Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

Editor:

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Published in Zerf, Germany

ISSN 1438-0269

2017

16603. Schneider, T.; Schneider, E.; Ikemeyer, D.; Seidenbusch, R.; Müller, O. (2017): Description of last instar larva of Gomphus kinzelbachi Schneider, 1984 and new aspects on distribution and habitats in Iran (Odonata: Gomphinae). Zootaxa 4365(4): 455-466. (in English) ["G. kinzelbachi was described on the basis of a single teneral male captured by B. L. Sage on the Alwand River in eastern Iraq. A detailed redescription of the male and description of the female were published recently. However, the larva of the species has remained unknown so far. In late April 2017 two of the authors (ES & TS) discovered freshly emerged G. kinzelbachi, some of them still on their exuviae, on the upper part of the Zoreh River in southwest Iran (Khuzestãn). Larvae ready to emerge were observed leaving the water and climbing reed stalks. The development from last instar larvae to freshly emerged G. kinzelbachi was observed, some until maiden flight. Five exuviae and two freshly emerged males were collected for further identification and description. Male and female exuviae of G. kinzelbachi are described and compared with exuviae of G. schneiderii Selys, 1850, from Mazandarãn province in Iran. Furthermore, a key is provided to determine the exuviae of four Iranian species belonging to the subfamily Gomphinae: Gomphus kinzelbachi, G. schneiderii, Stylurus ubadschii (Schmidt, 1953), and Anormogomphus kiritshenkoi Bartenev, 1913. In addition, the eastern Mediterranean Gomphus davidi Selys, 1887, is included in the comparison, because it seems to be the sister species of G. kinzelbachi. During the trips to Iran in 2017 eight new populations of G. kinzelbachi on different stretches of the river systems of Marun, Zoreh, Dalaki, Alwand, and Abi Zinkan were detected, enlarging the known range and habitat requirements significantly. The flight period of G. kinzelbachi in Iran is also discussed." (Authors)] Address: Schneider, T., Arnold–Knoblauch–Ring 76, 14109 Berlin–Wannsee, Germany. E-mail: thomas.rs@gmx.de

16604. Seehausen, M. (2017): Survey of Odonata from Timor Island, with description of the female of Anax georgius (Odonata: Aeshnidae). Faunistic Studies in SE Asian and Pacific Island Odonata 20: 1-34. (in English) ["The survey is based on specimens held at Museums in Australia, Belgium and Germany. Altogether 487 specimens of 31 species from Timor were examined. These include: a recent collection from Timor-Leste of 148 specimens (25 species) at the Australian Museum Sydney, an historic collection from West Timor consisting of 338 specimens (20 species) of the ex-collection Eugène Le Moult, stored at the Institut Royal des Sciences Naturelles de Belgique in Brussels, and a single specimen from West Timor of the Coll. Ris stored at the Senckenberg Naturmuseum Frankfurt, Germany. The following nine species are reported from Timor for the first time: Agriocnemis pygmaea, Austroallagma sagittiferum, Ischnura heterosticta, Xiphiagrion cyanomelas, Crocothemis servilia, Neurothemis ramburii, Orthetrum pruinosum cf. schneideri, Potamarcha congener and Zyxomma obtusum. The female of Anax georgius is described and illustrated. An illustrated key to the Anax species of the Lesser Sunda Islands is given and specimens from the Lesser Sunda Islands formerly identified as Anax gibbosulus are considered to be A. panybeus. Some characters of the O. pruinosum taxa group of species, Tramea stenoloba and female Z. obtusum are discussed. Figures of the male appendages and genital ligulae of A. sagittiferum, Aciagrion fragile and X. cyanomelas are provided, as well as figures of the male secondary genitalia, appendages and the penis of Trithemis lilacina and the male appendages of Epophthalmia vittigera. A preliminary checklist for Timor including 36 species is given." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich Ebert Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museumwiesbaden.de

16605. Seehausen, M. (2017): Indolestes lafaeci sp. nov. (Odonata: Lestidae) from Timor, with comparisons to related species. Zootaxa 4244(1): 79-90. (in English) ["I. lafaeci sp. nov. is described and illustrated (holotype ♂: vi.1929, Soe, South Central Timor Regency, West Timor, Indonesia, ex.-Coll. Le Moult; deposited at the Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium). Indolestes insularis comb. nov. is proposed. For comparison, illustrations of the head, synthorax, male anal appendages and genital ligula as well as of the ovipositor of I. bellax, I. gracilis and I. insularis are given." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2,

65185 Wiesbaden, Germany. E-mail: malte.seehausen@-museum-wiesbaden.de

16606. Seehausen, M.; Theischinger, G. (2017): Nosticta impercepta sp. nov. (Odonata: Platycnemididae) from Timor, with a key to the Sundaic species. Zootaxa 4250(3): 262-274. (in English) ["N. impercepta sp. nov. is described and illustrated (holotype ♂: 28.vi.1911, Niki-Niki [South Central Timor Regency], Timor, Indonesia, C.B. Haniel leg., Coll. Ris, No. 2477; deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany). An illustrated key for the species of Nosticta known from the Lesser Sunda Islands is given. The occurrence of N. selysi in Timor is considered to be doubtful. Nosticta emphyla is newly recorded from Sumbawa Island." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16607. Seehausen, M. (2017): Nomenclature and status of the Neurothemis tullia complex of species (Odonata: Libellulidae). Odonatologica 46(1/2): 119-136. (in English) ["Continental and Javanese specimens of the N. tullia-group were studied with an emphasis on wing color pattern and structure of the median process of the vesica spermalis. Continental N. tullia consists of two main variants: one well-known with a variable white wing pruinescence and a dry season variant in which it is lacking. The type of Libellula equestris var. feralis represents a distinct Javanese species, thus N. feralis is raised from being a subspecies of N. tullia to a full species. The variations of the wings as well as the median process of the vesica spermalis of both species are illustrated."] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E.mail: malte.seehausen-@museum-wiesbaden.de

16608. Seidel, M.; Voigt, M.; Langheinrich, U.; Hoge-Becker, A.; Gersberg, R.M.; Arévalo, J.R.; Lüderitz, V. (2017): Re-connection of oxbow lakes as an effective measure of river restoration. Clean. SoilAirWater 45(3). 1600211: (in English) ["Six years after re-connection of an oxbow lake from periodically to permanently connected to the main channel, the restoration success was assessed. This permanently connected oxbow lake was compared with the main channel of the Elbe River and with a periodically connected oxbow lake by means of comparisons of the aquatic macroinvertebrates, fish and aquatic macrophyte communities. The permanently connected oxbow was suited as important replacement habitat for riverine invertebrates, especially for clubtails (Odonata) and unionid mussels (Bivalvia). The periodically connected oxbow lake was colonized by typical species for shallow lakes. As expected, riverine species did not occur. Meanwhile, the invertebrate community in the main channel was poor and dominated by invasive species (Dikerogammarus villosus, Dreissena polymorpha). The results concerning fish showed a clear dominance of the rheophilic species spined loach (Cobitis taenia) in the permanently connected oxbow lake and of the indifferent species roach (Rutilus rutilus) and European perch (Perca fluviatilis) in the periodically connected oxbow lake. However, species number was highest in the main channel. For macrophytes, quantity, number of taxa and growth forms and diversity were lower in the permanently compared to the periodically connected oxbow lake. In conclusion, the re-connection of oxbow lakes to main channels can be an important measure for native species conservation, especially macroinvertebrates, and hence for the implementation of the Water Framework Directive." (Authors)] Address: Seidel, M., Univ. Appl. Sci. Magdeburg-Stendal, Breitscheidstraße 2, Dept of Water & Waste Management, 39114 Magdeburg, Germany. E-mail: Michael.Seidel@hs-magdeburg.de

16609. Shahzad, A.; Hamdani, H.R.; Aizaz, A. (2017): Investigation of corrugated wing in unsteady motion. Journal of Applied Fluid Mechanics 10(3): 833-845. (in English) ["Delayed stall is the most dominant lift enhancing factor in insect flapping motion. Micro air vehicle operates at Reynolds number 104-105; slightly higher than the insects' Reynolds number (Re). In the present research, thefocus is to investigate "stall-absent" phenomenon at Re representative of the micro air vehicles, the effect of spanwiseflow on the leading edge vortex and also to study the effect of geometry variations on the aerodynamic performance of the wing in unsteady motion. Corrugated dragonfly airfoil with rectangular wing planform is used, however, with wing kinematics restricted to azimuth rotation only. Three-dimensionalfinitevolume method is used, through commercial software Fluent, to numerically solve time-dependent incompressible Navier-Stokes equations. Computed results at Re 34000 and 100,000 reveal the same phenomenon of delayed stall, as observed in the case of insects. Furthermore, the performance of flat plate, profiled and corrugated wing in a sweeping motion at a high angle of attack is also compared." (Authors)] Address: Aizaz, A., Research Centre for Modelling & Simulation, National Univ. Sci. & Tech., Pakistan. E-mail: ahmadaizaz@cae.nust.edu.pk

16610. Shapoval, N.A.; Shapoval, A.P (2017): Annotated checklist of the dragonflies (Insecta: Odonata) of the Kaliningrad region, north-western Russia. Ukrainian Journal of Ecology 7(4): 157-168. (in English) ["The first comprehensive surveys on Odonata were made more than 100 years ago, at the beginning of 20th century by La Baume (1908) and especially by Le Roi (1911) and included 50 species. In the following years, no significant publications which particularly address faunistic and taxonomic studies related to the Kaliningrad region were published. Here we present the first modern, most complete checklist of the dragonflies of the Kaliningrad region with notes on the species composition, abundance, and periods of local flight and seasonal migrations. The current checklist is based on data collected by the authors on the Courish Spit (Kaliningrad region, Russia) in 2007-2016. In total, 278 955 specimens belonging to 57 species were recorded. Additional 7 species are included in the list based on the literature data. Thus, the number of species known for the territory of the Kaliningrad region has risen to 64." (Authors)] Address: Shapoval, N.A., Dept of Karyosystematics, Zoological Institute of Russian Academy of Sciences, Universitetskaya nab. 1, St. Petersburg 199034, Russia. E-mail: nazaret@bk.ru

16611. Sharma, G. (2017): Studies on the reproductive behaviour of dragonfly, Pantala flavescens (Fabricius, 1798) (Odonata: Insecta: Arthropoda) in Aravalli range and desert ecosystem of Rajasthan, India. Bio Bulletin 3(1): 67-73. (in English) ["The reproductive behaviour of P. flavescens was studied in different localities of Aravalli Range and Desert Ecosystem of Rajasthan during 2008-15. Courtship is well marked and male demonstrate a circular territory with a radius of about 4-6 meters and defended it from the intruding intra or some inter specific male by chasing it away or by warning signals like wing vibration or abdomen raising. As female entered into the territory, the male starts following her and forms a tandem link, catching hold of her prothorax by his anal appendages. The before wheel tandem lasted for 10-40 seconds and during this period intramale sperm translocation is not observed. The male forced female to form courtship wheel. The courtship wheel lasts for about 70 seconds to 3 minutes and is performed in air above water body. The courtship wheel breaks and in tandem position the female oviposit exophytically on the surface of water and it lasts for 60 seconds to 2 minutes. During oviposition the male in tandem and after release of grip hovers around the female, to defend her from intruding intra or inter specific males. The total duration of reproductive behaviour lasts for 3-6 minutes." (Author)] Address: Sharma, G., Zoological Survey of India, High Altitude Regional Centre, Saproon, Solan, (Himachal Pradesh), India 173211. E-mail: drgaurav.zsi.india@gmail.com

16612. Shi, L.; Cshen, R.-R.; Han, Y.; Gao, X.-F.; Chen, C.; Chen, Y.; Zhu, X.-X.; Tian, M.-q.; Sun, W.-J.; Jin, C.-Y.; De, C.-Q. (2017): A preliminary survey of species diversity of the freshwater insects in Inner Mongolia. Acta Entomologica Sinica 60(12): 1467-1480. (in Chinese, with English summary) ["[Aim] This study aims to provide the basic scientific data of aquatic insect species in Inner Mongolia and a solid base for their potential application in freshwater quality monitoring and protection by the government and scientists in the future. [Methods] Benthic aquatic insects were sampled by using a qualitative collection method and the water quality was assessed by the family biotic index (FBI), EPT species richness and Shannon-Wiener biodiversity index. [Results] Of 187 freshwater insect species in 72 genera, 59 families, 7 orders collected in the 52 localities, 1 species was new to science; 2 families, 3 genera and 25 species were newly recorded in Inner Mongolia; 1 genus and 2 species were recorded for the first time in China; and 56 additional species are under identification. The diversity of Trichoptera and Ephemeroptera were the highest while that of Plecoptera was the lowest in recorded 7 orders; the proportions of families and individuals of the two orders accounted for 42. 37% and 84.29%, respectively, so Trichoptera and Ephemeroptera are dominant groups among the seven orders. The localities of rich species diversity were distributed mainly in the eastern Inner Mongolia, including Hulunber, Hinggan League, Tongliao and Chifeng. The water quality ranks assessed by the family biotic index, EPT species richness and Shannon-Wiener biodiversity index showed that the evaluation results of FBI and EPT species richness were similar, but differed greatly from that of Shannon-Wiener biodiversity index. [Conclusion] There are more abundant species of Trichoptera and Ephemeroptera with lower tolerance value in Inner Mongolia, so the caddisflies and mayflies are more suitable and better candidates as indicators of water quality in this region." (Authors)] Address: Li, C., College of Agronomy, Inner Mongolia Agricultural University Hohhot 010019 China. E-mail: lirui2003@imau.edu.cn

16613. Shumway, N.; Gabryszuk, M.; Laurence, S. (2017): Abstract: L18.00008: Comparing the aerodynamic forces produced by dragonfly forewings during inverted and non-inverted flight. Bulletin of the American Physical Society, 70th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, November 19–21, 2017; Denver, Colorado: (in English) [Verbatim: Experiments were conducted with live dragonflies to determine their wing kinematics during free flight. The motion of one forewing in two different tests, one where the dragonfly is inverted, is described using piecewise functions and simulated using the OVERTURNS Reynolds-averaged Navier-Stokes solver that has been used in previous work to determine trim conditions for a fruit fly model. For the inverted dragonfly the upstrokes were significantly longer than the downstrokes, pitching amplitude is lower than that for the right-side up flight and the flap amplitude is larger. Simulations of dragonfly kinematics of a single forewing are presented to determine how the forces differ for a dragonfly flying inverted and a dragonfly flying right-side up.]

