian provinces (*Eythromma viridulum orientale*, *E. lindenii zemyi*, *Enallagma cyathigerum risi*, *Coenagrion persicum*, *C. vanbrinkae*, *Anax immaculifrons*, *Callaeschna microstigma*, *Paragomphus lineatus*, *Onychogomphus lefebvrei*, *O. flexuosus*, *Cordulegaster insignis nobilis*, *Diplacodes lefebvrei*, *Libellula depressa*, *Orthetrum cancellatum*, *Sympetrum sanguineum*, *Trithemis festiva*). About some species, like *E. lindenii zemyi*, *C. persicum*, *C. vanbrinkae*, *O. flexuosus*, restricted information was available for Iran. Records of *E. lindenii zemyi*, *C. persicum* and *O. flexuosus* from Iran date from more than 70 years ago.] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-Mail: DKJIkemeyer@t-online.de

16233. Schneider, T.; Ikemeyer, D. (2016): Records of dragon and damselflies from Khorāsān-e-Razavi and Khorāzān-e-Shomāli in Northeast-Iran (Odonata). *Entomologische Zeitschrift* 126(4): 211-216. (in english, with German summary) ["During a field trip in 2016 (8.–18. June) to Khorāzān-e-Shomāli and Khorāsān-e-Razavi a total of 33 Odonata species could be recorded. The region near the border to Turkmenistan and Afghanistan has a dry climate and sweet water habitats are sparse. Until now there exists no survey on this interesting region, being a transit zone of Eurosiberian to Irano-Turanian

faunal elements. About 70 % of the recorded Odonata taxa are new for one or both provinces. *Coenagrion scitulum* and *Cordulegaster coronata* were not reported from Iran since over a century. *Ischnura forcipata* one of the most frequent Zygoptera during our trip is new for both provinces. This species expands his distribution from NE-Iran to Sistān-va-Baluchestān in SE-Iran which represents its western distribution limit. *Orthetrum ransonnetii* known from SE-Iran, which was also recorded for the first time from this region, seems to reach its northeastern distribution limit in this region." (Authors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-Mail: DKJkemyer@t-online.de

16234. Seehausen, M. (2016): Eine kleine Libellensammlung vom Edersee (Odonata). *Libellen in Hessen* 9: 51-54. (in German) [Hessen, Germany. Records of *Lestes sponsa*, *L. virens*, *L. barbarus*, *Sympetrum sanguineum* and *S. flaveolum* are documented.] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16235. Seehausen, M.; Constant, J.; Smets, K. (2016): On a collection of Odonata from Cambodia, with the first record of *Sinictinogomphus clavatus* and a description of the female of *Zyomma breviventre*. *Notulae odonatologicae* 8(7): 222-230. (in English) ["71 specimens of 22 Odonata species from northwestern Cambodia stored at the Royal Belgian Institute of Natural Sciences were examined and catalogued. The specimens were collected between 24-v-2003 and 31-v-2003. *S. clavatus* is recorded in Cambodia for the first time, bringing the national checklist to 161 species. Several specimens of *Z. breviventre* (Martin, 1921), recorded for the third time ever, were collected using mercury vapour light traps. Females of this species are recorded for the first time and both sexes are illustrated. Information on the species' habitat is provided and the genus *Zyommoides* Martin, 1921 is briefly discussed. The following species were also collected at light traps: *Diplacodes trivialis*, *Neurothemis fluctuans*, *N. intermedia atalanta*, *Pantala flavescens*, *Potamarcha congener*, and *Zyomma petiolatum*." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16236. Seehausen, M.; Fiebig, J. (2016): A collection of Odonata from North Korea, with first record of *Ischnura elegans* (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(7): 203-211. (in English) ["A collection of 658 Odonata adults, exuviae, and larvae from North Korea comprising 43 species is presented. *Ischnura elegans* is a new record for North Korea." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16237. Seehausen, M.; Schröter, A.; Mumladze, L.; Grebe, B. (2016): Additional Odonata records from Georgia, southern Caucasus ecoregion, with the first record of *Ischnura*

fountaineae (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(8): 266-283. (in English) ["Records of 57 odonate species group taxa obtained at 76 sampling sites during several field surveys between 2012 and 2016 are presented, corresponding to more than three quarters of the Georgian odonate fauna. *Ischnura fountaineae* is a new addition to the country's list. *Sympetrum arenicolor* was recorded for the second time and *Aeshna serrata* was found at two further lakes on the Javakheti volcanic plateau. For other species, such as *Cordulia aenea* and *Leucorrhinia pectoralis* only very limited and mainly old data was available. In addition, new records for *Coenagrion ponticum*, an endemic of the Caucasus region, as well as for *C. pulchellum* and *C. scitulum*, both rare in the Caucasus region, are given. Further information on the globally threatened gomphids *Onychogomphus assimilis* and *O. flexuosus* are presented, including the first exuviae records of the latter in Georgia. New findings of the nominate taxon of *Sympetrum vulgatum* provided indications on regional distribution pattern and spatial delimitation from ssp. *decoloratum*. Further records of *Pantala flavescens* suggested rather regular occurrence in Georgia, being an integral part of the Georgian dragonfly fauna. The existence of small isolated pockets of *Calopteryx splendens* ssp. *tschaldirica* inside the core area of ssp. *intermedia* in Georgia was confirmed as well as several individuals of ssp. *tschaldirica* from the Georgian stronghold of the taxon in the Javakheti volcanic plateau showing entirely hyaline wings, phenotypically resembling ssp. *waterstoni*. Against the background of general taxonomic difficulties with the *Calopteryx splendens* taxa complex, both phenomena are discussed." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16238. Seehausen, M.; Günther, A. (2016): Records of *Neurothemis nesaea* from Sulawesi, with taxonomic annotations on the *N. intermedia*-group (Odonata: Libellulidae). *Odonatologica* 45(3/4): 271-290. ["Several specimens of *N. nesaea* from Central and South Sulawesi were examined. This species hitherto was only known from the original description. Figures of both sexes, annotations concerning the habitat and the type specimens are given (two syntypes deposited at SMF and one at ZMH). For comparison, figures of the wings of *N. intermedia intermedia* (holotype is deposited at RBINS), *N. intermedia atalanta* (two syntypes are deposited at NMS) and *N. intermedia excelsa* are provided, as well as figures of *N. degener* (three syntypes are deposited at RBINS). *N. degener* is not associated with *N. intermedia* but considered to represent a full species. *N. septentrionis* (holotype is deposited at UMMZ) is synonymized with the nominate subspecies of *N. intermedia*." (Authors)] Address: Seehausen, M., Mus. Wiesbaden, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16239. Severina, I. Yu.; Isavnina, L.; Knyazev, A.N. (2016): Topographic anatomy of ascending and descending neurons of the supraesophageal, meso- and metathoracic ganglia in paleo- and neopterous insects. *Journal of Evolutionary Biochemistry and Physiology* 52(5): 397-406. (in English)

["Topographic anatomy of ascending (AN) and descending (DN) neurons of the supraesophageal and thoracic ganglia in the nervous system of winged insects (Pterygota), representatives of the infraclasses Palaeoptera (Odonata, *Aeshna grandis*) and Neoptera (Blattoptera, *Periplaneta americana*), was studied. These insects differ in ecological niches, lifestyles, sets of behavioral complexes, levels of locomotor system development, evolutionary age and systematic position. Cell bodies and processes of ANs and DNs were stained with nickel chloride (NiCl₂), and their topography was studied on total preparations of the supraesophageal and thoracic ganglia. Unlike cockroaches, the dragonfly protocerebrum was found to contain DNs sending their processes to ocelli. Dragonfly DN processes exhibit a specific branching pattern in thoracic ganglia, with collaterals coming off both ipsi- and contralaterally. In cockroaches, collaterals of DN processes come off ipsilaterally. The AN cell bodies in dragonfly meso- and metathoracic ganglia lie both ipsi- and contralaterally relative to the ascending process, whereas in cockroaches most of the AN cell bodies in the same ganglia are located contralaterally. Substantial differences in the distribution of DNs and ANs in insects with different manners of locomotion appear to reflect different degrees of control the supraesophageal ganglion exerts over the activity of segmental centers. This does not seem to be related to the evolutionary age of insects or their systematic position. Probably, different degrees of control over locomotion depend on the way of food acquisition: catching prey in the air in "paleopterous" dragonflies versus maneuverable walking or running over a solid substrate in "neopterous" cockroaches." (Authors)] Address: Isavnina, I.L., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: isavnina@iephb.ru

16240. Shapiro, B.G. (2016): Physiology and structure of motion sensitive neurons in the dragonfly visual system. The FASEB Journal 30(1) Supplement 760.2 : (in English) [Verbatim: Aeshnid dragonflies are among the largest North American insects and also among the fastest and most accurate predators. During prey pursuit, they quickly respond to deviations in their flying-prey trajectory and alter their flight paths to intercept their quarry. Remarkably, a deviation in the prey's path results in a dragonfly turn in only 30 ms, much faster than the visual latencies in most animals. Visual neurons, called target-selective descending neurons (TSDNs) are hypothesized to mediate the dragonfly's fast response to flying prey. Once stimulated, these neurons send signals down the nerve cord to the wing-motor circuitry controlling flight, allowing for a flight path correction. In laboratory experiments with restrained dragonflies, TSDN activity is relatively weaker and slower than expected from the behaviour. We are testing the idea that this neural "lethargy" is due to the lack of neuromodulators such as octopamine in the restrained dragonfly's brain. We are investigating this hypothesis by comparing TSDN visual responses before and after injection of the octopamine mimic, chlordimeform. Our results show dramatic increases in TSDN spike activity after chlordimeform injection, suggesting that TSDN activity is augmented in the behaving animal by the neuromodulator, octopamine. Further, utilizing intracellular recording techniques, we aim to identify

the individual neurons which mediate responses to specific types of stimuli, such as approaching objects. Once a cell is identified, we will inject a dye through the recording microelectrode, which will travel within the cell in question up into the brain. This will allow us to obtain a structural representation of the neuron, which can then be linked back to its specific function in the visual processing cascade.] Address: Shapiro, B.G., Biology, Union College, Schenectady, NY, USA

16241. Sharkey, C.R.; Partridge, J.C.; Roberts, N.W. (2016): Polarization sensitivity as a visual contrast enhancer in the Emperor dragonfly larva, *Anax imperator* (Leach, 1815). J. Exp. Biol. 218(Pt 21): 3399-3405. ["Summary Statement: Behavioural evidence that polarization sensitivity in the larva of *A. imperator*, reduces the contrast-degrading effect of scattered light under naturalistic horizontally polarized underwater lighting conditions. Polarization sensitivity (PS) is a common feature of invertebrate visual systems. In insects, PS is well known for its use in several different visually guided behaviours, particularly navigation and habitat search. Adult dragonflies use the polarization of light to find water but a role for PS in aquatic dragonfly larvae, a stage that inhabits a very different photic environment to the adults, has not been investigated. The optomotor response of the larvae of *A. imperator*, was used to determine whether these larvae use PS to enhance visual contrast underwater. Two different light scattering conditions were used to surround the larval animals: a naturalistic horizontally polarized light field and nonnaturalistic weakly polarized light field. In both cases these scattering light fields obscured moving intensity stimuli that provoke an optokinetic response in the larvae. Animals were shown to track the movement of a square-wave grating more closely when it was viewed through the horizontally polarized light field, equivalent to a similar increase in tracking ability observed in response to an 8% increase in the intensity contrast of the stimuli. Our results suggest that larval PS enhances the intensity contrast of a visual scene under partially polarized lighting conditions that occur naturally in freshwater environments." (Authors)] Address: Sharkey, Camilla, School of Biological Sciences, Bristol Life Sciences Building, Tyndall Avenue, University of Bristol, Bristol, BS8 1TQ, UK. E-mail: camilla.sharkey@bristol.ac.uk

16242. Sharma, D.; Brahma, S.; Saha, N.; Kundu, M.; Saha, G.K.; Aditya, G. (2016): Association of larval Odonata and hydrophytes in wetlands of West Bengal, India: implications for conservation and monitoring. Journal of Entomology and Zoology Studies 4(3): 35-39. (in English) ["The abundance and distribution of the larval odonates depend on the hydrophytes, which was tested in the present study. A total of 19 genera of Odonata were observed in different relative abundance against the hydrophytes. Among the genera, *Ceriatrigon* and *Pantala* respectively, remained dominant over others with significant variations in relative abundance in the samples. Hydrophytes like *Wolffia* and *Marsilea* were key factors in explaining the relative abundance of larval odonates as explained through the canonical correspondence analysis. The species specific abundance seemed highly dependent on the hydrophytes in the concerned water bodies. In order to enhance the

sustenance of the Odonata in wetland habitats, availability of different species of hydrophytes seems to be an essential criterion. Considering the multifunctional role of the larval odonates in the freshwater aquatic communities, conservation effort should include the systematic inclusion of the preferred hydrophytes in the wetlands." (Authors)] Address: Sharma, D., Department of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata 700019, India

16243. Shukla, A.; Rai, S.; Ahirwar, B.K. (2016): Diversity assessment and expansion of Odonata in Narmada basin of Jabalpur region (M.P). *International Journal of Development Research* 6(5): 7786-7791. (in English) ["An opportunistic survey of Odonata diversity and distribution was done in along with river Narmada region of district Jabalpur to give updated list of species within the study. Odonata play crucial role in ecosystem functioning and can be used as biological indicators as well as potential bio-control agent of environmental quality whereas biodiversity protection and conservation is a national and international agenda and responsible for sustainable development of a region or a country. A total of 38 species are recorded belonging to Zygoptera with 16 species and Anisoptera with 22 species. In order Odonata, Libellulidae with 17 species is the most dominating families among dragonflies and Coenagrionoidae with 13 species among damselflies while others have fewer representatives. Bargi dam shows the highest Regional diversity of Odonata in Jabalpur. The present study encourages the conservation of a wide range of dragonfly species in this area." (Authors)] Address: Shukla, A., Research Scholar, Department of Zoology, Govt. Model Science College, Jabalpur (M.P.) India, 482001

16244. Shukla, A.; Rai, S.; Ahirwar, B.K.2 (2016): Pollution assessment using bioindicator (Odonata and Mollusca) in Narmada basin at Jabalpur: A developing smart city. *International Journal of Advances in Scientific Research* 2(4): 89-93. (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. Odonata and Mollusca are biological indicators so without using chemicals we aimed to know the pollution intensity of river Narmada basin. Benthos assemblage from Narmada basin in Jabalpur has been investigated. A total of 37 species of Odonata and 13 species of Mollusca were sampled. Keywords: smart city, benthic macroinvertebrates, diversity, Jabalpur." (Authors)] Address: Shukla, A., Dept Zoology Govt. Model Science College, Jabalpur (M.P.) India 482001. E-mail: arjunshukla37@gmail.com

16245. Simaika, J.P.; Samways, M.J.; Frenzel, P.P. (2016): Artificial ponds increase local dragonfly diversity in a global biodiversity hotspot. *Biodiversity and Conservation* 25(10): 1921-1935. (in English) ["Human demands have led to an increased number of artificial ponds for irrigation of crops year-round. Certain insect species have established in these ponds, including dragonflies (Insecta: Odonata). There has been discussion around the value of artificial ponds for encouraging dragonfly diversity, with little work in biodiversity hotspots

rich in rare and endemic species. We focus here on the Cape Floristic Region (CFR) global biodiversity hotspot, which has many endemic dragonfly species but has few natural ponds. Yet it has many artificial ponds mostly used for irrigation on local farms. This leads to an interesting question: to what extent do these artificial ponds provide habitats for dragonflies in this biologically rich, agriculturally fragmented landscape? To answer this, we recorded dragonfly species richness and abundances from 17 artificial ponds and 13 natural stream deposition pools as reference, in an area of the CFR where there are no local, natural, perennial ponds. 13 environmental and physical variables were recorded at the ponds and pools. We found that although ponds attracted no rare or threatened dragonfly species, they increased the area of occupancy and population sizes of many generalist species. These came from nearby natural deposition pools or from unknown sources elsewhere in the region, so providing refuges which otherwise would not be there. Interestingly, some CFR endemic species were also recorded at our artificial ponds. Overall dragonfly assemblages and those of Anisoptera Zygoptera differed between artificial ponds and deposition pools, suggesting that artificial ponds are to some extent a novel ecosystem. Habitat type, elevation and temperature were significant drivers in structuring overall species assemblages. For the Anisoptera, riparian vegetation and level of landscape connectivity was important, while temperature was not. In contrast, Zygoptera species were most affected by river catchment, habitat type and temperature. In sum, these artificial ponds are stepping stone habitats across an increasingly fragmented landscape. Managing these ponds with perennial water, constant water levels, and maximum complexity and heterogeneity of habitats in terms of vegetation will conserve a wide range of generalists and some specialists." (Authors)] Address: Simaika, J.P., Dept of Soil Science, Faculty of AgriSciences, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa. E-mail: simaikaj@sun.ac.za

16246. Smith, W.A.; Tennessen, K. (2016): Description of the nymph of *Ophiogomphus smithi* (Odonata: Gomphidae), with a key to the species of *Ophiogomphus* in the Western Great Lakes Region. *The Great Lake Entomologist* 49(1-2): 78-96. (in English) ["*O. smithi* is a gomphid dragonfly with restricted distribution which includes northeast Iowa, southeast Minnesota, and central to northwestern Wisconsin. The nymph is described and illustrated based on 173 specimens (66 exuviae of reared specimens plus 107 nymphs) from throughout the species' range. The nymph of *O. smithi* is very similar to nymphs of *O. carolus* Needham, *O. colubrinus* Selys, and *O. rupinsulensis* (Walsh). Nearly all (99%) of *O. smithi* sampled can be distinguished from *O. colubrinus* by prementum terminal width less than or equal to 2.97 mm (98% of *O. colubrinus* greater than 2.97 mm), and from *O. carolus* and *O. rupinsulensis* by the ratio of metatibia length to abdominal segment 10 width being greater than 1.66 (96% of *O. smithi*) vs. less than 1.66 (98.5% of *O. carolus* and *O. rupinsulensis*). Several characters and character combinations previously unused for *Ophiogomphus* nymphs were found to be of taxonomic value, including color pattern on dorsal hooks and dorsum of abdomen, shape of abdominal mid-dorsal punctae,

length and shape of fronto-clypeal ridge setae, and ratio of metatibia length to width of abdomen on segments 9 and 10. An illustrated quantitative key to the 7 species of *Ophiogomphus* occurring in the western Great Lakes region is provided, along with a separate, more qualitative key enabling species identification in the field. *Ophiogomphus smithi* is regularly syntopic only with *O. rupinsulensis*, rarely with *O. carolus* and *O. colubrinus* and not with *O. anomalus*, *O. howei*, or *O. susbehcha*; nymphs inhabit small to medium-sized, sandy, cool to warm stream segments with patches of pea-sized gravel." (Authors)] Address: Smith, W.A., 2043 Overlook Pass, Apt. 4, Middleton, WI 53562, USA. E-mail: smithroo.smith@gmail.com