16614. Siesa, M.E. (2017): Le libellule delle Alpi - Come riconoscerle, dove e quando osservarle. Blu Edizioni: 240 pp. (in Italian)]

16615. Sigutová, H.; Harabis, F.; Hykel, M.; Dolny, A. (2017): Motorway as a barrier to dispersal of the threatened dragonfly Sympetrum depressiusculum (Odonata: Libellulidae): Consequence of mortality or crossing avoidance? Eur. J. Entomol. 114: 391-399. (in English) ["Infrastructure is one of the main causes of landscape fragmentation, which results in isolation and loss of populations. Although the negative effect of roads on insects is well documented, only a minority of studies has focused on roads in the context of barriers to dispersal. Flying species in particular have been neglected. We investigated the effect of a four-lane motorway as a barrier to the movement of an isolated population of the threatened dragonfly S. depressiusculum in an agricultural landscape in Central Europe. Generalized additive models were used to assess the motorway's effect on (i) the distribution of adult dragonflies in patches of terrestrial habitat surrounding their natal site, and (ii) individual flight behaviour (i.e. willingness or unwillingness to cross the motorway). Movement patterns of marked adults throughout the landscape were also investigated. During one season, significantly fewer adults were found at patches located on the far side of the motorway, indicating it has a barrier effect. Observations on flight behaviour revealed no apparent effect of the motorway. The possible barrier effect for the species studied was therefore presumed to be a consequence of road mortality. Our results indicate that the motorway may influence the dispersal of this threatened species of dragonfly, which is a habitat specialist with particular requirements for its terrestrial environment. Negative effects

on other species with similar behaviour and strategy can be presumed. When establishing new habitats, carrying out reintroductions or translocations, it is necessary to consider that roadways may reduce population size and affect population dynamics by limiting dispersal." (Authors)] Address: Šigutová, Hana, Dept of Biology & Ecology, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 710 00 Ostrava, Czech Republic. E-mail: sigutova.hanka@gmail.com

16616. Simon, E.; Kis, O.; Jakab, T.; Kolozsvári, I.; Málnás, K.; Harangi, S.; E. Baranyai, E.; Miskolczi, M.; Tóthmérész, B.; Dévai, G. (2017): Assessment of contamination based on trace element concentrations in Gomphus flavipes (Odonata: Insect) larvae of the Upper Tisza Region. Ecotoxicology and Environmental Safety 136: 55-61. (in English) ["Highlights: • Dragonfly larvae are frequently used to assess the contamination level of aquatic systems. • The aim of our study was to assess the contamination in the Upper Tisza Region. • Trace element concentrations of Gomphus flavipes larvae were studied. • Significant differences were found in trace element concentrations of dragonfly larvae among studied localities. • Our results indicated a continuous pollution of studied rivers. Abstract: Odonata larvae are frequently used to assess the contamination of aquatic systems, because they tolerate a wide range of chemical and biological conditions in freshwater systems. In early 2000, the sediments of the Hungarian section of the River Tisza and the River Szamos were strongly enriched with heavy metals by an accidental mining spill. Earlier studies demonstrated higher contamination levels in the Szamos than in the Tisza, based on sediment analysis. The aim of our study was to assess the contamination in the Upper Tisza Region, along the upper reach of the Tisza, and the lower reach of the Szamos, based on the trace element concentrations of the Gomphus flavipes larvae. We collected 269 dragonfly specimens for the analyses. The Al, Ba, Cr, Cu, Fe, Mn, Pb, Sr and Zn element contents were analysed in the dragonfly larvae by microwave plasma atomic emission spectrometry (MP-AES). Significantly higher Ba and Cu concentrations were found in the dragonfly larvae of the Tisza than the Szamos. In spite of this, the Cr, Mn, Pb, Sr and Zn concentration was significantly lower in the dragonfly larvae of the Tisza than the Szamos. For all trace elements significant differences were found along the Tisza. Significant differences were also found in all trace element concentrations of dragonfly larvae among studied localities in the Szamos, except in the cases of Al and Ba. Our results demonstrated that the Szamos was more contaminated with Cr, Mn, Pb, Sr and Zn than the Tisza, but that the Tisza was more contaminated with Ba and Cu than the Szamos, based on the trace element concentrations in Gomphus flavipes larvae, which was likely to have been caused by the tributaries of the Tisza. In summary, our results indicated a continuous pollution of the Tisza and the Szamos and their tributaries." (Authors)] Address: Simon, Edina, Dept of Ecology, Univ. Debrecen, Debrecen, Egyetem sq. 1, H-4010, Hungary. E-mail: edina.simon@gmail.com

16617. Sobolev, N.A.; Volkova, L.B. (2017): Lindenia tetraphylla (Vander Linden, 1825) (Insecta: Odonata: Gomphidae) dragonfly as a target object of the Emerald Network. Biology and Ecology 2017(3): 59-66. (in Russian, with English summary) ["Here we report the data on L. tetraphylla in Eastern Europe for assessing the sufficiency of the Emerald Network alone to save it. Although existing protected areas are sufficient to protect the species, the diversity of protected habitats should be extended." (Authors)] Address: Volkova, L.B., Severtsov Institute of Ecology & Evolution RAS, Moscow, Russia

16618. Start, D.; Kirk, D.; Shea, D.; Gilbert, B. (2017): Cannibalism by damselflies increases with rising temperature. Biology Letters 13(5): 4 pp. (in English) ["Trophic interactions are likely to change under climate warming. These interactions can be altered directly by changing consumption rates, or indirectly by altering growth rates and size asymmetries among individuals that in turn affect feeding. Understanding these processes is particularly important for intraspecific interactions, as direct and indirect changes may exacerbate antagonistic interactions. We examined the effect of temperature on activity rate, growth and intraspecific size asymmetries, and how these temperature dependencies affected cannibalism in Lestes congener, a damselfly with marked intraspecific variation in size. Temperature increased activity rates and exacerbated differences in body size by increasing growth rates. Increased activity and changes in body size interacted to increase cannibalism at higher temperatures. We argue that our results are likely to be general to species with life-history stages that vary in their temperature dependencies, and that the effects of climate change on communities may depend on the temperature dependencies of intraspecific interactions." (Authors)] Address: E-mail: denon.start@mail.utoronto.ca

16619. Subramanian, K.A.; Babu, R. (2017): A Checklist of Odonata (Insecta) of India, Version 3.0. Zoological Survey of India, Southern Regional Centre, 130, Santhome High Road, Chennai-600 0028, www.zsi.gov.in: 54 pp. (in English) ["Odonata are key components of wetland ecosystem. Odonata of India is represented by 488 species and 27 subspecies in 154 genera and 18 families. The Suborder Zygoptera comprise of 211 species under 59 genera and 9 families; Anisozygoptera one species under one genera and one family; Anisoptera 276 species under 94 genera and 8 families. One species in Zygoptera is considered as incertae sedis. High diversity and endemism is found in the hill streams and rivers of Western Ghats and eastern Himalaya. The taxonomy of adult is well worked out, however the descriptions of larva and their ecology remains as a major gap area, especially for several elusive hill stream breeding species. Geographically, the central India, eastern Ghats, eastern Himalaya and Andaman Nicobar islands remains under explored where new species and records are still awaiting formal scientific description. In the current checklist, with reference to Version 2.0 (2014), there are 58 nomenclatural changes, 30 new additions, 10 deletions and 7 species are kept under doubtful status." (Authors] Address: Subramanian, K.A., Zoological Survey of India, Prani Vigyan Bhavan, M-Block, New Alipore, Kolkata-700 053, India. E-mail: subbuka.zsi@gmail.com

16620. Sun, X.; Gong, X.; Huang, D. (2017): A review on studies of the aerodynamics of different types of maneuvers

in dragonflies. Archive of applied mechanics 87(3): 521-554. (in English) ["In the recent decades, biomimetic robots have attracted scientific communities' attention increasingly, as people try to learn from nature in which exist astonishing and uniquely evolved mechanisms shown by very species. Dragonfly, as such one example, demonstrates unique and superior flight performance than most of the other insect species and birds. Researchers are obsessed with the aerodynamic characteristics of an in-flight dragonfly as two pairs of independently controlled wings provide them with an unmatchable flying performance and robustness. In this paper, an extensive review of recent studies related to the flight aerodynamics of dragonflies has been conducted. The main research findings about effect of the motion parameters and body attitude on the resulting aerodynamic forces and power requirements in different flight modes of a dragonfly are summarized. Particular attention is given to functional characteristics of dragonfly wings and the importance of mutual interaction between forewing and hindwing for its flyability. This article aims to bring together current understandings of dragonfly aerodynamics and thus has certain reference value to design and control of dragonfly-inspired biomimetic devices." (Authors)] Address: Sun, X. Univ. Shanghai Sci. & Tech., 200093, Shanghai, People's Republic of China

16621. Surdo, S. (2017): First record of Lindenia tetraphylla (Vander Linden, 1825) and rediscovery of Orthetrum nitidinerve (Selys, 1841) in Sicily (Insecta: Odonata). Fragmenta entomologica 49(2): 5 pp. ["The first Sicilian record of L. tetraphylla and a new regional record of O. nitidinerve, species not recorded since 1975 in mainland Sicily, are here reported. All individuals of L. tetraphylla and O. nitidinerve were observed in the same site in the province of Trapani." (Author)] Address: Surdo, S., Dept of Agriculture, Food & Forest Sciences, Univ. Palermo - Viale delle Scienze, 90128 Palermo, Italy. E-mail: salvatore.surdo@unipa.it

16622. Tagun, R.; Kunpradid, T. (2017): The relationship between diversity and distribution of aquatic insect with water quality of Mae Chaem headwater streams, Kanlayaniwattana district, Chiang Mai Province. Srinakharinwirot Science Journal 33(1): 117-133. (in Thai, with English summary) ["The aim of this study is to assess the relationship between diversity and distribution of aquatic insect with water quality in Mae Chaem headwater stream, Kanlayanitwatta district, Chiang Mai. Aquatic macroinvertebrates were sampled at Mae Chaem wadeable-headstream at four sites including MJ1, MJ2, MJ3 and MJ4 from December 2014 to August 2015 using D-frame net and obtained some physico-chemical parameter of water quality. A total of 8,889 individuals belonging to 84 families and nine orders were examined. The most aquatic insect abundance were Diptera (54%), Ephemeroptera (26%), Coleoptera (8%), Trichoptera (6%), Odonata (4%), Hempitera (3%) and others (<1%) respectively. The highest diversity index was recorded at MJ1, 2.564 and lowest diversity index was recorded at MJ2, 0.921. The highest evenness index was found at MJ1, 0.638 and lowest evenness index was found 0.521. In terms of the relative abundance, the most abundant taxa recorded was Chironomidae. The use of biological indices as BMWPThai score and ASPT and physical and chemical parameters of standard fresh-water surface to evaluate water quality showed that the water quality was moderate to good quality in each sampling sites." (Authors)] Address: E-mail rungnapatag@gmail.com

16623. Takahashi, Y. (2017): Genome-wide population genetic analysis identifies evolutionary forces establishing continuous population divergence. Ecological Research 32(4): 461-468. (in English) ["Elucidating the mechanism shaping the spatial variations of traits has long been a central concern of evolutionary biologists. Geographic clines of allele/morph frequencies along environmental gradients are suggested to be established and maintained by the balancing of two opposing evolutionary forces, namely selection that generates spatial differentiation in morph frequencies, and selection and/or stochastic factors that lead to the coexistence of multiple morphs within a population. Thus, testing for both selection and stochastic factors is necessary for a comprehensive understanding of the mechanism underlying clinal variation in morph/allele frequency in natural populations. Here, I identified the evolutionary forces responsible for clinal variation of color morph frequency in Ischnura senegalensis by comparing the population divergence of putatively neutral loci generated by high-throughput next-generation sequencing (FSTn) with that of the putative color locus (FSTc). No strong correlation was observed between FSTn and FSTc, suggesting that stochastic factors contribute less to color-locus population divergence. FSTc was less than FSTn between populations exposed to similar environmental conditions, but greater than FSTn between populations exposed to different environmental conditions, suggesting that both balancing selection and divergent selection act on the color locus. Therefore, two antagonistic selection factors rather than stochastic and historical factors contribute to establishing the clinal variation of morph frequency in I. senegalensis." (Author)] Address: Takahashi, Y., Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Sendai, Japan