16247. Soboleva, V.A.; Golub, V.B.. (2016): Zoogeographic analysis of the dragonflies fauna (Odonata) of Middle-Russian forest-steppe. Scientific statements, Science Series 34: 48-60. (in Russian, with English summary) ["The paper carries a most comprehensive list to date of the 62 dragonflies species of 8 families of the middle-russian forest-steppe fauna based on original and literature data. The overwhelming zoogeographical bulk of the investigated dragonflies fauna is formed by species having western palearctic ranges which are limited to one or two latitudinal belts (26 species, 44.8% of the total fauna). The second zoogeographical complex of the number of dragonflies species is formed by holarctic as well as intrazonal and boreo-mountain transpalearctic species (20 species, 34.5%). Most of them are very widely distributed in the latitudinal direction as well. A group of the species developing in slack water and weakly stream water reservoirs is a strongly dominant ecological complex. The group of rheophilous species includes *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Stylurus flavipes* and *Orthetrum brunneum*." (Authors)] Address: Voronezh State University, 1, Universitetskaya Sq, Voronezh, 394006, Russia. E-mail: strekoza_vrn@bk.ru

16248. Soga, M.; Gaston, K.J.; Yamaura, Y.; Kurisu, K.; Hanaki, K. (2016): Both direct and vicarious experiences of nature affect children's willingness to conserve biodiversity. *Int. J. Environ. Res. Public Health* 13, 529; doi:10.3390/ijerph-13060529: 12 pp. (in English) ["Children are becoming less likely to have direct contact with nature. This ongoing loss of human interactions with nature, the extinction of experience, is viewed as one of the most fundamental obstacles to addressing global environmental challenges. However, the consequences for biodiversity conservation have been examined very little. Here, we conducted a questionnaire survey of elementary schoolchildren and investigated effects of the frequency of direct (participating in nature-based activities) and vicarious experiences of nature (reading books or watching TV programs about nature and talking about nature with parents or friends) on their affective attitudes (individuals' emotional feelings) toward and willingness to conserve biodiversity. A total of 397 children participated in the surveys in Tokyo. Children's affective attitudes and willingness to conserve biodiversity were positively associated with the frequency of both direct and vicarious experiences of nature. Path analysis showed that effects of direct and vicarious experiences on children's willingness to conserve biodiversity were mediated by

their affective attitudes. This study demonstrates that children who frequently experience nature are likely to develop greater emotional affinity to and support for protecting biodiversity. We suggest that children should be encouraged to experience nature and be provided with various types of these experiences." (Authors)] Address: Soga, M., Dept Urban Engineering, School of Engineering, Univ. Tokyo, 7-3-1, Hongo, Bunkyo, Tokyo 113-8656, Japan. E-mail: soga@env.t.u-tokyo.ac.jp

16249. Solis, M.; Mugni, H.; Hunt, L.; Marrochi, N.; Fanelli, S.; Bonetto, C. (2016): Land use effect on invertebrate assemblages in Pampasic streams (Buenos Aires, Argentina). *Environmental Monitoring and Assessment* 188: 539. (in English) ["Agriculture and livestock may contribute to water quality degradation in adjacent waterbodies and produce changes in the resident invertebrate composition. The objective of the present study was to assess land use effects on the stream invertebrate assemblages in rural areas of the Argentine Pampa. The four sampling events were performed at six sites in four streams of the Pampa plain; two streams were sampled inside a biosphere reserve, and another one was surrounded by extensive livestock fields. The fourth stream was sampled at three sites; the upstream site was adjacent to agricultural plots, the following site was adjacent to an intensive livestock plot and the downstream site was adjacent to extensive breeding cattle plots. Higher pesticide concentrations were found at the site adjacent to agricultural plots and higher nutrient concentrations at the sites adjacent to agricultural and intensive breeding cattle plots. The invertebrate fauna were also different at these sites. Multivariate analysis showed a relationship between nutrient concentrations and taxonomic composition. Amphipoda (*Hyalella curvispina*) was the dominant group in the reserve and extensive breeding cattle sites, but was not present in the agricultural site. Also, Chironomidae were absent from the agricultural site while present at other sites. Gasteropoda (*Biomphalaria peregriana*), Zygoptera, and Hirudinea were dominant at the most impacted agricultural and intensive breeding cattle sites." (Authors)] Address: hernanmugni@gmail.com

16250. Sousa, E.; Quintino, V.; Palhas, J.; Rodrigues, A.M.; Teixeira, J. (2016): Can environmental education actions change public attitudes? An example using the pond habitat and associated biodiversity. *PLoS ONE* 11(5): e0154440. doi:10.1371/journal.pone.0154440: 13 pp. (in English) ["Ponds provide vital ecological services. They are biodiversity hotspots and important breeding sites for rare and endangered species, including amphibians and dragonflies. Nevertheless, their number is decreasing due to habitat degradation caused by human activities. The "Ponds with Life" environmental education project was developed to raise public awareness and engagement in the study of ponds by promoting the direct contact between the public and nature, researchers and pedagogical hands-on exploration activities. A pre-post- project survey was set-up to assess the effects of the project on the environmental consciousness, knowledge and attitude changes towards ponds and the associated biodiversity of school students aged 15 to 18. The survey questions were based on Likert scales and their pre-post project comparisons used

an innovative multivariate hypothesis testing approach. The results showed that the project improved the students' knowledge and attitudes towards ponds and associated biodiversity, especially the amphibians. Ponds can be found or constructed in urban areas and despite small sized, they proved to be interesting model habitats and living laboratories to foster environmental education, by encompassing a high number of species and a fast ecological succession." (Authors)] Address: Sousa, E., CIIMAR—Interdisciplinary Center of Marine and Environmental Research, Porto, Portugal, CIBIO/InBIO—Research Center in Biodiversity and Genetic Resources, Associated Laboratory, Porto, Portugal, Dept of Biology & CESAM—Research Center Environmental & Marine Research, Univ. of Aveiro, Aveiro, Portugal. E-mail: esousa@ciimar.up.pt

16251. Stanford-Camargo, S.-G.; Medina-Ortiz, G.R.; Ibarra-González, M.P.; Cruz-Miranda, S.G. (2016): Study of the odonates in the Sierra de Guadalupe, State of Mexico with some observations about their behavior. *Entomología mexicana* 3: 589-595. (in Spanish, with English summary) ["The study of the adult odonates was raised in an annual period from January to December of 2011 in three sites within the state park Sierra de Guadalupe in Ecatepec de Morelos, State of Mexico. A list of the species was realized and some observations about their behavior were annotated. 217 organisms were obtained and grouped in four families 10 genera and 12 species, in which *Sympetrum illotum* was the most abundant and *Anax amazili*, *Pseudoleon superbus*, *Archilestes grandis* and *Hesperagrion heterodoxum* were the less." (Authors)] Address: Stanford-Camargo, S.G., Facultad de Estudios Superiores Iztacala UNAM. Colección de Artrópodos de la FES Iztacala. Avenida de los Barrios No. 1, Los Reyes Iztacala, Tlalnepantla, Estado de México. C. P. 54090. E-mail: sstanford@campus.iztacala.unam.mx

16252. Stigge, H.A.; Bolek, M.G. (2016): Evaluating the biological and ecological factors influencing transmission of larval digenetic trematodes: A test of second intermediate host specificity of two North American *Halipegus* species. *Journal of Parasitology* 102(6): 613-621. (in English) ["Host specificity of parasites is a basic principle in parasitology; however, it is not easily measured. Previously, host specificity was calculated as the number of species that a parasite infected, but this is not an accurate description of host usage because some species are capable of being infected but do not contribute to the completion of the life cycle. Instead, measures of host specificity should take into consideration interactions between a parasite and a potential host species as well as interactions between current and subsequent hosts in the life cycle. The objectives of this study were to track the development of 2 trematode species, *Halipegus eccentricus* and *H. occidialis*, in 3 phylogenetically and ecologically distinct microcrustacean second intermediate hosts, and then, evaluate the extent to which each of these hosts contributed to transmission of each *Halipegus* species to the next odonate host in the life cycle. All 3 microcrustacean species exposed became infected with both species of *Halipegus*. The patterns of growth of *H. eccentricus* and *H. occidialis* were similar, but there were consistent differences

in the rates of growth among the microcrustacean species in both *Halipegus* species. Regardless of host species infected, all individuals of both species were considered to be developmentally infective to the next host in the life cycle by 19 days post exposure (DPE) when they lost their excretory bladder. Worms of varying sizes were capable of surviving without this structure suggesting that there is not a strong relationship between the rate of growth of the metacercariae and the development of their osmoregulatory system. Although *Halipegus* species were capable of living without an excretory bladder at 19 DPE, there were differences in their size and rates in which the 3 microcrustaceans contributed to transmission of the parasites to subsequent odonate hosts. Collectively, under controlled laboratory conditions, there was an approximately 2-fold difference in the average percent of worms that established in odonates from the ostracod, *Cypridopsis* sp., than from the harpacticoid copepod, *Phyllognathopus* sp., and the difference was nearly 3-fold between *Cypridopsis* sp. and the cyclopoid copepod, *Thermocyclops* sp. Therefore, despite all 3 microcrustacean species becoming infected, not all species were equally suited for transmission and completion of the life cycle. Differences among the 3 microcrustacean species in cercaria ingestion, metacercarial growth and development, and odonate predation rates on infected microcrustacean species were important factors in determining transmission of the 2 *Halipegus* species to odonate hosts." (Authors)] Address: Stigge, Heather, Dept of Integrative Biology, Oklahoma State University, Stillwater, Oklahoma 74078, USA. E-mail: heather.stigge@okstate.edu

16253. Suarez-Tovar, C.M.; Sarmiento, C.E. (2016): Beyond the wing planform: Morphological differentiation between migratory and non-migratory dragonfly species. *Journal of Evolutionary Biology* 29(4): 690-703. (in English) ["Migration is a significant trait of the animal kingdom that can impose a strong selective pressure on several structures to overcome the amount of energy that the organism invests in this particular behaviour. Wing linear dimensions and planform have been a traditional focus in the study of flying migratory species; however, other traits could also influence aerodynamic performance. We studied the differences in several flight-related traits of migratory and non-migratory Libellulid species in a phylogenetic context to assess their response to migratory behaviour. Wings were compared by linear measurements, shape, surface corrugations, and microtrichia number. Thorax size and pilosity were also compared. Migratory species have larger and smoother wings, a larger anal lobe that is reached through an expansion of the discoidal region, and longer and denser thoracic pilosity. These differences might favour gliding as an energy-saving displacement strategy. Most of the changes were identified in the hind wings. No differences were observed for the thorax linear dimensions, wetted aspect ratio, some wing corrugations, or the wing microtrichiae number. Similar changes in the hind wing are present in clades where migration evolved. Our results emphasize that adaptations to migration through flight may extend to characteristics beyond the wing planform and that some wing characteristics in libellulids converge in response to migratory habits whereas other closely related

structures remain virtually unchanged. Additionally, we concluded that despite a close functional association and similar selective pressures on a structure, significant differences in the magnitude of the response may be present in its components." (Authors)] Address: Suárez-Tovar, Catalina, Inst. de Ciencias Naturales, Universidad Nacional de Colombia, A.A, Bogotá, Colombia. E-mail: camsuarezto@unal.edu.co

16254. Sueyoshi, M.; Ishiyama, N.; Nakamura, F. (2016): β -diversity decline of aquatic insects at the microhabitat scale associated with agricultural land use. *Landscape and Ecological Engineering* 12: 187-196. (in Japan) ["Several studies report the decline of β diversity caused by agricultural impacts in river ecosystems. However, the susceptible scale of β diversity to agricultural impacts and the indirect effects on β diversity within hierarchically nested ecosystems are unclear. We first tested the hypothesis that β diversity between microhabitats is significantly influenced by agricultural land use. We also examined the indirect effects of agricultural land use on α and β diversities at the microhabitat scale. Twelve microhabitat samples (25 cm²) were collected at 27 reaches within Kitamihorobetsu River, Japan. All reaches were classified into three agricultural intensities based on pasture area (low, middle, and high), and their hierarchical diversities (microhabitat, reach, and catchment) were calculated using additive partitioning. Indirect effects were demonstrated by structural equation modelling using indirect and direct environmental gradients. The α and β diversities at the microhabitat scale decreased significantly with agricultural intensity. Increasing pasture cover within catchments showed a negative correlation with habitat heterogeneity and water quality (habitat homogenization and water degradation) and a positive correlation with sand cover on streambeds (sedimentation of fine particles). The α diversity decreased with sedimentation of fine particles, and the β diversity decreased with habitat homogenization and water degradation. Our findings suggest that species diversity of aquatic insects at the microhabitat scale would be susceptible to agricultural land use. Furthermore, we emphasize that the diversity index used to evaluate restoration projects should be carefully selected because influential abiotic factors were different between α and β diversities." (Authors)] Address: Sueyoshi, M., Graduate School of Agriculture, Hokkaido University, North 9, West 9, Sapporo 060-0859, Japan. E-mail: m-sueyoshi55@pwri.go.jp

16255. Sumanapala, A.; Podduwage, D.R. (2016): Notes on the natural history and distribution of *Elatoneura leucostigma* (Fraser, 1933), a montane endemic damselfly (Zygoptera: Platynemididae) in Sri Lanka. *NeBIO* 7(1): 13-16. (in English) ["*E. leucostigma* is one of the rarest damselflies in Sri Lanka. It is endemic to the montane zone of the country and is categorized as a Critically Endangered species at both national and global level. Apart from the limited knowledge on distribution and flight season, nothing is known of the natural history of this species. We present a summary of recent observations of the species confirming its presence in Horton Plains National Park and extending its distribution range to Peak Wilderness Sanctuary. Further, the present records extend its altitudinal range, flight season and provide the first

account on its natural history based on field observations." (Authors)] Address: Sumanapala, Amtila, Foundation for Nature Conservation & Preservation, 16, Sri Saddhananda Rd, Wekada, Panadura, Sri Lanka. E-mail: apsumanapala@gmail.com

16256. Sumanapala, A.P.; Jayawardana, N.C. (2016): Range extension off *Lyriothemis defonsekai* van der Poorten, 2009 (Anisoptera: Libellulidae), an endemic odonate from Sri Lanka. *Journal of Threatened Taxa* 8(13): 9589-9591. (in English) ["An immature σ and a mature φ *L. defonsekai* were observed at Yagfirala Forest Reserve (6.36236N & 80.17666E; elevation: 42m) on 01 August 2015 at about 10:30hr. A φ *L. defonsekai* was observed at the same locality at 09:00hr and 15:00hr on the following day (2 August 2015)." (Authors)] Address: Sumanapala, A.P., Foundation for Nature Conservation & Preservation, 16, Sri Saddhananda Road, Wekada, Panadura, Sri Lanka. E-mail: apsumanapala@gmail.com

16257. Sumanapala, A.P.; Jayasinghe, H.D. (2016): Range extension of *Heliogomphus lyratus* Fraser, 1933 (Anisoptera: Gomphidae) with notes on its identification, habits and habitat. *Journal of Threatened Taxa* 8(9): 9190-9194. (in English) ["*H. lyratus* is a Sri Lankan endemic dragonfly. It is one of the rarest Sri Lankan dragonflies with only three hitherto known localities. Apart from the faunistic records of the species, nothing much is known of its biology or ecology. We report five new distribution localities for *H. lyratus* with seven different observations. All these new localities extend the previously known range of the species. We also provide some notes on its field identification, habits and habitat based on our field observations." (Authors)] Address: Sumanapala, Amtila, Foundation for Nature Conservation & Preservation, 16, Sri Saddhananda Rd, Wekada, Panadura, Sri Lanka. E-mail: apsumanapala@gmail.com

16258. Swarrup, S.; Ganguli, R.; Madras, G. (2016): Nano-material based ionic polymer metal composite insect scale flapping wing actuators. *Mechanics of Advanced Materials and Structures* 23(11): 1300-1311. (in English) ["Small size actuators (8 mm \times 1 mm), IPMNC (RuO₂/Nafion) and IPMNC (LbL/CNC) are studied for flapping at the frequency of insects and compared to Platinum IPMC-Pt. Flapping wing actuators based on IPMNC (RuO₂/Nafion) are modeled with the size of three dragonfly species. To achieve maximum actuation performance with *Sympetrum* frequens scale actuator with optimized Young's modulus, the effect of variation of thickness of electrode and Nafion region of *S. frequens* scale actuator is studied. A trade-off in the electrode thickness and Young's modulus for dragonfly size IPMNC- RuO₂/Nafion actuator is essential to achieve the desirable flapping performance." (Authors)] Address: Ganguli, R., Department of Aerospace Engineering, Indian Institute of Science, Bangalore-560012, India. E-mail: ganguli@aero.iisc.ernet.in

16259. Takahashi, H.; Concordel, A.; Paik, J.; Shimoyama, I. (2016): The effect of the phase angle between the forewing and hindwing on the aerodynamic performance of a dragonfly-type ornithopter. *Aerospace* 2016, 3(1), 4; doi: 10.3390/aerospace3010004 : 15 pp. (in English) ["Dragonflies achieve

agile maneuverability by flapping four wings independently. Different phase angles between the flapping forewing and hindwing have been observed during various flight modes. The aerodynamic performance depends on phase angle control, as exemplified by an artificial flying ornithopter. Here, we present a dragonfly-like ornithopter whose phase angle was designed to vary according to the phase lag between the slider-cranks of the forewing and hindwing. Two microelectromechanical systems (MEMS) differential pressure sensors were attached to the center of both forewing and hindwing to evaluate the aerodynamic performance during flapping motions when the phase angle was changed. By varying the phase angle in both the tethered condition and free-flight, the performance of the forewing remained approximately constant, whereas that of the hindwing exhibited obvious variations; the maximum average value was two-fold higher than the minimum. The experimental results suggest that simple phase angle changes enable a flying ornithopter to control flight force balance without complex changes in the wing kinematics." (Authors)] Address: Takahashi, H., Dept of Mechano-Informatics, Graduate School of Information Science & Technology, Univ. Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8654, Japan

16260. Takahashi, Y.; Suyama, Y.; Matsuki, Y.; Funayama, R.; Nakayama, K.; Kawata, M. (2016): Lack of genetic variation prevents adaptation at the geographic range margin in a damselfly. *Molecular Ecology* 25(18): 4450-4460. (in English) ["What limits a species' distribution in the absence of physical barriers? Genetic load due to asymmetric gene flow and the absence of genetic variation due to lack of gene flow are hypothesized to constrain adaptation to novel environments in marginal populations, preventing range expansion. Here we examined the genetic structure and geographic variation in morphological traits in *I. asiatica* and *I. senegalensis* along a latitudinal gradient in Japan, which is the distribution center of *I. asiatica* and the northern limit of *I. senegalensis*. Genome-wide genetic analyses found a loss of genetic diversity at the edge of distribution in *I. senegalensis* but consistently high diversity in *I. asiatica*. Gene flow was asymmetric in a south-north direction in both species. Though body size and wing loading showed decreasing latitudinal clines (smaller in north) in *I. asiatica* in Japan, increasing latitudinal clines (larger in north) in these phenotypic markers were observed in *I. senegalensis*, particularly near the northern boundary, which coincided well with the location where genetic diversity began a sharp decline. In ectothermic animals, increasing latitudinal cline in these traits was suggested to be established when they failed to adapt to thermal gradient. Therefore, our findings support the possibility that a lack of genetic variation rather than gene flow swamping is responsible for the constraint of adaptation at the margin of geographic distribution." (Authors)] Address: Takahashi, Y., Frontier Research Inst. Interdisciplinary Sci., Tohoku Univ., Sendai, Miyagi, Japan. E-mail: takahashi.yum@gmail.com