16624. Tallei, T.E.; Koneri, R.; Kolondam, B.J. (2017): Sequence analysis of the Cytochrome C Oxidase subunit I gene of Pseudagrion pilidorsum (Odonata: Coenagrionidae). Makara Journal of Science 21/1: 43-52. (in English) ["P. pilidorsum is 1 of over 140 species of Pseudagrion, the largest genus of Zygoptera. This species exhibits dimorphism due to the different body colorations of males and females, making them difficult to distinguish from other congeneric species. This study analyzed the cytochrome C oxidase subunit I (COI) gene sequence of P. pilidorsum found in Bogani Nani Wartabone National Park (North Sulawesi) and compared it with other sequences of P. pilidorsum from distinct geographical locations in Asia. The COI gene for the Sulawesi specimen was amplified using the universal primer pair LCO1490 and HCO2198. A sequence homology search was conducted through BLAST. Multiple sequence alignment was executed using CLUSTAL O (1.2.1). A phylogenetic tree was constructed using the Neighbor-Joining method, and genetic distance was calculated using the Kimura 2-parameter. The COI gene sequence of the Sulawesi specimen lies in the range of 83.99-89.10% with

other P. pilidorsum deposited at GenBank, namely KF369526 (Sarawak specimen), AB708543, AB708544, and AB708545 (Japan specimens). The genetic distance falls in the range of 0.146-0.149 between the Sarawak specimen and the Japan specimen; 0.122-0.125 between the Sulawesi and Japan specimens; and 0.185 between the Sulawesi specimen and the Sarawak specimen. It can thus be inferred that the Sarawak and Japan specimens may not belong to the same species; the Sulawesi and Japan specimens may not belong to the same species; and the Sarawak specimen and Sulawesi specimens might be placed in different genera." (Authors) Rory Dow: "The supposed P. pillidorsum from Sulawesi in this paper will be P. ustum!" 28.05.2017] Address: Tallei, Trina, Dept Biol., Fac. of Mathematics & Natural Sci., Univ. Sam Ratulangi, Manado 95115, Indonesia. E-mail: trina_tallei@unsrat.ac.id

16625. Tamrin, A. (2017): Abundance of Paederus sp, Micraspis sp, Austrogomphus sp, and Orthetrum sp. in paddy field using Cowpea and Mung beans as shelter at paddy dikes. Research Journal of Pharmaceutical, Biological and Chemical Sciences 8(2): 1994-2000. (in English) ["Paederus sp., Micraspis sp., Austrogomphus sp. and Orthetrum sp. are important biological agents. The presence of them attractive by cowpea and mung beans as shelter. The study was conducted in village of Mappadaelo, sub-districts Tanasitolo, Wajo Regency South Sulawesi, Indonesia, aims impact of cowpea and mung beans as shelter in paddy dikes and their relationship with abundance of predatory insects in rice field. The experiment was arranged in Randomized Block Design, consisting of five treatments with two replication. All of predatory insects were collected with a 12-volt dust vacuum. Predatory insects keep in the glass bottle contain 70% alcohol. Results showed highest population of predatory insects in cowpea at 38 days after rice transplanting is Paederus sp. with average 16.5 individual; Austrogomphus sp. (11.5 individual) and Micraspis sp. (9.0 individual), respectively. The lowest number of Orthetrum sp. in similar plant and age (1.5 individual). Mung beans at 38 days after rice transplanting showed highest population of Micraspis sp. (11.5 individual) and lowest population in Orthetrum sp. on same age (0.0 individual). Our results suggested cowpea played important role as shelter and food source of predatory insects in rice field." (Authors)] Address: Tamrin, A., Dept of Plant Protection, Faculty of Agriculture, Hasanuddin University, Makassar (90245) Indonesia

16626. Tennessen, K. (2017): A method for determining stadium number of late dragonfly nymphs (Odonata: Anisoptera). Entomological News 126(6): 299-306. (in English) ["A method for recognizing the final stadium and the four preceding stadia of dragonfly nymphs was derived by dividing hind wing sheath length (WSL) by maximum head width (HW). Based on measurements for 15 species representing all seven North American families, five stadia can be delineated, counting backwards from the final (F-0) to the four preceding stadia (F-1, F-2, F-3, and F-4). The ratio WSL/HW over all species ranged as follows: F-0, 0.89–1.39 (mean 1.16); F-1, 0.57–0.88 (mean 0.70); F-2, 0.36–0.61 (mean 0.46); F-3, 0.24–0.44 (mean 0.32); and F-4, 0.15–0.32 (mean 0.23). As a crude guide, a ratio near 1 or greater indicates F-0, about twothirds indicates F-1, about one-half indicates F-2, about one-third indicates F-3, and about one-fourth indicates F-4. Plathemis lydia (Libellulidae) had the highest WSL/HW ratio in F-0 (1.32–1.39)." (Author)] Address: Tennessen, K., 125 N. Oxford Street, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

16627. Tennessen, K.J.; DuBois, R.; Hemeon, K. (2017): Description of the last stadium nymph of Ladona exusta (Say) (Odonata: Libellulidae). Entomologica Americana 123(1-4): 1-8. (in English) ["L. exusta is a small libelluline dragonfly restricted to the Atlantic coastal region of North America from southern Newfoundland to Virginia. Based on 20 nymphs collected in shallow ponds in Massachusetts, New Jersey and New York, we describe the final unknown nymph of the genus. The palps have 5 major setae, differing from its more widespread congeners, L. deplanata and L. julia, which normally have 6 on each side, sometimes 7 (rarely 5 or 8). Nearly all L. exusta nymphs can be separated from L. deplanata using the number of palpal setae (5 v. 6) in conjunction with the ratio of epiproct length to metafemur length (0.42–0.48 v. 0.49–0.67). L. exusta is smaller than L. julia in a number of characters, the most distinctive of which are prementum length (3.70–3.90 mm vs. 3.90–4.75 mm) and prementum maximum width (3.35–3.85 mm vs. 3.90–4.85 mm)." (Authors)] Address: Tennessen, K., P.O. Box 585, Wautoma, Wisconsin 54982, USA. E-mail: ktennessen@centurytel.net

16628. Tennessen, K.J.; Abbott, J.C. (2017): Description of the nymph of Gomphurus gonzalezi (Odonata: Gomphidae). International Journal of Odonatology 20(3/4): 201-208. (in English) ["G. gonzalezi is a locally distributed dragonfly ranging from the Lower Rio Grande in south Texas southward to San Luis Potosi state in northeastern Mexico. We describe and illustrate the nymph based on specimens from Hidalgo County, Texas. The palpal lobe of G. gonzalezi has 7–8 small teeth in a straight line with the bifid end tooth approximately the same size as the more proximal teeth, typical of the Gomphurus fraternus-group. G. gonzalezi is distinct from the other species in this group by the long, round-tipped posterolateral spines on abdominal segment 9. In the Lower Rio Grande, the nymphs of G. gonzalezi bury themselves in sand and mud in slow flowing reaches." (Authors)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

16629. Tennessen, K.T.; Trapero-Quintana, A., Cruz Ferreira, F. (2017): Description of the nymph of Tramea binotata (Rambur, 1842) (Odonata: Libellulidae). Zootaxa 4337(3): 445-450. (in English) ["The nymph of T. binotata is described and illustrated based on reared specimens from Brazil and Ecuador, and also matching nymphs from Venezuela. A new character was discovered, i.e., density of minute spiniform setae scattered on the dorsum of abdominal segments 7 & 8, that separates the Neotropical species into two groups: high density of the tiny setae separates T. binotata, T. insularis Hagen, 1861 and T. calverti Muttkowski, 1910 from the other known species which have zero to only a few of these setae. T. binotata is distinct from most other Neotropical species known in the nymph stage by having only 7 or 8 palpal setae, rarely 6 or 9, on one side (versus 10–12); T. calverti and

T. insularis have similar low numbers of palpal setae (8–10) but each has more premental setae per side (11–14 in calverti and insularis vs. 8–10, rarely 11, in binotata). The nymphs of Tramea minuta De Marmels & Rácenis, 1982 and T. rustica De Marmels & Rácenis, 1982 are still unknown." (Authors)] Address: Tennessen, K.T., Florida State Collection of Arthropods, Gainesville, USA. E-mail: ktennessen@centurytel.net

16630. ter Hofstede, H.; Voigt-Heucke, S.; Lang, A.; Römer, H.; Page, R.; Faure, P.; Dechmann, D. (2017): Revisiting adaptations of neotropical katydids (Orthoptera: Tettigoniidae) to gleaning bat predation. Neotropical Biodiversity 3(1): 41-49. (in English) ["All animals have defenses against predators, but assessing the effectiveness of such traits is challenging. Neotropical katydids (Orthoptera: Tettigoniidae) are an abundant, ubiquitous, and diverse group of large insects eaten by a variety of predators, including substrate-gleaning bats. Gleaning bats capture food from surfaces and usually use prey-generated sounds to detect and locate prey. A number of Neotropical katydid signaling traits, such as the emission of ultrasonic frequencies, substrate vibration communication, infrequent calling, and ultrasound-evoked song cessation are thought to have evolved as defenses against substrate-gleaning bats. We collected insect remains from hairy big-eared bat (Micronycteris hirsuta) roosts in Panama. We identified insect remains to order, species, or genus and quantified the proportion of prey with defenses against predatory bats based on defenses described in the literature. Most remains were from katydids and half of those were from species with documented defenses against substrate-gleaning bats. Many culled remains were from insects that do not emit mate-calling songs (e.g. beetles, dragonflies, cockroaches, and female katydids), indicating that eavesdropping on prey signals is not the only prey-finding strategy used by this bat. Our results show that substrate-gleaning bats can occasionally overcome katydid defenses." (Authors)] Address: ter Hofstede, Hannah, Dept of Biol. Sciences, Dartmouth College, Hanover, NH, USA. E-mail: Hannah.ter.Hofstede@Dartmouth.edu

16631. Theischinger, G.; Burwell, C.J. (2017): A second species of Oristicta Tillyard (Odonata: Isostictidae). Zootaxa 4323 (1): 83-95. (in English) ["In order to include an additional species in the genus Oristicta Tillyard, 1913, the lectotype of its sole species O. filicicola Tillyard, 1913 and the holotype of Phasmosticta interposita Lieftinck, 1951, its assumed junior synonym, the original descriptions of both and numerous museum specimens identified as O. filicicola are studied and discussed. In spite of some variability being noted, it is concluded that they all are O. filicicola which is considered a monotypic species. The additional species is described as Oristicta rosendaleorum sp. nov. It is comprehensively illustrated, and its affinities are discussed. Possibly sympatric in places with O. filicicola, Oristicta rosendaleorum sp. nov. has richer black markings, lacks posterolateral processes/horns on the male's pronotum (present in O. filicicola), and the male anal appendages are of different form. Oristicta filicicola is known from far north-eastern Queensland from Hammond Island (10.5°S) at the tip of Cape York to the Paluma Range (19°S) in the southern Wet Tropics Bioregion. Oristicta rosendaleorum sp. nov. is currently known from only two localities within 20 km of Lakeland (15.9°S) in south-eastern Cape York Peninsula." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

16632. Theischinger, G.; Richards, S.J. (2017): Teinobasis vincenti sp. nov., a new damselfly from the Muller Range in Papua New Guinea (Odonata: Coenagrionidae). IDF-Report 106: 1-6. (in English) ["A new species of the genus Teinobasis Kirby is described from the Muller Range in Western Province, Papua New Guinea. Its male is distinguished from all other Teinobasis species by having a pale labrum, an extensively bright orange thorax, and ventrally bowed superior anal appendages that are markedly shorter than the plump, apically rounded inferiors. Characters of the male are illustrated, and the affinities of the new species are discussed." (Authors)] Address: Theischinger, G., Office of Environment & Heritage New South Wales, Sydney, NSW, Australia, & Australian Museum, Entomology, 6 College Str., Sydney, NSW, 2010, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

16633. Thomas, K. (2017): Four-spotted Chaser Libellula quadrimaculata Roosting in Large Numbers at Ham Wall Nature Reserve, Somerset. Atropos 60: 47-49. (in English) [Verbatim: On 1-VI- 2017 a small group of RSPB staff, including Reserves Ecologists Graham White and Bex Cartwright, were visiting RSPB's Ham Wall nature reserve for an early morning bird survey. Ham Wall sits in the Avalon Marshes, Somerset. Not long after reaching the site, between 04.30 and 05.15hrs, a group of roosting L. quadrimaculata were observed in an area of reeds. These were counted, and there were over 600 individuals present. However, it was soon realised that there were more present, and further counting estimated 2,000-3,000 individuals in the area. It is assumed that the dragonflies had roosted there overnight and would then disperse during the daytime. They were observed over subsequent days, but within two weeks the roost was no longer present in this area, although some wings could be found amongst the reeds. Ham Wall is a wetland created on an area previously worked by the peat industry. We are encouraged that the habitat created is suitable for a range of wildlife, including this spectacular display of dragonflies. We will re-visit the area at a similar time in 2018 to determine if this event is repeated (please note, the area that the roost was observed in is a sensitive area for wildlife and is off the path network). This was an interesting observation of a dragonfly roosting in such large numbers; we have not been able to find any similar documented sightings and would be interested to hear if similar observations have been recorded elsewhere.] Address: Thomas, Kelly, Reserves Ecologist, RSPB, The Lodge, Bedfordshire, SG19 2 DL, U.K. E-mail: kelly.thomas@rspb.org.uk

16634. Thompson, A.C.; Bazelet, C.S.; Naskrecki, P.; Samways, M.J. (2017): Adapting the Dragonfly Biotic Index to a katydid (Tettigoniidae) rapid assessment technique: case study of a biodiversity hotspot, the Cape Floristic Region, South Af-

rica. Journal of Orthoptera Research 26(1): 63-71. (in English) ["Global biodiversity faces many challenges, with the conservation of invertebrates among these. South Africa is megadiverse and has three global biodiversity hotspots. The country also employs two invertebrate-based rapid assessment techniques to evaluate habitat quality of freshwater ecosystems. While grasshoppers (Acrididae) are known indicators of terrestrial habitats, katydids could be as well. Here, we adapt a South African freshwater invertebrate-based rapid assessment method, the Dragonfly Biotic Index (DBI), for the terrestrial katydid assemblage, and propose a new assessment approach using katydids: the Katydid Biotic Index (KBI). KBI assigns each katydid species a score based on a combination of: 1) IUCN Red List status, 2) geographic distribution, and 3) life history traits (which consist of mobility and trophic level). This means that the rarer, more localized, specialized and threatened katydid species receive the highest score, and the common, geographically widespread and Least Concern species the lowest. As a case study, we calculated KBI across one of South Africa's global biodiversity hotspots, the Cape Floristic Region (CFR). We then correlated KBI/Site scores of individual ecosystems with their ecosystem threat scores. The CFR's katydid assemblage did not differ significantly from that of the overall South African katydid assemblage in terms of its species traits, threat statuses, or distribution among tettigoniid subfamilies. Likewise, KBI/Site scores did not differ significantly among ecosystem threat statuses. This may be explained by the coarse spatial scale of this study or by the lack of specialization of the CFR katydid assemblage. Nevertheless, the KBI holds promise as it is a relatively simple and non-invasive technique for taking invertebrate species composition into account in an assessment of habitat quality. In regions where katydid assemblages are well-known, acoustic surveys and KBI may provide an efficient means for assessing habitats." (Authors)] Address: Thompson, Aileen, Dept of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. E-mail: acthompson@sun.ac.za

16635. To, V.Q.; Phan, Q.T.; Tran, V.B. (2017): Description of Coeliccia bhriulieci sp. nov. (Odonata: Zygoptera: Platycnemididae) from central Vietnam. Zootaxa 4341(2): 279-282. (in English) ["C. bhriulieci sp. nov. (holotype male from Tay Giang district, Quang Nam province, central Vietnam, deposited in the Zoological collection of the Southern Institute of Ecology, Vietnam Academy of Science and Technology, Ho Chi Minh City, Vietnam) is described based on male specimens. The new species is easily distinguished from other Coeliccia species in the Southeast Asian region by the combination of its blue abdominal tip, black anal appendages and structure of genital ligula with two long flagella extending from lateral corners of apical segment. Damselflies of the genus Coeliccia Kirby, 1890 display a remarkably high diversity in Vietnam, with at least 17 species currently described, several of which only recently (e.g. Dow 2016, Phan & Kompier 2016, Kompier & Phan 2017). In this paper C. bhriulieci sp. nov. from central Vietnam is described. The new species appears to be most similar to C. cyanomelas Ris, 1912, C. pyriformis Laidlaw, 1932 and C. mientrung Kompier & Phan, 2017, but the combination of a narrow and long antehumeral stripe, entirely black mesepimeron, blue abdominal tip and black appendages is unique for C. bhriulieci sp. nov. and allows for the differentiation of this new species from its congeners in the Southeast Asian region." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research and Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16636. Torres-Cambas, Y.; Ferreira, S.; Cordero-Rivera, A.; Lorenzo-Carballa, M.O. (2017): Identification of evolutionarily significant units in the Cuban endemic damselfly Hypolestes trinitatis (Odonata: Hypolestidae). Conservation Genetics 18(5): 1229-1234. (in English) ["Species classification may not reflect the underlying/cryptic genetic diversity which should otherwise be conserved as it represents the potential of populations to evolve and adapt. The identification of evolutionarily significant units (ESUs) allows cryptic genetic diversity to be taken into account when designating conservation priorities. Here, we used mitochondrial and nuclear DNA sequences integrated with ecological niche models (ENM) to identify ESUs in H. trinitatis, a threatened Cuban endemic damselfly species. We found that this species comprises two distinct genetic groups in Central and Eastern Cuba respectively, which are also geographically isolated, as shown by ENM. Therefore, we propose these groups to be considered as different ESUs. According with their extent of occurrence, number of locations and inferred decline of habitat extent and quality, Central and Eastern ESUs qualify as Endangered [EN B1b(iii)] and Vulnerable [VU B1b(iii)], respectively." (Authors)] Address: Torres-Cambas, Y., Depto de Biol., Fac.Ciencias Naturales y Exactas, Univ. de Oriente, Santiago de Cuba, Cuba

16637. Torres-Pachón, M.; Novelo-Gutiérrez, R.; Espinosa de los Monteros, A. (2017): Phylogenetic analysis of the genus Argia Rambur, 1842 (Odonata: Coenagrionidae), based on morphological characters of larvae and mitochondrial DNA sequences. Organisms Diversity & Evolution 17(2): 409-420. (in English) ["The study of the evolutionary interrelationships among the species encompassed in the Neotropical genus Argia has been neglected. The goal of this study is to infer the phylogenetic relationships among 36 species of Argia Rambur, 1842, using complementary data sets (i.e., larval morphology and mitochondrial DNA). The morphological data set comprises 76% of the larvae currently described for this genus and includes 97 morphological characters. From those, 47 characters have not been previously used in taxonomic studies involving dragonflies' larvae. This is the first cladistic study based on larvae morphology for species within the suborder Zygoptera. Data partitions were analyzed individually, as well as total evidence, using parsimony and Bayesian inference as criteria for optimal-tree selection. The results support the monophyly of the North American species of Argia. This genus can be identified by the combination of eight synapomorphies, four of which are exclusively found in Argia. According to the optimal trees, the individual data sets (i.e., morphology and DNA sequences) have a high level of ho-

moplasy, resulting in soft polytomies and low support for several nodes. The specific relationships of the terminal units differ between the phylogenies; nonetheless, there is historical congruence among them. Within Argia, five clades were consistently recovered. Most of those clades have been identified, at least in part, in previous phylogenetic and taxonomic studies. Indubitably, the morphological characters from larvae have historical signal useful for cladistic and taxonomic inference. Therefore, it should be a priority to pay more attention to this source of characters." (Authors)] Address: Espinosa de los Monteros, A., Depto Biol. Evol.. Inst. Ecol., A. C. Carretera antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: alejandro.espinosa@inecol.mx

16638. Tost, S.; Chovanec, A. (2017): Beobachtung einer Attacke eines Teichmolches auf ein immatures Weibchen von Aeshna cyanea (Odonata: Aeshnidae). Mercuriale 17: 57-62. (in German, with English summary) ["Observation of a teneral female A. cyanea attacked by a female Common Newt. On June 6th, 2011, a freshly hatched female A. cyanea was attacked by a female Common Newt (Lissotriton vulgaris) for several hours in a garden pond. In this paper this presumingly rarely occurring interaction between an anisopteran imago and a newt is discussed by means of comprehensive literature on predator-prey-relationships between dragonflies and amphibians. The ultimately unsuccessful attack was documented by a photo." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

16639. Tüzün, N.; Stoks, R. (2017): Carry-over effects across metamorphosis of a pesticide on female lifetime fitness strongly depend on egg hatching phenology: A longitudinal study under seminatural conditions. Environ. Sci. Technol. 51(23): 13949-13956. (in English) ["Current ecological risk assessment of pesticides fails to protect aquatic biodiversity. For the first time, we tested two potential reasons for this failure with regard to carry-over effects across metamorphosis: their dependence on hatching period, and the lack of studies quantifying adult fitness under seminatural conditions. Using Coenagrion puella sampled from six populations, we designed an outdoor longitudinal one-year study starting from the egg stage. We exposed the aquatic larvae to the pesticide esfenvalerate (0.11 µg/L) during the initial microcosm part. Next, we monitored the lifetime fitness of the terrestrial adults in an insectary. Exposure to the pesticide negatively impacted not only larval traits, but also drastically reduced lifetime mating success of adult females. The impact of this postmetamorphic effect of the pesticide on the population level was three times more important than the effects in the larval stage. Importantly, this carry-over effect was only present in females that hatched early in the season, and was not mediated by metamorphic traits (age and mass at emergence). We provide proof-of-principle under seminatural conditions for two potential pitfalls that need to be considered when improving risk assessment: carry-over effects on adult fitness can (i) be much more important than effects during the larval stage and may not be captured by metamorphic traits, and (ii) be strongly modulated by egg hatching dates." (Authors)] Address: Tüzün, N., Evol. Stress Ecol. & Ecotoxicology, Univ. Leuven, Deberiotstr. 32, 3000 Leuven, Belgium

16640. Turnmore, M. (2017): An early morning dragonfly sighting. Atropos 58: 55. (in English) [Verbatim: "In the early hours of 30 August 2016 I was carrying out a pre-dawn bat survey in St Ives, on the north coast of Cornwall, as part of my work as an ecologist. This involved standing looking northwards (towards the sea) at one aspect of a large flat-roofed building, approximately 100m from the seafront. The survey began at approximately 04.50hrs. Weather conditions were dry and calm with a temperature of 15°C and complete cloud cover; sunrise was at 06.36hrs. It was a fairly uneventful survey with a single Common Pipistrelle Pipistrellus pipistrellus returning to roost behind hanging tiles on the exterior of the building at around 06.10hrs, after which all bat activity ceased. At around 06.20hrs my attention was drawn towards a movement low over the roof of the building and I was surprised to see a dragonfly appear, flying down to circle a few metres in front of me at around head height, gaining height over the roof, before doing one more similar circuit and disappearing. This appeared to be a patrolling flight rather than a foraging flight. The insect was not seen again, much to my frustration. It appeared to be a small hawker-type dragonfly but unfortunately as it was not yet fully light it was not possible to discern any colours or markings on the insect and confirm the identity. This part of St. Ives is fairly urban with lots of buildings and small gardens but no obvious areas of water—not classic Odonata habitat by any means. The nocturnal occurrence of Odonata at moth-traps is well-known in the UK, being particularly associated with species that are known migrants, and it is generally accepted that most such records refer to migrant insects (Parr, 2006). Whilst Odonata species occurring in the UK are diurnal species that are particularly active in sunny conditions, it is clear that some are capable of nocturnal activity when on migration. Activity at sunrise and sunset is known in some European species, which also includes Anax imperator in Spain (Corbet, 1999); the same author notes that many aeshnids may exhibit occasional episodes of activity over water at sunrise and sunset, especially during warm weather. All things considered I suspect this particular sighting relates to Aeshna mixta." (Author)] Address: Tunmore, M., The Boat House, Church Cove, Lizard, Cornwall, TK12 7PH, UK

16641. Usman, K.; Pervaiz, K.; Rehman, H.U.; Achakzai, W.M.; Saddozai, S. (2017): Exploring of dragonfly fauna in lower region of district Karak KP, Pakistan. Journal of Entomology and Zoology Studies 5(1): 708-710. (in English) ["The present study was conducted to explore dragonfly fauna in the lower region (North West) of District Karak Khyber Pakhtunkhwa Pakistan. Duration of the study was one year, i.e., January 2015 to December 2015. A total of 850 specimens were collected from various sampling sites, viz., Rehmat Abad, Soor Dag, Latamber, Shareef Wala and Paloskai Banda of the North West region. The Specimens identified belong to … Libellulidae, Aeshnidae and Gomphidae, 6 Genera and 6 Species respectively. Family Libellulidae was the largest family consisting 4 Species Orthetrum triangulare triangulare, Palpopleura sexmaculata, Pantala flavescens and Trithemis

aurora. Family Aeshnidae and Gomphidae comprising only one species, each Anax immaculifrons and Onychogomphus strigatus respectively. From the current research it can be concluded that this region have a diverse dragon fly fauna. Similar survey on large scales is recommended to fully evaluate the dragonfly fauna of North West region of District Karak." (Authors)] Address: Usman, K., Dept of Zoology, Hazara University, Mansehra, Khyber Pakhtunkhwa, Pakistan

16642. Usman, K.; Pervaiz, K.; Wasif, M.; Rehman, H.U.; Khattak, B. (2017): Exploring of dragonfly fauna in city Karak and its surrounding areas Khyber Pakhtunkhwa, Pakistan. Journal of Entomology and Zoology Studies 5(2): 905-907. (in English) ["Karak is located in the Khyber Pakhtunkhwa Province, Pakistan. The Dragonfly fauna in City Karak and its surrounding areas was first time explore during the present study 29 species from 17 families under 25 genera are being reported during February 2014 to October 2014. Salticidae were most commonly occurred species. Duration of the current study was one year, i.e., February 2014 to October 2014. A total of 725 specimens of the dragonfly were collected from various sampling sites of City Karak. These sampling sites were Tehsil colony, Gulshan Abad colony, Rehmania colony, Tappi, Jama, Kach Banda, Porana Bazra and main Karak city respectively. The Specimen collected and identified belong to Libellulidae, Aeshnidae and Gomphidae, 6 genera Orthetrum, Palpopleura, Pantala, Trithemis, Anax and Onychogomphus. Family Libellulidae was the largest family consisting of 7 species while Aeshnidae and Gomphidae comprising only one species each. From the current study, it can be concluded that the City Karak and its surrounding areas having a diverse range of dragonflies. Furthermore, the same study on large scales is recommended to fully explore the dragon fly fauna in this region." (Authors)] Address: Usman, K., Dept of Zoology, Hazara, Univ. Mansehra, Khyber, Pakhtunkhwa, Pakistan

16643. Usman, K.; Pervaiz, K.; Rehman, H.U.; Sadia, H.; Akbar, N.U.; Khan, M.Y.; Nawaz, A.; Baloch, H.A.; Ateeq, M.; Zareen, S. (2017): Monitoring of dragonfly fauna in Tehsil Takht-ENasrati district Karak KP, Pakistan. Journal of Entomology and Zoology Studies 5(1): 378-379. (in English) ["This paper communicates the exploring of the dragonfly fauna collected from Tehsil Takhti Nusrati District Karak Khyber Pakhtunkhwa, Pakistan. A survey was conducted over a period of one year. A total 733 specimens of dragonfly were collected from various sampling sites of Tehsil Takhti Nusrati. These sampling sites were Takhti Nusrati, Zarki Nasrati, Ganderi Khattak, Bogara and Khada respectively. The specimens collected and identified belonged to 1 Order, 3 Families, 6 Genera and 7 Species. Family Libellulidae was the largest family consisting 5 Species while Family Aeshnidae, and Gomphidae comprising only one species each. From the Present study, it is concluded that Takht-e-Nusrati Tehsil have a diverse dragon fly fauna. Similar survey on large scales is recommended to fully evaluate the dragonfly fauna in the Warana region of District Karak." (Authors)] Address: Usman, K., Dept of Zoology, Hazara University, Mansehra, Khyber Pakhtunkhwa, Pakistan