16261. Takaki, Y.; Kinoshita, M.; Hayashi, K. (2016): Influence of a past nature experience to life form cognition of the students who want to become preschool teachers. *Research Bulletin of Kyushu Junior College of Kinki University* 46: 15-30. (in Japanese, with English summary) ["About five life species,

influence of a past nature experience to the grade of life form cognition based on a unified evaluation standard were investigated in the students who want to become preschool teachers. Although the differences of degree existed, the life form cognition grade of chicken, dragonfly and crab were higher in the students who experienced capture or breeding of them in the past. On the other hand, the life form cognition grade of carp and tulip were low regardless of having a past nature experience or not. Moreover, the students who could not recognize life form definitely were seen by factors such as a contribution degree to breeding, lack of observation, various form of species, difficulty to make a picture and influence of various media. The experience to watch the real thing directly is useful, but it is necessary to observe it consciously in that experience. Because the life form cognition grade of students seems to lower year by year, it is required to improve the power of observation and interest to nature by a practical lecture." (Authors)] Address: not stated

16262. Talukder, R.; Shivakumar, K.N. (2016): Measurement of vibrational stiffness and air damping of damselfly wings. *Journal of Biomaterials and Nanobiotechnology* 7: 127-141. (in English) ["A simple cantilever beam vibration test method made of biomorph and insect wing, were used to measure the vibrational stiffness and the air damping of insect wings. Vibration tests were performed in vacuum pressures to atmosphere and the wing stiffness and air damping factor were measured. The test method was found to be a viable method for measuring wing stiffness, natural frequencies and mode shapes. The vibrational deformation of the insect wings was found to be combination of bending and torsion because of unsymmetrical geometry of wing. The measured stiffness (K) of damselfly wings varied from 0.18 to 0.31 N/m and the air damping ratio ranged from 0.72 to 0.79. The undamped natural frequency (fn) at 13 kPa varied from 249 to 299 Hz and at atmosphere it varied from 168 to 198 Hz." (Authors)] Address: Talukder, R., Center for Composite Materials Research (CCMR), Dept of Mechanical Engineering, North Carolina A&T State Univ. (NC A&T SU), Greensboro, North Carolina, USA

16263. Tanaka, K. (2016): Functional biodiversity indicators and their evaluation methods in Japanese farmlands. *The Challenges of Agro-Environmental Research in Monsoon Asia*. Edited by Kazuyuki Yagi and C. George Kuo, National Institute for Agro-Environmental Sciences (NIAES), Tsukuba, Japan, Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region, Taipei, Taiwan. NIAES Series 6: 160-169. (in English) ["To mitigate the detrimental environmental effects of modern agriculture, such as those from chemical fertilizers and pesticides, environmentally friendly farming systems have been developed and propagated. Such farming systems are expected to conserve both the wildlife inhabiting agroecosystems and overall biodiversity. However, actually little is known about the effect of environmentally friendly farming systems on biodiversity in agroecosystems. To address this issue, the research project "Selection of functional biodiversity indicators and development of assessment methods" was conducted in Japan across the 2008-2011 fiscal years. After the conclusion of this project in March

2012, a manual was published that describes indicator animals and explains the survey and evaluation methods used. This paper outlines the research project and describes some examples of the manual's contents." (Author)] Address: Tanaka, K., National Institute for Agro-Environmental Sciences, Kannondai 3-1-3, Tsukuba 305-8604, Japan. E-mail: tanaka@affrc.go.jp

16264. Tarasov, G.S.; Khamitov, O.I.; Frolova, L.A. (2016): Characterization of littoral macro-zoobenthos communities of the Kuybyshev Reservoir in the area of Kazan. Proceedings of Kazan University (Natural Sciences Series) 158(1): 135-147. (in Russian, with English summary) ["Seasonal fluctuations in the species composition and quantitative indices of benthic communities in the littoral zone of the Kuybyshev Reservoir were investigated near the village of Staroe Arakchino in the summer–autumn season of 2014. On the whole, 40 taxa of macrozoobenthos were identified during the period of investigation. These taxa belong to the following groups of invertebrates: the phylum of Mollusca (the classes of Bivalvia and Gastropoda), the class of Insecta (the orders of Diptera, Ephemeroptera, Odonata), and the phylum of Annelida (the classes of Oligochaeta and Hirudinea). The highest species diversity was observed for insects and mollusks species. There was a reduction in the species diversity compared to the data of a similar research performed in 2010–2013. Zoobenthos samples were characterized by the absence of some orders of insects (Trichoptera, Coleoptera larvae and adults) and Maxillopoda. The abundance and biomass indices of macrozoobenthos in 2014 were lower than the same indices in 2010–2013. Two classes of mollusks (Gastropoda and Bivalvia) formed the dominant group in abundance and biomass. The significant influence on the quantitative indices was produced by *Viviparus viviparus* (L., 1758), as well as by such invasive species as *Dreissena polymorpha* (Pallas, 1771) and *Lithoglyphus naticoides* (Pfeiffer, 1828)." (Authors)] Address: G.S. Tarasov, G.S., Kazan Federal University, Kazan, 420008 Russia. E-mail: gregtar@yandex.ru

16265. Terzani, F. (2016): Note su *Cordulegaster boltonii* (Donovan, 1807) in Italia centrosettentrionale (Odonata: Cordulegasteridae). *Onychium* 12: 23-39. (in Italian, with English summary) ["The *Cordulegaster boltonii* (Donovan, 1807) of the central-northern Italy (Odonata: Cordulegasteridae). The "atypical form" of *C. boltonii* inhabitant in the central-northern Italy is described and illustrated." (Author)] Address: Terzani, F., Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola", via Romana 17, I-50125 Firenze, Italia. E-mail: libellula.ter@gmail.com

16266. Theischinger, G.; Richards, S.J. (2016): A new species of *Gynacantha* Rambur, 1842, from Papua New Guinea (Odonata: Aeshnidae). *Odonatologica* 45(3/4): 317-326. (in English) ["*Gynacantha nuda* sp. nov. is described based on a male from Southern Highlands Province, Papua New Guinea. It is the largest known species of the genus to be reported from New Guinea. Characters of the adult male are illustrated, the affinities of the new species are discussed, and a key is presented to males of the *Gynacantha* species recorded from New Guinea." (Authors)] Address: Theischinger, G., NSW

Dept Planning & Environment, Office of Environment & Heritage, Water Science, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

16267. Theischinger, G.; Richards, S.J. (2016): *Palaeosynthemis opaca* sp. nov., a new dragonfly from Papua New Guinea (Anisoptera: Synthemistidae). International Dragonfly Fund - Report 99: 1-8. (in English) ["A new species of the synthemistid genus *Palaeosynthemis* is described from the northern slopes of Papua New Guinea's central cordillera. It is distinguished from all congeners by having females with large, nearly black patches at the bases of both wings. The male is most similar to *P. cervula* and *P. feronia*, but it differs from those species in having superior anal appendages less than three times as long as S10, basally enlarged and otherwise unarmed vs basally not enlarged (*feronia*) and almost four times as long as S10 and armed (*cervula*). Characters of the adults (both sexes) are illustrated and the affinities of the species are discussed." (Authors)] Address: Theischinger, G., Office of Environment and Heritage New South Wales, Sydney, NSW, Australia, and Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

16268. Theischinger, G.; Richards, S.J. (2016): Six new species of *Nososticta* Hagen, 1860 from Papua New Guinea (Odonata: Platycnemididae). *Odonatologica* 45(3/4): 291-316. (in English) ["The males and, when available, females of six new species of the damselfly genus *Nososticta* are described from the upper Fly, Strickland, and Kikori River basins in southern Papua New Guinea. They are *Nososticta caelestis* sp. nov. (♂ holotype, 10-viii-2014), *N. chrismulleri* sp. nov. (♂ holotype, 04-viii-2013), *N. makrodon* sp. nov. (♂ holotype, 01-viii-2013), *N. megantereon* sp. nov. (♂ holotype, 03-viii-2013, ♀ described), *N. ovimacula* sp. nov. (♂ holotype, 29-vii-2013, ♀ described), and *N. paraconifera* sp. nov. (♂ holotype, 02-viii-2013, ♀ described." (Authors)] Address: Theischinger, G., NSW Dept of Planning & Environment, Office of Environment & Heritage, Water Sci., PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

16269. Timofeev, A.N. (2016): The ecology and behavioral features of dragonflies (Insecta, Odonata) in the forest–steppe zone of Central Chernozem region. *Russian Journal of Ecology* 47(5): 501-507. (in English) ["The species composition of Odonata facultatively associated with forest ecosystems at the adult stage have been studied in the forest–steppe of Central Chernozem region. Factors facilitating the entry of adult dragonflies deep into forested areas, specific features of their behaviour in the forest, and the role of human activities in the spread of these insects in forest ecosystems have been elucidated." (Author)] Address: Timofeev, A.N., Voronezh State Pedagogical Univ., ul. Lenina 86, Voronezh, 394043, Russia

16270. Tirado-Hernández, E.L. (2016): Diversidad del orden Odonata en la localidad Surutato, Badiraguato, Sinaloa. *Bol. Soc. Mex. Ento. (n. s.) Número especial 2*: 6-10. (in Spanish, with English summary) ["This study was performed to measure diversity and to identify the species of the order Odonata

in the pine-oak forest in Surutato town, municipality Badiraguato, Sinaloa, Mexico. A total of 24 species of Odonata in this study were captured. Sinaloa only has record of 21 species, which means that 3 new records were obtained. The greatest diversity and abundance was recorded in September with a total of 57 individuals collected, with a variety of Shannon index $H' = 2.6941$; in November were collected 50 individuals, and a diversity of Shannon index $H' = 1.8328$; in December the lowest abundance and diversity of this study was recorded, with a total of 7 individuals, and a diversity of Shannon index $H' = 0.41012$.. (Author)] Address: Tirado-Hernández, Ercy Leticia, Universidad Autónoma de Sinaloa, Escuela de Biología Universidad Autónoma de Sinaloa. Calzada de las Américas y Universitarios, s/n, Ciudad Universitaria, Culiacán Rosales, C. P. 80030, Sinaloa, México. E-mail: ercytirado@gmail.com