16644. Van der Meer, H. (2017): Note on the behaviour of Onychogomphus boudoti in Morocco and discovery of a second population. Brachytron 19(2): 117-123. (in Dutch, with English summary) ["In 2011 a new dragonfly species was discovered in Morocco which was described in 2014. During a field trip to Morocco in June 2017 several individuals of O. boudoti were observed during two visits at the known site east of Khenifra. The behaviour of these individuals was divergent from the information as described in the article which was published in 2014. We observed several indidviduals sitting on the ground, especially when the weather was very cloudy. Mating wheels were observed as well, both on the ground, and perched in bushes. Oviposition was performed by the female alone, under some bushes providing shadow over the small stream. Also, a new location is mentioned which was found in 2016." (Author)] Address: Harold van der Meer. E-mail: Harold_zeearend@hotmail.com

16645. VeenaChoubey, R.B (2017): Benthos and venomous snakes in Narmada valley Jabalpur for environment and human welfare. Global Journal of Multidisciplinary Studies 6(7): (in English) ["Narmada River, a mighty west flowing river is the fifth largest river in India. At present pollution load of river increases rapidly. Benthic macroinvertebrates are used as pollution indicators that live on or inside the river bed of a water body. Recently this region is rapidly undergoing industrialization, township etc., and such these areas are prone to habitat loss due to which different types of poisonous and non-poisonous snakes are being noticed in the residential areas. Snake bite is an acute life threatening hazard often faced by farm labors and farmers leads to death. This study aims to reduce such problems. The whole Narmada valley of Jabalpur region was selected as study site for the collection of sample. The present study was carried out from January 2014 to December 2016. Sampling of snakes was done as per the requirement of local people. Four study sites had been selected for the investigation of benthos were Bargi dam, Gwarighat, Tilwaraghat and Bhedaghat. Organisms were identified by using standard identification keys provided by Fraser (1933, 1934 and 1936); Mitra (2006); Subramanian (2005, 2009); Andrew et al., (2009); Varshney (1983); Tonapi (1980); Adoni et al., (1985); SubbaRao (1993), Smith (1943); Whitaker & Captain (2004) and indiansnakes.org. In present study total 81 species of various fauna have been recorded viz., Odonata 37 species (7 Families), Lepidoptera 25 Species (5 Families), Mollusca 13 Species (2 Class), Reptiles 06 species (2 families). Benthos helps to assess quality of water and play an important role in food chain for the natural balance. In the same way this study will help people to know venomous snakes when encountered namely, Common Krait, Spectacled Cobra, Russell's viper and Saw-scaled Viper; responsible for more than 80% fatalities in Indian Subcontinent. The whole study on benthos as well as reptile encircle around environment and human welfare." (Authors)] Address: not stated

16646. Vermaat, J.E.; Hellmann, F.A.; van Teeffelen, A.J.A.; van Minnen, J.; Alkemade, R.; Billeter, R.; Beierkuhnlein, C.; Boitani, L.; Cabeza, M.; Feld, C.K.; Huntley, B.; Paterson, J.;

WallisDeVries, M.F. (2017): Differentiating the effects of climate and land use change on European biodiversity: A scenario analysis. Ambio 46(3): 277-290. (in English) ["Current observed as well as projected changes in biodiversity are the result of multiple interacting factors, with land use and climate change often marked as most important drivers. We aimed to disentangle the separate impacts of these two for sets of vascular plant, bird, butterfly and dragonfly species listed as characteristic for European dry grasslands and wetlands, two habitats of high and threatened biodiversity. We combined articulations of the four frequently used SRES climate scenarios and associated land use change projections for 2030, and assessed their impact on population trends in species (i.e. whether they would probably be declining, stable or increasing). We used the BIOSCORE database tool, which allows assessment of the effects of a range of environmental pressures including climate change as well as land use change. We updated the species lists included in this tool for our two habitat types. We projected species change for two spatial scales: the EU27 covering most of Europe, and the more restricted biogeographic region of 'Continental Europe'. Other environmental pressures modelled for the four scenarios than land use and climate change generally did not explain a significant part of the variance in species richness change. Changes in characteristic bird and dragonfly species were least pronounced. Land use change was the most important driver for vascular plants in both habitats and spatial scales, leading to a decline in 50–100% of the species included, whereas climate change was more important for wetland dragonflies and birds (40–50 %). Patterns of species decline were similar in continental Europe and the EU27 for wetlands but differed for dry grasslands, where a substantially lower proportion of butterflies and birds declined in continental Europe, and 50 % of bird species increased, probably linked to a projected increase in semi-natural vegetation. In line with the literature using climate envelope models, we found little divergence among the four scenarios. Our findings suggest targeted policies depending on habitat and species group. These are, for dry grasslands, to reduce land use change or its effects and to enhance connectivity, and for wetlands to mitigate climate change effects." (Authors)] Address: Vermaat, J.E., Dept Environmental Sciences, Norway's University of Life Sciences, Ås, Norway. E-mail: jan.vermaat@nmbu.no

16647. Vieira, V.; Cordero-Rivera, A. (2017): Ischnura hastata – a new species for Graciosa Island, Azores, Portugal (Odonata: Coenagrionidae). Notulae odonatologicae 8(9): 332-336. (in English) ["A small population of I. hastata was observed on 20-vii- and 21-vii-2016 at the freshwater pond 'Charco da Caldeira' in the Caldeira of Graciosa island, Portugal. It constitutes both the first record in this island and the presence in all major islands of the Azores archipelago." (Authors)] Address: Vieira, V., Univ. dos Açores, Depto de Biol. & CE3C/ABG – Centre for Ecol., Evol. & Environ. Changes/Azorean Biodiversity Group. Rua da Mãe de Deus 13A, Apartado 1422, PT – 9501-801 Ponta Delgada, Açores, Portugal. E-mail: virgilio.ff.vieira@uac.pt

16648. Viganò, M.; Janni, J.; Corso, A. (2017): Tramea basilaris on Linosa Island, Italy: A new species for Europe and the Western Palaearctic (Odonata: Libellulidae). Odonatologica 46(1/2): 55-66. (in English) ["Two individuals of T. basilaris were observed and photographed at Linosa Island south of Sicily on 21-x-2016. This constitutes the first record of this species north of the Sahara, for Europe and for the Western Palaearctic. The closest known record is from Lake Chad, about 2 500 km to the South." (Authors)] Address: Viganò, M., MISC – Via Ongetta, 5 – 21010 Germignaga, Varese, Italy. E-mail: mikivigano@yahoo.com

16649. Vilela, D.S.; Del-Claro, K.; Guillermo-Ferreira, R. (2017): The influence of body size and agility in displacement capacity of male damselflies (Odonata, Protoneurinae). Journal of Insect Behavior 30(6): 759-767. (in English) ["Alternative mating tactics (AMT) occur in several animal taxa as a way to respond to physiological or environmental factors that affect reproductive success. In other words, males can exhibit different mate acquisition tactics associated with phenotypic variations. Here we present the case of Epipleoneura williamsoni, a non-territorial Neotropical damselfly in which larger males actively search for females along the margins of streams and smaller males remain perched on the vegetation and adopt a sit-and-wait strategy. Males were captured, marked and behavioral observations were conducted to take notes on the spatial displacement of individuals. We then measured male body size and agility to test whether these traits could be used to predict flight ability and thus AMT's. Agility was measured by the 2(S) coefficient, which is a surrogate of flight ability and maneuverability. The results show that body size was positively correlated with male flight ability and agility. However, male agility did not predict the adopted AMT. These results suggest that the strategies adopted by E. williamsoni males may be a reflection of body condition. This study adds evidence on how selection may act on different phenotypes within a population and how body size variations may result in different displacement capacities and flight agility." (Authors)] Address: Vilela, D.S., Dept Biol., Univ. São Paulo (USP), Ribeirão Preto, Brazil

16650. Vilela, D.S.; Ricioli, L.S.; Del-Claro, K.; Guillermo-Ferreira, R. (2017): Female color polymorphism of Ischnura capreolus Hagen, 1861 (Odonata: Coenagrionidae) with notes on behavior and ontogenetic color changes. International Journal of Odonatology 20(3/4): 191-200. (in English) ["Polymorphism in coenagrionids is widely known, mainly for Ischnura. Here, we present the case of I. capreolus, a Neotropical species of which, until now, little information concerning color polymorphism and ontogenetic color changes was known. We used a marking and recapture method to evidence ontogenetic coloration changes in females. We show that, in addition to the gynochrome morph, I. capreolus females also exhibit at least one additional morph: an androchrome color pattern. Gynochrome females (97.1% of marked females) are green-yellow when young and change to a brownish pattern with age, within a week. Androchrome females (2.9% of marked females) exhibit blue coloration, similarly to males. Our study provides

the first evidence of ontogenetic color change in I. capreolus. Furthermore, field observations show that I. capreolus is similar to other Ischnura species regarding sexual harassment behavior." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept Biology, Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeogoo@gmail.com

16651. Villalobos-Jiménez, G.; Hassall, C. (2017): Effects of the urban heat island on the phenology of Odonata in London, UK. International Journal of Biometeorology 61: 1337-1346. (in English) ["Urbanisation is one of the major drivers of ecosystem change, and includes increased temperatures in cities leading to an urban heat island (UHI). This study quantified the phenological response of odonates across London, UK, from 1990 to 2012 using a database of 1,031,277 historical sightings. The ordinal flight dates of each species were used to calculate the leading edge, middle, and trailing edge of the flight period (P5, P50, and P95, respectively). The results suggest that the phenology of odonates is affected by the UHI only at a community level: no significant changes in the P5 or P50 of the flight period were found, although the P95 shows a mean advance of 4.13 days compared to rural areas, thus suggesting a contraction of the flight period in urban areas. However, only one individual species (Sympetrum striolatum) exhibited an advance in the P95 of the flight period in urban areas compared to rural areas. On the other hand, climate change (minimum temperature) had a much stronger impact on the phenology of odonates at the community level with a significant advance of 6.9 days $°C^{-1}$ in the P5 of the flight period, 3.1 days $°C^{-1}$ in the P50, and 3.3 days $°C^{-1}$ in the P95 flight date. Similarly, a significant advance in P5 was found in 7 of the 15 species tested in response to minimum temperature and 2 species showed a significant advance in P50 in response to minimum temperature, but no species showed a shift in the P95 flight date due to minimum temperature. As shown in previous studies, life history influences the phenological response of odonates, with spring species and those species lacking an egg diapause being the most responsive to increased temperatures, although summer species and species with obligate egg diapause also respond to the UHI by advancing the P95 by 3.8 days and 4.5 days respectively compared to rural areas, thus contracting the flight period. The present study shows that the UHI has negligible impacts on emergence patterns of odonates compared to climate change, which may result from the capacity of aquatic habitats to buffer the microclimatic conditions of the surrounding terrestrial habitats. We conclude by highlighting the importance of climate change on freshwater habitats over the impacts of the UHI." (Authors)] Address: Villalobos-Jiménez, Giovanna, School of Biol., Univ. Leeds, Woodhouse Lane, Leeds LS2 9JT, UK. E-mail: bsgdjv@leeds.ac.uk

16652. Vinko, D.; Kulijer, D.; Billqvist, M.; Martens, A. (2017): The biting midge Forcipomyia paludis (Macfie, 1936) (Diptera: Ceratopogonidae) in Slovenia, Bosnia and Herzegovina, Croatia and Sweden. Natura Sloveniae 19(1): 5-21. (in English, with Slovene summar) ["Records of F. paludis from Slovenia and Bosnia and Herzegovina are reported herewith as the first finds of F. paludis in both countries, together with new records from Croatia and Sweden. This biting midge is a temporary ectoparasite of dragonfly imagines and the only ceratopogonid species known in Europe to feed specifically on this insect group. Forcipomyia paludis is already known in 18 European countries. Prior to this report, F. paludis was known to infest 67 dragonfly species in Europe. 13 dragonfly imagines from 11 sites in Slovenia, 27 imagines from 13 sites in Bosnia and Herzegovina and six imagines from two sites in Croatia having F. paludis on their wings were recorded. Additional data for 50 imagines from 15 sites in Sweden are also presented. In Slovenia, the species is known to occur in the Gorenjska, Goriška Brda, Vipava River Valley, Coastal-Karst region, Central Slovenia, Koèevska region and Bela krajina, while in Bosnia and Herzegovina it is known only from south Herzegovina (Ljubuški, Èapljina, Mostar and Stolac areas). In Croatia, the species is present in several parts of the country, while in Sweden it occurs only in the southern and middle parts of the country (Skane, Öland, Gotland, Göteborg and Gävle). Six new dragonfly host species and the northernmost occurrence of F. paludis are also reported." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

16653. Voss, K.; Loewy, K. (2017): Hudsonian Emerald (Somatochlora hudsonica, Hagen) in Boulder County. https://assets.bouldercounty.org/wp-content/uploads/2018/10/hudsonian-emerald.pdf: 34 pp. (in English) ["Dragonfly conservation in parks serves the dual purpose of protecting iconic species of aesthetic value to park visitors as well as preserving aquatic ecosystem function. S. hudsonica is the only Colorado dragonfly listed as sensitive by the US Forest Service. Little is known about S. hudsonica's habitat associations, distribution, and life history, all essential for future management of the species. We began answering those basic questions with literature-based habitat suitability models followed by a ground-truthing survey of adults across Boulder County Parks and Open Space (BCPOS) properties that span the suitability gradient to determine the local habitat variables that influence probability of occurrence. To determine breeding habitat, we also conducted an exuvial survey, and set the groundwork for captive rearing. The information collected as part of this project will provide critical baseline data necessary for BCPOS to draft habitat management and monitoring plans for the Hudsonian emerald." (Authors)] Address: Kristofor Voss, K., Dept of Biology, Regis University, kvoss@regis.edu

16654. Wang, Z. (2017): Systematic dragonflies names of China (Odonata). Henan Science 2017(1): 48-77. (Chinese, with English summary) ["The paper reports all three suborder Zygoptera, Anisozygoptera and Anisoptera 730 dragonfly species (subspecies) belong to 160 genera and 20 families of Odonata from China." (Author)] Address: Wang, Z., Henan Academy of Sciences, Zhengzhou 450002, China

16655. Wang, A.R.; Kim, M.J.; Kim, S.S.; An, J.; Kim, I. (2017): Development and validation of microsatellite markers from the Tiny dragonfly, Nannophya pygmaea (Odonata: Libellulidae) populations that are endangered in Korea. Proceed-

ings of the Korean Society of Applied Entomology, 2017 Annual Meeting of the Korean Soc. Appl. Ento. & Intern. Symp., Emergence of Applied Insects: 153. (in English) [Verbatim: "N. pygmaea is one the smallest dragonflies in the world and listed as a second-degree endangered wild animal in Korea. We developed microsatellite markers and applied selected markers to South Korean populations to understand population genetic characteristics, along with two mitochondrial DNA (mtDNA) gene sequences (COI and ND5). Two mtDNA-based population genetic analysis indicates substantially reduced genetic diversity in an island population (Muuido) compared to others. On the other hand, population-based FST and RST consistently support that N. pygmaea populations are overall well interconnected with a relatively high gene flow. These results may collectively indicate that N. pygmaea populations in South Korea may have rather larger population size than we previously acknowledged based on a single-locus mtDNA sequence and field observation." (Authors)] Address: not stated.