16271. Tomazelli, O.Jr.; Franco, G.M.S.; Munarini, A.; Casaca, J.M.; Niero, R.; Monache, F.D. & Magro, J.D. (2016): *Melia azedarach* L. fruit extract as a potential candidate in controlling the *Neuraeschna* Hagen, 1867 (Odonata: Aeshnidae), predominant predators for fish fingerlings. *Braz. J. Aquat. Sci. Technol.* 20(1): 54-60. (in English) ["Odonata larvae in fishponds prey on fish fingerlings and decrease the profits from production. With the goal of eliminating these larvae from fishponds, large quantities of pesticides are applied. These products are toxic to fish and have unpredictable effects on the food chain. The objective of this study is to evaluate the effect of the plant extract of fruits of *Melia azedarach* (CEE) and of methyl parathion (MP) adsorbed in silica in the control of *Neuraeschna* larvae. The LC50-18h for CEE was 0.57 mg L⁻¹, and for MP the LC50-12h was 0.17 mg L⁻¹. Two compounds with the highest concentration were isolated and identified from CEE, linoleic acid and melianone. The latter is a triterpene precursor of limonoids, compounds with insecticide properties. The substitution of synthetic pesticides for natural products is a path towards the sustainability of fish farming." (Authors)] Address: Dal Magro, J., Programa de Pós-graduação em Ciências Ambientais (PPGCA) da Univ. Comunitária da Região de Chapecó, Chapecó, SC, Brazil. E-mail: jaci@unochapeco.edu.br

16272. Torres-Cambas, Y.; Cabana-Otero, M.; Lorenzo-Carballa, M.O.; Cordero-Rivera, A (2016): Conservation status and protection of three Antillean endemic damselflies. *Journal of Insect Conservation* 20(2): 277-284. (in English) ["*Hypolestes* (Odonata, Zygoptera) is a damselfly genus endemic to the Greater Antilles. The genus comprises three species: *H. clara* from Jamaica, *H. trinitatis* from Cuba, and *H. hatuey* from Hispaniola, which are currently evaluated by the IUCN as Endangered (EN), Vulnerable (VU) and Data Deficient, respectively. Here, we re-assess the conservation status of these species based on their extent of occurrence, as estimated from ecological niche models. In addition, we analyse the coverage offered to each of the three species by the protected areas from Jamaica, Cuba, Dominican Republic and Haiti. Our results support the maintenance *H. trinitatis* in the category of VU, and suggest the re-classification of *H. hatuey* as Near Threatened. The estimated extent of occurrence for *H. clara* is 6422 km², a value close to the threshold of 5000 km² between VU

and EN. Therefore, we recommend keeping *H. clara* as EN, until new evidence based on population size and trend could support a change from this category to VU. We found that 14 % of the extent of occurrence for *H. clara* and *H. hatuey*, and 33 % for *H. trinitatis*, are within protected areas. However, the ongoing extensive deforestation in Hispaniola, coupled with the lack of protection in Haiti, could cause a decrease of the extent of occurrence of *H. hatuey* in the future." (Authors)] Address: Torres-Cambas, Y., Depto Biol., Fac. Cien. Naturales y Exactas, Univ. de Oriente. Patricio Lumumba s/n, Santiago de Cuba, Cuba. E-mail: yusdiel.torres@gmail.com

16273. Tsurusaki, N.; Yin, Z.; Iwamoto, M. (2016): Adult emergence pattern of the golden frangetail *Sinictinogomphus clavatus* (Odonata: Anisoptera: Gomphidae) in the last year of its occurrence in Lake Koyama, Tottori City, Honshu, Japan. *Sanin Natural History Research* 13: 37-44. (in Japanese, with English summary) ["*S. clavatus* was one of the commonest dragonflies in Lake Koyama in Tottori City (Tottori Prefecture, Honshu, Japan) before the intentional induction of higher salinity (3.5–8.75 ppt) in March in 2012 by the local government. We surveyed pattern of adult emergence of the species by collecting exuviae of larvae every day during the adult emergence from June to early August in 2012 which became the last year of the occurrence of the species in the lake. The results obtained were as follows: 1) There was a tendency that females tend to emerge earlier than males (protogeny). 2) Females were larger than males and individuals molted earlier were larger than those emerged later in both males and females. No adult emergence from the lake has been observed since 2013 due to high salinity." (Authors)] Address: Tsurusaki, N., 4-101 Kohanamachi Minami Tottori City 680 - 8551 Tottori University Dept of Regional Environmental Studies, Japan. E-mail: ntsuru@rs.tottori-u.ac.jp

16274. Turiault, M. (2016): The type material of Calopterygidae in the Museum für Naturkunde in Berlin (Odonata). *Odonatologica* 45(1/2): 95-106. (in English) ["A catalogue is presented listing all species-group names associated with type specimens of the family Calopterygidae (Odonata) currently housed in the entomological collection of the Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science in Berlin (Germany). Information on the current status of the species-group names, transcriptions of data labels and references to the original descriptions are provided." (Author) *Archineura incarnata* (Karsch, 1892); *Hetaerina infecta* Calvert, 1901; *Matrona kricheldorffi* Karsch, 1892 = *Matrona basilaris* Selys, 1853; *Mnesarete pruinosa* (Hagen in Selys, 1853); *Mnesarete pudica* (Hagen in Selys, 1853); *Sapho venusta* Karsch, 1889 = *Sapho orichalcea* McLachlan, 1869] Address: Turiault, Mélanie, Uhlenhorster Str. 23, 12555 Berlin, Germany. E-mail: melanieturiault@msn.com

16275. Twissell, I.; Hart, A. (2016): Dragonflies & damselflies of Gloucestershire: Their distribution and status. *The Gloucestershire Naturalist* 28 (Special issue): 192 pp. (in English) ["The present publication includes a checklist and accounts of all 35 species of Odonata that have occurred in the two vice-counties with accompanying maps, flight-time histograms

and photographs, as well as their breeding and Red List status, and some of the best locations to visit. The maps show the distribution of species up to the end of 2014, with notes of additional significant sightings that occurred in 2015 in the text. The book includes all of Vice-Counties 33 and 34, covering Gloucestershire as far north as Tewkesbury area, and South Gloucestershire as far south as some areas of Bristol. Three species have been re-recorded since publication of *Distribution of Dragonflies in Gloucestershire in 1991*. The species new to the county since 1991 are Yellow-winged Darter in 1995, Lesser Emperor in 1996, Variable Damselfly in 1998 (although an old record exists in South Gloucestershire VC34; this area not being covered by the 1991 Atlas), Scarce Chaser in 2004, Southern Emerald Damselfly in 2006, Small Red-eyed Damselfly in 2006, Small Red Damselfly in 2013, and Vagrant Emperor in 2013." (Publisher)] Address: not stated

16276. Ueda, K.; Ashizawa, J.; Fujimoto, Y.; Shimada, T. (2016): Survey in 2014 of the adult Odonata fauna in Lake Izunuma-Uchinuma and the surrounding area, Miyagi Prefecture, Japan. Research report of Uchinuma 10: 21-37. (in English) ["We carried out qualitative observations of adult Odonata fauna at Lake Izunuma-Uchinuma and the surrounding area, Miyagi Prefecture, Japan, in 2014. We observed a total of 10 families and 37 species including 3 species which newly were recorded. Previous studies have recorded a total of 10 families and 44 species in this area. 7 out of 10 species which were not found in this study were designated as an endangered species by Red List of Miyagi Prefecture and/or Red Data Book in Japan. These results indicate that Lake Izunuma-Uchinuma and the surrounding areas are available for over 30 odonate species as habitat, but not for endangered odonate species." (Authors)] Address: Ueda, K., Miyagi Prefectural Izunuma-Uchinuma Environmental Foundation. 17_2 Shikimi, Wakayanagi, Kurihara, Miyagi 989-5504, Japan. E-mail maraka@hotmail.co.jp

16277. Ujszegi, J.; Gál, Z.; Mikó, Z.; Hettyey, A. (2016): No effect of a glyphosate-based herbicide on larval *Aeshna cyanea* and adult newts (*Lissotriton vulgaris*) in a laboratory-based experiment. *Acta Zoologica Academiae Scientiarum Hungaricae* 62(4): 355-367. (in English) ["Pesticides can exert negative effects on aquatic organisms at very low concentrations. While several prey taxa are frequently used as models in ecotoxicology studies, there is little information about the pesticide-sensitivity of predators. We examined the effects of a frequently applied glyphosate-based herbicide on two common aquatic predators: larval *A. cyanea* dragonflies and adult male *Lissotriton vulgaris* newts, which are top predators in ephemeral water bodies lacking fishes. We exposed predators to the herbicide for 18 days under laboratory conditions and measured potential effects on survival, activity, body mass and predatory activity. To maximize detectability of effects, we applied the herbicide at a concentration of 6.5 mg a. e. glyphosate/L, corresponding to the highest concentration expected in nature. Our results showed that the tested herbicide formulation did not have severe effects on any of the measured fitness-related traits. Results of the present study support the hypothesis that the tested species

are insensitive to the herbicide and are able to fulfil their important ecological role of top-down regulation even in highly contaminated habitats. However, potential long-term or indirect effects of the herbicide on the fitness of aquatic predators remain unknown." (Authors)] Address: Gál, Z., Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Budapest, Hungary. E-mail: zoltan.gal89@gmail.com

16278. Upton, L.; Price, B.; Percy, D.; Brooks, S. (2016): Applying novel digital visualization tools and traditional morphometrics to the analysis of wing size and asymmetry and to male wing spot size in *Calopteryx splendens* (Harris) (Banded Demoiselle). *Journal of the British Dragonfly Society* 32(1): 8-25. (in English) ["*C. splendens* has sexually dimorphic wing pigmentation: males have a wing spot which is lacking in females. We investigated the relationship between wing size, wing asymmetry and, in males, the size of the pigmented area, against latitude, longitude, mean winter and summer temperatures and the time of year the specimen was collected. A total of 270 specimens were analysed, using Pearson's product moment correlation, from museum collections in England and Scotland. Wing size was significantly positively correlated with latitude and mean winter temperature, in both males and females, and wing spot size was positively correlated with collection day in males. Increasing wing size with latitude follows Bergmann's Rule and increasing wing size with increasing mean winter temperature may reflect increased larval growth during warm winters. Increase in wing spot size through the summer probably does not reflect a temperature response, since increasing summer temperature might be expected to lead to smaller wing spots if these had a thermoregulatory function. It is more likely that enhanced pigmentation of the wing spots may lead to increased reproductive success, which becomes a premium as the summer advances." (Authors)] Address: Upton, Laura, University College London, Gower Street, London, WC1E 6BT, UK

16279. Verma, P.; Andrew, R. (2016): Structure of the female reproductive system of the dragonfly *Orthetrum sabina sabina* (Drury 1770) (Anisoptera: Libellulidae). *Journal of Entomology and Zoology Studies* 4(5): 457-462. (in English) ["The female reproductive system in *O. s. sabina* consists of a pair of ovaries and a post ovarian genital complex (POGC). The ovaries are long, thin panoistic type germinal tissues occupying the first to the sixth abdominal segment. The mature ovariole consist of the terminal filament, germarium, vitellarium and pedicel. The POGC is composed of the sperm storage organ and vagina. The sperm storage organ is formed of a small bursa copulatrix and a pair of spermathecae with long tubular duct. The vagina is a short laterally folded tube covered by thick muscle bands. On the mid-dorsal region, the POGC bears a highly complex sclerotized cuticular collar formed of three pairs of cuticular plates. The POGC is ectodermal in origin and is composed of outer muscle, middle epithelial and inner cuticular layer. These layers exhibit site specific modifications with respect to the functional significance of the components." (Authors)] Address: Verma, P., P. G. Dept Zool., Hislop College, Civil Lines, Nagpur-01, Maharashtra, India

16280. Vilenica, M.; Alegro, A.; Koletić, N.; Mihaljević, Z. (2016): New evidence of *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata, Gomphidae) reproduction at the north-western border of its distribution. *Nat. Croat.* 25(2): 287-296. (in English, with Croatian summary) ["A total of 12 dragonfly species were recorded at Vlačine Reservoir in the Dinaric Western Balkan region (ER 5) in Croatia. Habitat conditions, i.e. vegetation structure and physico-chemical water properties of the reservoir, are presented and discussed. Habitat conditions were suitable for life cycle completion of Mediterranean species such as *Lindenia tetraphylla* and *Selysiothemis nigra*. Exuviae of *L. tetraphylla* represent new evidence of the species' reproduction in the north-western border of its distribution." (Authors)] Address: Vilenica, Marina, Univ. of Zagreb, Faculty of Teacher Education, Dept in Petrinja, Petrinja, Croatia. E-mail: marina.vilenica@gmail.com

16281. Vincy, M.V.; Brilliant, R.; Pradeep Kumar, A.P. (2016): Checklist of Odonata species as indicators of riparian ecosystem of a tropical river, the southern Western Ghats, Kerala, S. India. *Journal of Entomology and Zoology Studies* 4(2): 104-108. (in English) ["A total of 36 species of odonates, including 24 species of Anisoptera belonging to 3 families and 12 species of Zygoptera belonging to five families were recorded from the riparian zones of Meenachil River Basin, Kottayam District. The study was carried for a period of six years from 2009-2015. The highest diversity of odonates was that of family Libellulidae (61.11%), followed by Coenagrionidae (13.89%), Calopterygidae (10.71%), Gomphidae (8.33%) and Platycnemididae (5.56%). Six species were reported for the first time. Our data revealed odonate assemblages specific to the studied habitats such as marshlands, flowing water bodies, stagnant water bodies and vegetation type (wet zone and dry zone). These data will be useful in future studies and conservation of biodiversity in the studied habitats." (Authors)] Address: Vincy, M.V., Dept of Zoology, St., Berchmans College, Changanacherry, India

16282. Wada, S. (2016): Odonata species observed in San Diego, California, U.S.A. *Aeschna* 52: 1-16. (in Japanese, with English summary) ["The author stayed in San Diego, California, from July 6th to 31st and August 8th to September 26th in 2014, and collected or took pictures of 20 Odonata species. Among them, the record of *Ischnura ramburii* collected at Buena Vista Creek, Carlsbad, is probably the first record in the coastal area of California. Some of the specimens and photographs reported in this paper were identified by Dr. Rosser W. Garrison." (Author)] Address: Wada, S., 3-8-18, Nishikida, Fukui-shi, 918-8004, Japan

16283. Walia, G.K.; Gill, J.K.; Hallan, H.K. (2016): C-Banding and Ag-NOR Staining on *Neurobasis chinensis chinensis* (Linnaeus) of Family Calopterygidae from Himachal Pradesh, India (Odonata: Zygoptera). *Cytologia* 81(2): 175-178. ["*N. c. chinensis* of the family Calopterygidae is the only species of this genus present in India. This species was collected from Andretta and Mcleodganj areas of Himachal Pradesh, India. The species possesses $2n=23$ which is less than the type number ($2n=25$) of the family. The chromosome

complement shows the presence of large pair of autosomes originated by the fusion of two autosome pairs and is responsible for the reduction in the chromosome number. This fusion has been confirmed by C-banding with the presence of two interstitial and terminal C-bands on the largest autosomal bivalent having two chiasmata while remaining autosomal bivalents possess terminal C-bands and single chiasma which is the characteristic feature of Odonata. Ag-NOR staining shows the presence of terminal NOR bands in seven autosomal bivalents and the X chromosome is rich in NORs. C-banding and Ag-NOR staining have been performed for the first time on this species." (Authors)] Address: Walia Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

16284. Walker, G. (2016): Flight periods of dragonflies and damselflies in Orkney. *Journal of the British Dragonfly Society* 32(2): 60-71. (in English) ["There are eight breeding species of odonate in Orkney, four zygopterans and four anisopterans. Using data from records for Orkney, the flight times of these species have been established to provide an Orcadian flight season table." (Author)] Address: Walker, G., Starafea, Holm, Orkney, KW17 2SB, UK

16285. Wandera, D.A.; Mukhwana, M.N. (2016): Effect of flower farm effluents on diversity and composition of macroinvertebrates in Marura wetland. *Agriculture, Forestry and Fisheries* 5(6): 207-214. (in English) ["Wetlands are important sites for biological conservation due to their rich biodiversity which possess high productivity. They also offer shelter to many organisms and offers services such as water purification and flood control. However, biodiversity in wetlands has been reduced due to human activities that cause pollution like, flower farm effluents which are discharged directly to wetlands or river systems. Four water quality parameters; DO, BOD, pH, TDS, TSS and macro-invertebrates composition were investigated at four different stations (S1, S2, S3, S4) adjacent to Equator Flower Farm along the Marura wetland. PAST program was used to calculate diversity indices and richness in the macroinvertebrates communities. Station S2 had the highest temperature (22.6°C), whereas S4 had the lowest temperature (19.6°C). The pH value did not vary along the stations (8.3-6.3). The DO level fluctuated along the river, station S1 had highest level of 3.6 mg/l and lowest station S3 had 0.8mg/l. TSS and TDS did not show significant variations, while BOD levels varied with different stations. The highest value of TN was recorded at Station 3 (0.33±0.045mg/l). There was no significant difference ($p=0.055$) in three stations (S1, S2, S4) except S3. In total 10 orders, 30 genera and 30 families of macroinvertebrates were identified. The orders; Odonata, Coleoptera, Hemiptera and Diptera were the main macroinvertebrates found in all station, while the members of orders; Ephemeroptera, Trichoptera, Oligochaeta Mollusca, Gnathobellidae and Isopoda were few in all sampling stations. Station S2 and S4 had the highest species diversity compared to station S1 and S3 which had the lowest diversity. DO, BOD and temperature were found to have a significant effect on abundance and composition of benthic organisms with S3 having less abundance due to its

proximity to the flower farm." (Authors)] Address: Wandera, D.A., Dept of Fisheries and Aquatic Science, University of Eldoret, Eldoret, Kenya. E-mail: dawandera@gmail.com

16286. Wasscher, M.T.; Verspui, K.; Cammaerts, R. (2016): An *Aeshna affinis* watercolour by Pierre Léonard Vander Linden (1797-1831) found in the Selys collection. *Notulae odonologica* 8(7): 240-245. (in English) ["A yet unknown watercolour by Pierre Léonard Vander Linden showing a male of *Aeshna affinis* was found in the collection of Edmond de Selys Longchamps in the Royal Belgian Institute for Natural Sciences (RBINS) in Brussels. The circumstances of discovery and a biographical sketch of the artist are provided and the biographical chronology of the drawing is established." (Authors)] Address: Wasscher, M., Minstraat 15bis, 3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

16287. Westermann, E. (2016): Vorkommen und Schutz der Kleinen Moosjungfer (*Leucorrhinia dubia*) im Oberen Hotzenwald (Hochschwarzwald). *Naturschutz südl. Oberrhein* 8: 187-191. (in German, with English summary) ["From 2011 to 2015 populations of dragonflies in the moors of the upper Hotzenwald were recorded. *L. dubia* was recorded in the 1980ies in former peat-digging areas in five moors in this area, which, however, have been largely silted since then. A re-population has occurred since 2012 in artificial moor ponds, which evolved during restitution measurements when wide ditches were blocked. In the first moor the numbers of freshly emerged imagoes increased annually up to at least 700 individuals in 2015. In the second moor the numbers have remained low so far. During several months of draught and heat from July 2015 onwards the water level of the pond with the highest population by far decreased to small remainders, whereas the other water bodies had sufficient water during the whole development period. For the protection of the locally important population the water level needs to be stabilized by further improvement of the water blockings." (Author)] Address: Westermann, Elisabeth, Buchenweg 2, 79365 Rheinhausen., Germany