16656. Wang, M.; Wang, M.; Shen, L.; Sun, X.; Shi, G.; Ma, W.; Yan, X. (2017): High-performance flexible surface-enhanced Raman scattering substrates fabricated by depositing Ag nanoislands on the dragonfly wing. Applied Surface Science 436: 391-397. (in English) ["Highlights: •Dragonfly wing with irregular surface for template gets a high SERS performance. •The optimized structure of Ag on irregular DW was obtained by magnetron sputtering. •The prepared substrates are flexible, low-cost, large-scale and environment-friendly. •The limit of detection reaches 10-10 M to 4-aminothiophenol. •Rapid and quantitative detection of crystal violet can be achieved by our substrates. Abstract: Natural dragonfly wing (DW), as a template, was deposited on noble metal sliver (Ag) nanoislands by magnetron sputtering to fabricate a flexible, low-cost, large-scale and environment-friendly surface-enhanced Raman scattering (SERS) substrate (Ag/DW substrate). Generally, materials with regular surface nanostructures are chosen for the templates, the selection of our new material with irregular surface nanostructures for substrates provides a new idea for the preparation of high-performance SERS-active substrates and many biomimetic materials. The optimum sputtering time of metal Ag was also investigated at which the prepared SERS-active substrates revealed remarkable SERS activities to 4-aminothiophenol (4-ATP) and crystal violet (CV). Even more surprisingly, the Ag/DW substrate with such an irregular template had reached the enhancement factor (EF) of ~1.05×105 and the detection limit of 10-10 M to 4-ATP. The 3D finite-different time-domain (3D-FDTD) simulation illustrated that the “hot spots” between neighbouring Ag nanoislands at the top of pillars played a most important role in generating electromagnetic (EM) enhancement and strengthening Raman signals." (Authors)] Address: Wang, M., Key Lab. for Microstructural Material Physics of Hebei Province, School of Science, Yanshan Univ., Qinhuangdao 066004, China. E-mail: wml@ysu.edu.cn

16657. Wang, R.; Yu, X.; Xue, J.; Ning, X. (2017): Descriptions of larvae of Vestalaria venusta (Hämäläinen, 2004) and Matrona basilaris Selys, 1853 (Odonata: Calopterygidae). Zootaxa 4306(4): 580-592. (in English) ["Larva of V. venusta is identified using DNA barcoding match with the adult and described in the first time. Morphological characters are compared with those of M. basilaris and V. amoena. The validity of genus the Vestalaria is reconfirmed. The important role of DNA barcoding in odonate larva identification is emphasized." (Authors)] Address: Yu, X., Inst. Entomology, College of Life Sciences, Nankai Univ., Tianjin, 300071, China. E-mail: lannysummer@163.com

16658. Wang, Y.; Yin, Y.; Zheng, G. (2017): Fluid-coupled vibration control inspired by dragonfly wings. Topics in Modal Analysis & Testing 10: 31-36. (in English) ["Dragonfly wings have excellent aerodynamic performance and damping capacity, which is driving people’s attention. The existing researches on it are mainly from the vein structure and focusing on the static performance demonstration of dragonfly wings. Flutter analysis is very important during the process of aircraft design. With the inspiration of internal flow of dragonfly wings, the Coriolis force on the pipe wall while vibrating is discussed. By establishing a two-dimensional wing model, using quasi-steady aerodynamic equation, the aerodynamic force and the Coriolis force generated while fluttering were calculated. Theoretical calculation and numerical method are used to find critical velocity with and without internal flow. Coriolis force is proved effective on reducing two-dimensional wing flutter." (Authors)] Address: Wang, Y., School of Aerospace Engineering, Tsinghua Univ., Beijing, China. E-mail: 972559901-@qq.com

16659. Wei, Y.; Luo, J.; Zhou, Z.; Liu, Y.; Zhang, D. (2017): The research of Odonata resources in Gansu province. Gansu Agr. Sci. and Techn. 9: 16-20. (in Chinese, with English summary) ["In this paper the insect resources of Odonata in Gansu province are preliminary study. Through the identification of specimen and literature search there are 69 species of Odonata insect in Gansu province and they belonged to 45 genera, 12 families. Among them, 22 species are newly recorded species in Gansu. Libellulidae are the dominant families with 10 genera and 24 species. The faunal analysis shows that the Palaearctic and Oriental common species are in the majority there are 37 species accounting for 53.6% of the total. In different geographic regions in Gansu province the Odonata resource is most rich in Longnan area." (Authors)] Address: Wei, Y., Dawei Inst. of Plant Protection Gansu Acad. of Agricultural Sci. CLanzhou Gansu 730070 China

16660. Wild, N. (2017): Spatio-temporal patterns of dragonfly occurrence on meadows in the Donau-Auen National Park, Lower Austria. Conference Volume, 6th Symposium for Research in Protected Areas, 2 to 3 November 2017, Salzburg: 727-732. (in English) ["Dispersal is a characteristic trait in Odonata. While dispersal behavior of dragonflies and damselflies between waterbodies has generally received a great deal of attention, dispersal processes subjected to terrestrial habitats and hence, Odonate’s use in the context of foraging activities, have previously only attracted limited interest. This study aimed to investigate the dispersal of dragon-

flies and damselflies to floodplain meadows used for foraging or as refuge. The primary focus was on assessing species-specific dispersal characteristics influencing the spatial distribution of species, species richness and community structure on meadows. Therefore, Odonata were sampled between May and September 2016 at 16 meadow and eight waterbody sites in the Donau–Auen National Park (DANP), Eastern Austria near Orth an der Donau. In total, 1.427 dragonflies were recorded, including 667 observed on meadows. Anisopterans were more likely to disperse long distances from waterbodies than zygopterans, and females showed proportionally higher abundances on meadows than at waterbodies. Species composition, species richness and occurrence of dragonflies were highly influenced by the distance meadows were situated away from waterbodies. Moreover, the results from this study demonstrated that occurrence of Odonata, species richness and the structure of species assemblages are associated with structural characteristics of forest margins adjacent to meadows. For most Odonata species, a positive relationship between heterogeneity in forest margin vegetation structure and occurrence could be found. This study provides important insight into odonate's utilization of meadows embedded in floodplain systems and provides some basis for potential conservation management considerations with the aim to protect terrestrial habitats of rare dragonflies." (Author)] Address: Wild, Natascha, University of Vienna, Dept of Tropical Ecology and Animal Biodiversity, Rennweg 14, 1030 Vienna, Austria. E-mail: nataschawild98@gmail.com

16661. Wildermuth, H. (2017): Zum Verhalten der Großen Moosjungfer Leucorrhinia pectoralis vor, während und nach dem Schlupf (Odonata: Libellulidae). Mercuriale 17: 17-25. (in German, with English summary) ["Behaviour of Leucorrhinia pectoralis before, during and after emergence - L. pectoralis was studied and photographically documented immediately before, during and shortly after the last ecdysis at small peat ponds in the Swiss Plateau. The larvae, ready to molt, reacted to visual and mechanical stimuli still immediately before eclosion by escape and change of the emergence substrate. After climbing out of the water, the larvae remained still and neither circling movements with the hind legs nor wiggling with the abdomen were observed. Ecdysis from splitting of the larval skin until opening of the wings proceeded according to the well-known type of Libellulidae. In this phase too, the dragonflies were excitable but only reacted slightly to mechanical stimuli. They started for the maiden-flight without preceding warming up by wing whirring. The tenerals were shy and escaped quickly from an approaching human observer, seeking cover in the branches of trees." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

16662. Wildermuth, H. (2017): Zur Erstbeschreibung der Alpen-Smaragdlibelle Somatochlora alpestris (Selys, 1840) aus dem Berner Oberland (Odonata: Corduliidae). Entomo Helvetica 10: 81-86. (in German, with English and French summaries) ["On 15.07.1838, while on his honeymoon, Edmond de Selys Longchamps collected S. alpestris at the Grosse Scheidegg (Bernese Oberland, CH). He described and named the species based on three specimens, which were later painted in watercolor by Guillaume Séverin. At the same time and locality he collected four specimens of Leucorrhinia dubia that he mistakenly considered to be L. rubicunda. Understanding of the distribution of S. alpestris in Switzerland remained limited for some 130 years and only improved from the late 1970s onwards." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

16663. Wildermuth, H.; Schneider, B. (2017): Das Blässhuhn als Libellenjäger (Odonata). Mercuriale 17: 1-10. (in German, with English summary) ["The Eurasean Coot (Fulica atra L.) as dragonfly hunter (Odonata) - Dragonfly monitoring and direct observations at small ponds in Switzerland indicated that Coots, especially during their breeding season, might prey upon numerous emerging and teneral damselflies and dragonflies. Slow motion films (175 frames/s) revealed how young and adult Coots tried to catch odonates as individuals, in tandem, or during copulation by darting their head towards the target and opening the beak for o.l-0.2 s. In all documented cases damselflies and dragonflies had a narrow escape. It is discussed if Coots at small ponds could impact dragonfly populations." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

16664. Xu, Q.-h. (2017): The final stadium larva of Euphaea decorata Hagen in Selys, 1853, from Fujian, China (Odonata: Zygoptera: Euphaeidae). Zootaxa 4244(4): 595-599. (in English) ["The final stadium larva of E. decorata is described and illustrated for the first time. The larva of E. decorata is typical of the genus and characterized by having a flat and long body with large saccoid caudal gills, seven pairs of lateral abdominal gills, two or three large and sharp spines in front of the ventral margin of the eyes, and tridentate palpal lobes of the prementum. The supposed larva of Rhipidolestes nectans is corrected to that of an unknown Euphaeidae. Known Euphaea larvae are shown to be generally very similar, but an old report suggests that the Indian species E. dispar and E. fraseri may show sufficient differences to restore them to the genus Indophaea." (Author)] Address: Xu, Q.-h., Dept of Garden & Horticulture, Zhangzhou City University, Zhangzhou, Fujian 363000, PR China. E-mail: qihanxu@aliyun.com

16665. Xue, J.; Yu, X.; Zhang, H.; Chen, X.; Bu, W. (2017): Population genetics and ecological niche modeling shed light on conservation of the island endemic damselfly Pseudolestes mirabilis (Odonata, Pseudolestidae). Hydrobiologia 790: 273-286. (in English) ["Island endemic species have a much higher risk of extinction than those of mainland. P. mirabilis, the single representative of the family Pseudolestidae which is endemic to Hainan Island, is facing a danger of extinction along with the acceleration of urbanization. To investigate population genetics and further evaluate the conservational importance, the mitochondrial gene COI of 126 individuals from 11 populations of the phoenix damselfly were sequenced and analyzed. This is the first comprehensive population ecological study for this species. The results recovered low genetic diversity and weak phylogeographic structure. Mul-

tiple lines of evidence including neutrality test, mismatch distribution analysis, phylogenetic topologies, and Bayesian skyline plot supported a population expansion just after the Last Glacial Maximum. Statistics of genetic diversity, gene flow, and potential habitats reconstruction suggested that the refugia constricted to the south central areas of the island. Meanwhile, the small population size and low genetic variation in some peripheral populations also implied a niche reduction. Increasing human activity and severe environment destruction may be the main reasons causing a recent decline of the population and increasing the risk of extinction. Therefore, urgent conservational efforts must be implemented to ensure the long-term survival of P. mirabilis. The present research has provided a way to prioritize and assess management strategies of this charismatic species." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, China

16666. Yalles Satha, A.; Sanraoui, B. (2017): Environmential factors influencing Odonata communities of three Mediterranean rivers: Kebir-Est, Seybouse, and Rhumel Wadis, northeastern Algeria. Revue d'Ecologie (Terre et Vie) 72(3): 314-329. (in English, with French summary) ["Odonata are an important component of lotic communities and their abundance and diversity may inform on the health of running waters. The survey of the odonatofauna of three major Algerian wadis: Kebir-East, Seybouse, and Rhumel, led to the identification of 40 species. Our results revealed the presence of Calopteryx exul, a Maghrebian endemic, at Wadi Seybouse and seemed to confirm the extinction of the type population at Wadi Rhumel where the species was first recorded in the XIXth Century. The results also indicated the range expansion of several species: Coenagrion caerulescens, Orthetrum nitidinerve, Trithemis kirbyi and Urothemis edwardsii whose relict population is critically endangered. Additionally sampling of abiotic factors (altitude, water temperature, conductivity, etc.) was carried out and data analysed in view of exploring a possible co-structure between the faunistic and environmental data sets. Data analysis indicated that correlation between abiotic factors (hydroperiod, water conductivity and water temperature) and species richness differed between streams and thus Odonata may prove useful in evaluating the ecological integrity of Mediterranean lotic systems." (Authors)] Address: Sanraoui, B., Biology Dept, Univ. Annaba, Annaba, Algeria. E-mail: bsamraoui@gmail.com

16667. Yoon, S.S.; Kim, M.-H.; Choi, S.K.; Eo, J.; Kwon, S.-I.; Song, Y.J. (2017): The development of a sampling instrument for aquatic organisms in rice paddy fields: Submerged funnel traps with attractants. Korean Journal of Environmental Biology 35(4): 640-647. (in Korean, with English summary) ["The need for an efficient sampling technique to collect aquatic organisms has risen with the increase of interest in rice paddy fields, which have been recognized as important ecosystems supporting biodiversity. In the present study, a submerged funnel trap used with the assistance of attracting agents (fish meal and chemical light) was designed as an easy, objective and quantitative tool for collecting aquatic organisms in the rice paddy fields. The preference for collecting aquatic organisms as a means for attracting agents was analyzed using a generalized linear mixed model. Also, based on the data of previous research, we compared the community composition of the aquatic macroinvertebrates, which were collected using the quadrat method, and newly designed submerged funnel traps, by analyzing non-metric multidimensional scaling. The results showed that the catching efficiency of 18 of the total 65 taxa was affected by the attracting agents. 12 taxa including Pomacea canaliculata, Hippeutis cantori, Austropeplea ollula, Erpobdella lineata, Ostracoda spp. Branchinella kugenumaensis, Hydaticus grammicus, Rhantus pulverosus, Chironomidae spp., Rana nigromaculata, Cobitidae spp. etc., favored fish meal and 6 taxa including Ischnura asiatica, Coenagrionidae spp. Sternolophus rufipes etc., were attracted by chemical light. The submerged funnel trap used as a measurement tool for biodiversity was less applicable than the quadrat method; however, it was more effective for the selective collection of specific taxa. We expect that this newly designed trap can be a simple and quantitative method for collecting aquatic organisms, and could be used for long term and extensive surveys in rice paddy fields in the future." (Authors)] Address: Yoon, S.S., National Institute of Agricultural Sciences, RDA, Wanju 55365, Republic of Korea

16668. Younas, S.; Rehman, H.U.; Gul, S.; Gul, R.; Khattak, B. (2017): Animal diversity of district Karak, KP, Pakistan. Journal of Entomology and Zoology Studies 5(4): 1126-1134. (in English) ["The present study was conducted to explore the vertebrate and invertebrate fauna of district Karak, Khyber Pakhtunkhwa province of Pakistan during the period from May 2016 to May 2017. Karak includes all the vertebrates, including fishes, amphibians, reptiles, birds and mammals. During the present survey, 184 different species of the both vertebrates and invertebrates fauna of the district Karak were observed. … and 56 species of invertebrates. So from the present study, it may be concluded that the families Cyprinidae, Ranidea, Agamidae, Phasianidae, Equidae, Bovidae, Libellulidae, Formicidae were very dominant in the district Karak." (Authors)] Address: Gul, R., Dept of Chemistry, Kohat Univ. of Science & Technology, KUST, Kohat, Pakistan

16669. Yukita, Y.; Ichikawa, Y. (2017): The impact of the tsunami on the habitats or dragonflies in the pacific coastal area of Aomori prefecture, northern Japan. Tombo 59: 2-5. ["There were several suitable habitats for dragonflies, comprising ponds and wetlands in the pacific coastal area of Aomori prefecture before the Great East Japan Earthquake and tsunami. Some of them were damaged by the big tsunami, but other water environments, including ponds and wetlands, were reproduced by the tsunami. Many insects including dragonflies invaded those areas, therefore we need to continuously observe them, because such environments are easyily changed or could vanish in near future."] Address: not stated

16670. Zawal, A.; Therry, L.; Stoks, R.; Michonski, G. (2017): New records of host-parasite relationships between Coenagrion scitulum (Rambur, 1842) (Odonata) and water mite larvae (Hydrachnidia) in core and edge host populations. Acta Parasitologica 62(1): 38-45. (in English) ["The relationships between water mite larvae parasitizing C. scitulum in core

and edge populations were described. A total of 636 larvae of 7 water mite species were found on 143 C. scitulum adults (82 females and 61 males). C. scitulum was recorded for the first time as a host species for Arrenurus cuspidator, A. bruzelii, A. bicuspidator, A. tricuspidator, A. claviger and Hydryphantes octoporus. The degree of infestation by particular parasite species was typical for these species. In contrast, the parasites' preferences for host body parts were not typical, as they preferred abdominal segments 2-4, which in earlier studies had been avoided by water mite larvae. No differences were found in degree of infestation of C. scitulum individuals between core and edge populations, with the exception of Hydryphantes octoporus, which parasitized damselflies only in core populations." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

16671. Zawal, A.; Cuber, P., Szilman, P. (2017): First records of parasitizing water mite larvae (Hydrachnidia) on damselflies (Odonata: Zygoptera) from southwestern Poland. North-Western Journal of Zoology 13(1): 144-148. (in English) ["We describe the relationships between the water mites Arrenurus s. str. and their damselfly (Zygoptera) hosts from small water bodies in the Silesian Lowland (SW Poland). We found 1088 larvae of five water mite species on 75 adult odonates belonging to six species. The prevalence of infestation was very high (92.3%) due to the cumulative effect of water temperature. This is the first record of parasitism of Arrenurus cuspidator on Enallagma cyathigerum, A. maculator on Coenagrion hastulatum, and A. tetracyphus on Lestes sponsa and Enallagma cyathigerum." (Authors)] Address: Zawal, A., Dept of Invertebrate Zool. & Limnology, Univ.y of Szczecin, Waska 13, 71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

16672. Zhang, H.-M.; Guan, Z.-Y.; Wang, W.-Z. (2017): Updated information on genus Gomphidictinus (Odonata: Gomphidae) in China with description of Gomphidictinus tongi sp. nov.. Zootaxa 4344(2): 321-332. ["A new gomphid species, named as Gomphidictinus tongi sp. nov. (Holotype ♂, Mt. Diaoluoshan, altitude 930m a.s.l., Lingshui County, Hainan Province, China) is described here. It is regarded as the third species of Gomphidictinus based on the presence of the basal spine on median segment of the penis organ. Gomphidia interruptistria Zha, Zhang & Zheng, 2005 is regarded as a junior synonym of Gomphidictinus perakensis (Laidlaw, 1902), which is recorded from Yunnan, China." (Authors)] Address: Zhang, H.-m., South China DNA Barcoding Center, Kunming Inst. Zool., Chinese Academy of Sciences 32 Jiaochang Donglu, Kunming 650223, China. E-mail: zhanghaomiao@mail.kiz.ac.cn

16673. Zhang, L.; Wen, C.-L.; Wang, M.-Y.; Yang, X.-Z.; Yuan, M.-L. (2017): The complete mitochondrial genome of Enallagma cyathigerum (Odonata: Coenagrionidae) and phylogenetic analysis. Mitochondrial DNA Part B, Resources 2(2): 640-641. (in English) ["To better understand the diversity and evolution of Odonata, we sequenced and annotated the complete mitochondrial genome (mitogenome) of Enallagma cyathigerum. This mitogenome was 16,661 bp in size and encoded the typical 37 genes, i.e. 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs) and two ribosomal RNA genes. The nucleotide composition of the E. cyathigerum mitogenome was significantly biased toward A and T, with an A + T content of 74.2%. Eleven PCGs started with a typical ATN codon, whereas the remaining two PCGs (nad1 and nad3) used TTG as the initial codon. All the 22 tRNAs had a typical secondary cloverleaf structure. The Bayesian phylogenetic analysis based on the concatenated nucleotide sequences of 13 PCGs strongly supported the sister relationship of E. cyathigerum and two Ischnura species from the same family Coenagrionidae. The phylogenetic tree strongly supported the monophyly of each of the two suborders (Zygoptera and Anisoptera) and recovered a phylogeny of Zygoptera + (Anisoptera + Anisozygoptera)."] Address: Zhang, L., State Key Laboratory of Grassland Agro-Ecosystems, College of Pastoral Agricultural Science & Technology, Lanzhou Univ., Lanzhou, Gansu, People's Republic of China

16674. Zheng, D.; Chang, S.-C.; Jarzembowski, E.A.; Wang, B. (2017): The first aeshnoid dragonfly (Odonata: Anisoptera: Telephlebiidae) from mid-Cretaceous Burmese amber. Cretaceous Research 72: 105-109. (in English) ["A new true dragonfly, Cretaeshna lini gen. et sp. nov., is described based on a forewing from mid-Cretaceous Burmese amber. Cretaeshna is probably a member of Telephlebiidae: Telephlebiinae, but differs from the latter in having a weakly-defined IR1 and a short pterostigma. Cretaeshna lini is the first aeshnid dragonfly to be found as an amber inclusion and the third Cretaceous true dragonfly recorded in amber. Our find augments the diversity of Mesozoic true dragonflies, and enhances our understanding of the palaeogeographic distribution of aeshnid dragonflies." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China

16675. Zheng, D.; Nel, A.; Wang, H.; Wang, B.; Jarzembowski, E.A.; Chang, S.C.; Zhang, H. (2017): The first Late Triassic Chinese triadophlebiomorphan (Insecta: Odonatoptera): biogeographic implications. Sci. Rep. 7(1): 7 pp. (in English) ["The clade Triadophlebiomorpha represents a morphological 'link' between the Paleozoic griffenflies (Meganisoptera) and the modern taxa. Nevertheless they are relatively poorly known in the body structures and paleobiogeography. The Triassic dragonfly is extremely rare in China with only one previously recorded. A new family, Sinotriadophlebiidae Zheng, Nel et Zhang fam. nov., for the genus and species Sinotriadophlebia lini Zheng, Nel et Zhang gen. et sp. nov., is described from the Upper Triassic Baijiantan Formation of Xinjiang, northwestern China. It is the second Chinese Triassic odonatopteran and the second largest Mesozoic representative of this superorder in China. The discovery provides new information for the clade Triadophlebiomorpha during the Late Triassic and expands its distribution and diversity in Asia. The find reflects a close relationship between the two Triassic entomofaunas from Kyrgyzstan and the Junggar Basin, and provides a Carnian age constraint on the lowermost part of the Baijiantan Formation." (Authors)] Address: Nel, A., Lab.

Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16676. Zheng, D.; Chang, S.C.; Nel, A.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2017): Electrodysagrion lini gen. et sp. nov., the oldest Dysagrionini (Odonata: Zygoptera: Dysagrionidae) from mid-Cretaceous Burmese amber. Cretaceous Research 77: 44-48. (in English) ["The dysagrionid damselflies are relatively diverse in Burmese amber, with two genera already recorded. A new dysagrionid damselfly, Electrodysagrion lini Zheng, Nel and Wang, gen. et sp. nov., corresponding to the oldest record of the tribe Dysagrionini, is described herein. It has the unique 'sieblosiid-dysagrionine' type of discoidal cell. It differs from other genera of Dysagrionini in having no antenodal crossveins distal of Ax2, Arc aligned with Ax2, and only one row of cells in the cubito-anal area below the nodus. This find puts the origin of Dysagrionini back to at least the mid-Cretaceous." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Inst. Geology & Palaeontology, Chinese Acad. Sci., 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

16677. Zheng, D.; Dong, C.; Wang, H.; Ye, Y.; Wang, B.; Chang, S.-C.; Zhang, H. (2017): The first damsel-dragonfly (Odonata: Isophlebioidea: Campterophlebiidae) from the Middle Jurassic of Shaanxi Province, northwestern China. Alcheringa 41(4): 509-513. (in English) ["Campterophlebiidae is the most diverse family of fossil odonatans in China with ten genera recovered mostly from Middle Jurassic strata of Inner Mongolia. We describe a well-preserved campterophlebiid damsel-dragonfly from the Middle Jurassic Yanan Formation in Shanxi Province, northwestern China. This discovery adds to the diversity of Campterophlebiidae and identifies a new Middle Jurassic insect fossil locality in China. Within Campterophlebiidae, the new taxon most closely resembles Ctenogampsophlebia from the Middle Jurassic of Inner Mongolia but differs from other genera in having vein AA with four parallel posterior branches uncrossed in the anal triangle." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Acad. of Sciences, 39 East Beijing Road, Nanjing 210008, PR China. E-mail: dranzheng@gmail.com