16288. Westermann, K. (2016): Zur Phänologie der Emergenz der Kleinen Moosjungfer (*Leucorrhinia dubia*) im Hochschwarzwald. *Naturschutz südl. Oberrhein* 8: 192-195. (in German, with English summary) ["In two bogs in the Southern Black Forest, in 2014 and 2015 *L. dubia* emerged from mid-May, reaching the highest abundance of emergence during the first ten days of June. Half of each annual population had hatched only after two to three weeks, and in two accurately investigated cases, after 16 and 18 days. In spatially adjacent bog ponds, imagoes emerged in both years on average at statistically significantly different times, which was probably dependent on the daily exposure of the water to sunshine. During the first ten days of July 2015, a pronounced second peak of emergence was observed in one bog. The obtained data about the phenology of emergence differ to existing literature data for the Black Forest. The differences can be explained sufficiently with different altitudes and different degrees of exposure to sunshine of each investigated water body." (Author).] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen., Germany

16289. Westermann, K. (2016): Die Libellen des Naturschutzgebiets „Hinterzartener Moor“ – Moorlibellen als Indikatoren des Moorzustands. *Naturschutz südl. Oberrhein* 8: 139-165. (in German, with English summary) ["80 hectares of the "Hinterzartener Moor" are declared as a nature reserve. It consists of a natural transition and peat-bog called „Westmoor“, a partially drained peat-bog called „Ostmoor“, and spruce forests and meadows. In the „Westmoor“ some large bog pools as well as many small water bodies can be found. Between the end of May and beginning of September 2015 exuviae were collected over twelve days at the margins of the water bodies. Due to a pronounced emergence peak of *Aeshna subarctica* four controls were made at the first half of July. All bog dragonflies which can be regularly found in the Black Forest have reproductive populations in the "Westmoor". A very large population of *Aeshna subarctica* and fairly big populations of *Aeshna juncea*, *Somatochlora arctica*, *Leucorrhinia dubia* and *Coenagrion hastulatum* were found. A small but probably stable population of *S. alpestris* at its lower altitudinal distribution limit in the Black Forest was found. remarkably, a small population of *Lestes dryas* was found in a marginal sedge reed, which had been recorded for the first time approximately 40 years ago. A few decades ago marked population decreases of *A. subarctica* and other species were reported from the „Westmoor“, which were related to severe eutrophication and a rapid infilling caused by a nutritional load from a rubbish dump and rivulets. Although the populations of the dragonflies changed dynamically at that time, the present investigation was the first since this occurrence. The result was surprisingly high populations of the representative species, which could only be explained by a partial regeneration of the "Westmoor". *A. subarctica* stood out, which has obviously recently developed a new nucleus of the metapopulation of the area Hinterzarten/ Feldberg. In the future investigations should be carried out at regular intervals of approximately five years and the regeneration should be supported by diverse measurements. In the „Ostmoor“, natural moor water bodies have not existed for quite some time. At present only a few species with a small number of individuals exist in almost completely silted former drainage ditches and peat-digging areas. restitution measurements by the NABU Baden-Württemberg will however lead to a significant increase of the water level in the moor and create new habitats for bog dragonflies." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen., Germany

16290. Wildermuth, H. (2016): Auswirkung der Hochmoorregeneration auf die Libellenfauna (Odonata) des Torfrieds Pfäffikon (ZH). *Entomo Helvetica* 9: 41-51. (in German, with English and French summaries) ["Impact of raised bog restoration on the dragonfly fauna of an exploited peat bog in the Swiss Midlands. - The remains of a highly exploited and overgrown peat bog near Pfäffikon (ZH) (Switzerland) were restored in a step-by-step process between 2003 and 2015 by the impoundment of drainage ditches and the partial clearing of woodland. The removal of trees allowed for more sunlight at a number of former peat-ditches thus rendering them more suitable for dragonfly reproduction. Subsequent monitoring from 2010 to 2015 revealed that 16 species of indigenous

Odonata colonized up to ten bodies of water a year. Most of these species were recorded before bog restoration but only in small numbers and restricted to the four peat-ditches that had been left partially cleared. These species dispersed over the cleared area and some populations strengthened significantly. *Leucorrhinia pectoralis*, critically endangered and currently confined to peat-ditches in Switzerland, was of special interest. This libellulid reacted to the implemented measures by establishing a strong and stable population. In order to improve the breeding conditions of odonates, floating mats of vegetation were recently removed from five partially or completely overgrown peat-ditches. For sustainable conservation and promotion of the local dragonfly fauna, reeds are mowed annually and water bodies are managed using a rotational strategy." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

16291. Wildermuth, H. (2016): Aeshna-Larve wehrt sich gegen Molchgriff mit Kaudalstacheln. *Mercuriale* 16: 45-48. (in German, with English summary) ["Aeshna larva defends itself against newt attack with anal spines - At a small garden pond an adult alpine newt *Ichthyosaura alpestris* was observed to snap an F-0-larva of *A. cyanea* from the side, obviously taking it for a prey. The larva reacted immediately, striking out at the newt by a fierce sideways movement of the abdomen and stabbing the assailant with the anal spines. This accidental Observation is obviously the first report on the use of anal spines by an aeshnid larva as defence weapons against predator attack in a seminatural habitat.] Address: Wildermuth, H., Haltbergstrasse 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

16292. Willigalla, C.; Schotthöfer, A.; Frank, D. (2016): Zur Situation von *Orthetrum albistylum* in Rheinland-Pfalz (Odonata: Libellulidae). *Libellula* 35(3/4): 217-221. (in German, with English summary) ["The situation of *O. albistylum* in Rheinland-Palatinate (Odonata: Libellulidae) – *O. albistylum* was observed for the second time, in 2016, after the first record in 2008 in Rhineland-Palatinate. On both occasions, only one adult male was found. The total number of dragonfly species recorded for the federal state has now risen to 69." (Authors)] Address: Willigalla Ökol. Gutachten, Am Großen Sand 22, D-55124 Mainz, Germany. E-mail: christoph@willigalla.de

16293. Willigalla, C. (2016): Neue Entwicklungen der Libellenfauna im Soonwald, Rheinland-Pfalz (Insecta: Odonata). *Fauna Flora Rheinland-Pfalz* 13(2): 557-571. (in German, with English summary) ["Within the EU-LIFE Project "Soonwald" 49 ponds were maintained and 35 bodies of water newly created in winter 2010. Both at the beginning and at the end of the project, in 2014, the Odonata were mapped at 56 ponds, totally. In 2011 19 Odonata species were registered, in 2014, 25 odonata species were recorded. 17 species showed a positive trend, eight species acted steadily. Three species, *Coenagrion scitulum*, *Sympetma fusca* and *Brachytron pratense*, were indexed for the first time in this physical region, so in total 29 species are known of the Soonwald." (Author)] Address: Willigalla, C., Ökol. Gutachten, Am Großen Sand 22, 55124 Mainz, Germany. E-mail: christoph@willigalla.de

16294. Worthen, W.B. (2016): Observation of wing-whirring O Libellulidae). *Notulae odonatologicae* 8(8): 261-265. (in English) ["Dragonflies are classified behaviourally as perchers or fliers. The thermoregulatory behaviour of wing-whirring to generate heat is common in fliers but rare in perchers. On 25-I-2016, I observed and photographed a female *M. atra*, a percher, engaged in wing-whirring behaviour while perched in the Cantarrana Swamp at La Selva Biological Station, Heredia Province, Costa Rica." (Author)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

16295. Worthen, W.B.; Morrow, P.H. (2016): Perch selection by three cooccurring species of *Celithemis* (Odonata: Libellulidae): Testing for a competitive hierarchy among similar species. *Psyche*, Volume 2016, Article ID 9028105, <http://dx.doi.org/10.1155/2016/9028105>: 8 pp. (in English) ["In many communities of perching dragonflies (Odonata: Libellulidae), a size-dependent competitive hierarchy creates a positive relationship between male body size and perch height. We tested for this pattern among three similar-sized species: *Celithemis elisa*, *C. fasciata*, and *C. ornata*. Males were caught and photographed from May to July 2015 at Ashmore Heritage Preserve, Greenville County, SC, USA, and perch heights and perch distance to open water were measured. Five indices of body size were measured with ImageJ software: abdomen length, forewing length, hindwing length, area of forewing, and area of hindwing. *C. fasciata* was significantly larger than the other two species for all five anatomical characters and used perches that were significantly taller and closer to open water than the other species, though these differences changed over the summer. Aggressive interactions between and within species were tallied and compared to expected distributions based on mean relative abundances derived from hourly abundance counts. Patterns of interspecific aggression were also consistent with a size-dependent hierarchy: the large *C. fasciata* was attacked less frequently, and the small *C. ornata* more frequently, than predicted by their relative abundances. We conclude that even small differences in body size may contribute to niche partitioning in perch selection." (Authors)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

16296. Xu, Q.-h. (2016): Description of the final stadium larva of *Philoganga vetusta* Ris, with discussion of the taxonomic characters of the larvae of the genus *Philoganga* Kirby (Odonata: Philogangidae). *International Journal of Odonatology* 19(1-2): 69-74. (in English) ["The final stadium larva of *P. vetusta* is described and illustrated in detail. The larva of supposed *P. vetusta* from Hong Kong is confirmed, and that of *Philoganga* sp. from Fujian can be determined to be *P. robusta*. The taxonomic characters and systematic status of the larvae of genus *Philoganga* are discussed and summarized." (Authors)] Address: Xu, Q.-h., Dep of Garden and Horticulture, Zhangzhou City University, Zhangzhou, Fujian, PR China

16297. Yang, D. (2016): Important Medicinal Insects of China. Henan Science and Technology Press: 432 pp. (in Chinese) [Chapter II treats Odonata.]