16678. Zheng, D.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.; Xia, F.; Liu, H.; Wang, B. (2017): Extreme adaptations for probable visual courtship behaviour in a Cretaceous dancing damselfly. Sci. Rep. 7, 44932; 8 pp. (in English) ["Courtship behaviours, frequent among modern insects, have left extremely rare fossil traces. None are known previously for fossil odonatans. Fossil traces of such behaviours are better known among the vertebrates, e.g. the hypertelic antlers of the Pleistocene giant deer Megaloceros giganteus. Here we describe spectacular extremely expanded, pod-like tibiae in males of a platycnemidid damselfly from mid-Cretaceous Burmese amber. Such structures in modern damselflies, help to fend off other suitors as well as attract mating females, increasing the chances of successful mating. Modern Platycnemidinae and Chlorocyphidae convergently acquired similar but less developed structures. The new findings provide suggestive evidence of damselfly courtship behaviour as far back as the mid-Cretaceous. These data show an unexpected morphological disparity in dancing damselfly leg structure, and shed new light on mechanisms of sexual selection involving intra- and intersex reproductive competition during the Cretaceous." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16679. Zheng, D.R.; Nel, A.; Wang, B.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.C (2017): The first Triassic 'Protodonatan' (Zygophlebiidae) from China: stratigraphical implications. Geological Magazine 154(1): 169-174. (in English) ["The clade Triadophlebioptera within the Odonatoptera greatly diversified and became widely distributed worldwide during the Triassic. Although abundant insect fossils have been reported from the Triassic of China, no Triassic dragonflies have been recorded. In this paper, Zygophlebia tongchuanensis sp. nov., the first species of Zygophlebiidae discovered outside the Madygen Formation of Kyrgyzstan, is described from the Middle–Upper Triassic Tongchuan Formation of Shaanxi Province, northwestern China. The discovery extends the distribution of the family Zygophlebiidae in Asia, indicating a high diversity of Triadophlebioptera during Middle–Late Triassic times. Combined with the palaeontological and geochronological evidence, the age of the Tongchuan Formation is considered to be Anisian – Early Carnian, and the insect-bearing layers are considered to be Ladinian." (Authors)] Address: Zheng, D.R., Department of Earth Sciences, The University of Hong Kong, Hong Kong Special Administrative Region, China. E-mail: dranzheng@gmail.com

2018

16680. A Mahyoub, J. (2018): Mosquito larvicidal activity of seaweed extracts against Anopheles d'thali with reference to its side effects on aquatic nontraget organisms. International Journal of Mosquito Research 5(6): 34-38. (in English) ["The biological effects of three Seaweed extracts Seagrass Thalassia hemprichii, Sea lettuce Ulva lactuca, and Gray Mangrove Avicennia marina against 4th instar mosquito larvae of A. d'thali were evaluated. Values of IC50 (concentration which to inhibit the emergence of 50% of mosquito adults survived from larval treatments) indicated that A. marina (107.3 ppm) proved to be the most effective extract against A. d'thali, followed by T. hemprichii (197.3 ppm) while the seaweed extract U. lactuca (335.3 ppm) was the least effective one. Variations in susceptibility levels of An. d'thali mosquito larvae may probably due to differences in toxicity levels among the active components of seaweed extracts. On the other hand, treatments with IC90 values of the test extracts A. marine (284.7 ppm), T. hemprichii (293.8 ppm) and U. lactuca (588.3 ppm) did not have any adverse effects towards some aquatic nontarget organisms (Odonata naiads, aquatic hemipterous, aquatic coleopterans) prevailing in mosquito breeding sites." (Author)] Address: A Mahyoub, J., Dept of Biology Sciences, Fac. Sciences, King Abdulaziz Univ., Jeddah, Saudi Arabia

16681. Abdillah, M. (2018): Distribusi, karakteristik dan perilaku capung endemik Jawa Rhinocypha heterostigma (Rambur, 1882) (Famili: Chlorocyphidae) die Java Timur. Jurnal Biota 4(2): 68-72. (in Indonesian, with English summary) ["East Java is a province that has various geographic characteristics. Some of the geographical features that exist have a forest that is habitat of dragonflies and damselflies. One of the dragonfly needles that live in the forest is R. heterostigma. This species spreads in Western Java and Central Java. Research on the characteristic and distribution behaviour for this species in Eastern Java has not been previously disclosed. This study aims to determine the distribution, characteristic and behaviour of R. heterostigma in Eastern Java. The methods undertaken in this study are direct observation and collection of specimens. Observations show several locations there are species such as Kakek Bodo Waterfall, Sumber Mangli, Mountain Pundak, Tretes Waterfall and Coban Glotak. R. heterostigma found in eastern Java has a dark colour pattern to almost the entire wing. Leaving a transparent colour only at the base of the wing with a slight blue pattern in the centre of the wing. This species is often found along with Euphaea variegata and interact to keep the territorial. This species always perch on leaf, twigs and rocks among the water streams. This study show that Rhinocypha heterostigma found at five locations in East Java and the highest population is at Sumber Mangli." (Author)] Address: Abdillah, M., Prodi Biologi Fakultas Sains dan Teknologi Universitas Islam Negeri Sunan Ampel Surabaya, Indonesia. E-mail:mallahsleiv@gmail.com

16682. Abukenova, V.S.; Blyalova, Zh.Zh. (2018): Specification of odonatafauna species diversity in some areas of Karaganda region. Bulletin of the Karaganda University. Biology. Medicine. Geography Series 2(90): 53-58. (in English, with Kazkh and Russian summaries) ["The article provides information on the species composition of dragonflies in some areas of Karaganda region. Specified period, number and place of collection of odonatofauna areas are study. In order to identify the species composition according to literary sources, the author pays special attention to the peculiarities of the morphology of the Odonata. An updated faunal list of species of dragonflies submitted of the vicinities of Karaganda region. Dominant and concomitant types of dragonflies are determined. It is revealed that the background form a family of Libellulidae. In general, to the conditions of the Karaganda region the most common representatives of the family of Libellulidae, in our collections this family is represented by four genera and seven species. Dominant on the number of occurrence of the species in the city of Karaganda of the dragonfly Sympetrum flaveolum, codominant is Lestes barbarus, rare species is Libellula fulva, and in Shakhtinsk is the dominant species Libellula quadrimaculata, codominant is Orthetrum cancellatum, rare species is Platycnemis pennipes and Cordulia aenea. The characteristic features of biology and ecology of mass species are highlighted and described. The article also discusses the features of seasonal activity of dragonflies, marked daily peaks of activity and mating periods." (Authors)] Address: Buketov, Ye.A., Karagandà State Univ., Kazakhstan. E-mail: zhanerke1807@mail.ru

16683. Acquah-Lamptey, D.; Brandl, R. (2018): Effect of a dragonfly (Bradinopyga strachani Kirby, 1900) on the density of mosquito larvae in a field experiment using mesocosms. Web Ecol. 18: 81-89. (in English) ["Laboratory experiments with food-deprived larvae of odonates suggested that these predators may have the potential to control mosquito populations. However, it remains unclear whether larvae of odonates co-occur with mosquito larvae in the field and whether larvae of odonates reduce the density of mosquito larvae in the field. We exposed 35 water-filled concrete containers in the field in shady and sunny conditions. Some of these containers were partially covered (for simplicity called closed containers, allowing only mosquitoes to lay eggs), whereas others remained open. The density of mosquito larvae was higher in shaded containers and in closed containers. The multivoltine odonate B. strachani colonized open containers and the occurrence of these predators resulted in a clear reduction of the mosquito population. Our results indicate that increasing the colonization of water bodies by B. strachani is a promising strategy for controlling populations of mosquitoes." (Authors)] Address: Acquah-Lamptey, D., Faculty of Biology, Dept of Ecology–Animal Ecology, Philipps Universität Marburg, Karl-von-Frisch-Strasse 8, 35043 Marburg, Germany

16684. Adu, B.W. (2018): The penultimate and ultimate larvae instars of Ictinogomphus ferox (Rambur, 1842) Odonata: Gomphidae from Igbara-oke, southwestern, Nigeria. Journal of Entomology and Zoology Studies 6(4): 149-152. (in English) ["I. ferox larva was collected at the littoral section of River Owena dam in Igbara-Oke, Nigeria. The penultimate and ultimate instars of the larva was described with the morphological character of the species and was compared with Gomphidia which is also in Nigeria. There is similarity in the general appearance of Ictinogomphus larva and that of the Gomphidia. But the Ictinogomphus is bigger than the Gomphidia both as larvae or Adults. This study is describing the larvae of Ictinogomphus ferox from Nigeria for the first time." (Authors)] Address: Adu, B.W., Dept Biol., the Federal Univ. Technology, Akure, Nigeria

16685. Al-Hashmi, A.H.; Al-Saffar, H.H.; Augul, R.S. (2018): Key to the species of the Orthetrum Newman, 1833 (Odonata, Libellulidae) with a new record species in Iraq. Bull. Iraq nat. Hist. Mus. 15(1): 15-29. (in English, with Arabian summary) ["This paper provides an identification key to the species of Orthetrum, including six species that were collected from different localities in Iraq. The species of O. anceps (Schneider, 1845) is registered as a new record in Iraq; the most important characters which are used in diagnostic key are included." (Authors)] Address: Al-Hashmi, A.H., Department of Biology, College of Science, Al Mustansiriyah University, Baghdad, Iraq. E-mail: asmaa_alhashmi80@yahoo.com

16686. Almeida, T.R.de; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2018): Female colour form has no effect on copulation duration of the polymorphic Ischnura fluviatilis (Odonata: Coenagrionidae). Odonatologica 47(3/4): 229-243. (in English) ["We studied a population of I. fluviatilis in Mato Grosso do Sul (Brazil), to establish the range of female colour polymorphism and associated mating behaviour. We found three female colour

forms: orange and brown, which were the immature and mature coloration of the commoner gynochrome morph, and a blue androchrome morph. We observed mating couples and analysed the relationship between copulation duration and phenotypic characteristics of males and females. There were significant differences between colours for female body size, fecundity, egg size and copulation duration, and in most cases the most deviant colour form was the immature orange. These females were significantly larger, and had the highest fecundity. Androchrome females produced smaller eggs. Copulations lasted on average 65 min, with the shortest copulation durations observed for brown females. Male size and the order of observation (indicative of seasonal effects) explained a significant proportion of variation in copulation duration, but female colour form, fecundity and size were not significant. We found evidence for assortative mating by size. Our results indicate that female colour does not explain variation in copulation duration, and therefore the possibility of cryptic male choice seems unlikely." (Authors)] Address: Almeida, T.R.de, Graduate Program in Entomology and Biodiversity Conservation, Federal University of Grand Dourados, Dourados, MS, Brazil. E-mail: thais_keuri@hotmail.com

16687. Álvarez Fidalgo, M. (2018): Nuevos registros de Coenagrion caerulescens (Fonscolombe, 1838) en Asturias (norte de España) (Odonata: Coenagrionidae). BVnews 7 (93): 70-79. (in Spanish, with English summary) ["New records of C. caerulescens for the province of Asturias are reported, after 30 years without literature records for this region. On the other hand, these data coincide with the highest known altitude for the species on the Iberian Peninsula and in Europe. Finally, the situation of this taxon, vulnerable in Spain and decreasing in Europe, in the northwestern part of the Iberian Peninsula is analyzed." (Author)] Address: Marián Álvarez Fidalgo Experta de los Grupos de Odonata y Lepidoptera de Biodiversidad Virtual – Oviedo, Asturias, Spain. E-mail: madamcoolpix@gmail.com

16688. Amaya-Vallejo, V.; Novelo-Gutiérrez, R.; Realpe, E. (2018): The larva and female of Perigomphus basicornis Amaya-Vallejo, Novelo-Gutiérrez & Realpe, 2017, and the first record of Perigomphus pallidistylus (Belle, 1972) for Colombia (Insecta: Odonata: Gomphidae). PeerJ. 2018; 6: e5279: 17 pp. (in English) ["The larva and female of P. basicornis are described and illustrated, and compared with the larva and female of P. pallidistylus. The larva of P. basicornis differs from that of P. pallidistylus in having sternum 8 divided in five sclerites, abdominal segments 8 and 9 with small, low protuberances on the tergites and male's epiproct as long as its basal width, mainly. The female of P. basicornis differs from that of P. pallidistylus in having the apical lobes of vulvar lamina wider, with divergent tips. P. pallidistylus is recorded for Colombia for the first time." (Authors)] Address: Amaya-Vallejo, Vanessa, Lab. Zool. y Ecol. Acuática LAZOEA, Univ. de Los Andes, Bogotá, Cundinamarca, Colombia

16689. Ansari, M.I.; Anwer, S.F. (2018): Numerical analysis of an insect wing in gliding flight: Effect of corrugation on suction side. Fluid Dynamics and Materials Processing 14(4): 259-279. (in English) ["We have conducted a numerical study to investigate the relationship between the aerodynamic performance of an insect wing section and the effect of corrugation in gliding flight. In particular, an Airfoil-CR, corresponding to Kesel's Profile 2 (Kesel, Journal of Experimental Biology, vol. 203, 2000), has been used. This profile represents exactly the cross section of the so-called "Aeshna cyanea". A smoothed variant of this profile (referred to in the present study as Airfoil-SM) has also been considered. Introducing five different variants of the Airfoil-CR corresponding to different levels of corrugation, namely M1, M2, M3, M4 and M5, an unsteady fluid flow analysis has been carried out in the framework of a Fraction-Step Method (based on a velocity-pressure coupling scheme). Another airfoil M6 has also been considered by taking all the corrugations on the suction side simultaneously while the pressure side remains smooth. Simulations were performed for variety of Reynolds numbers ranging from 150 to 10000, while angle of attack was varied from 0° to 20°. According to the results, the performances (in terms of shear and pressure drags) change as a function of the corrugation and Reynolds number. While the performances of the Airfoil-CR are relatively good at low Reynolds numbers, its behavior changes completely at higher Reynolds number where the best performances are achieved by using the Airfoil-SM. Moreover, steady or oscillatory flow can emerge depending on the considered situations. Address: Ansari, M.I., Zakir Husain College of Engineering & Technology, Aligarh Muslim University, Aligarh, 202002, India. E-mail: mailimran99@gmail.com

16690. Antczak-Orlewska, O.; Tonczyk, G. (2018): Damselflies (Odonata: Zygoptera) and dragonflies (Odonata: Anisoptera) in north-eastern Poland: new records. Odonatrix 14-10: 3 pp. (in Polish, with English summary) ["The observations were conducted in the lakes, canals, rivers in north-eastern Poland (14 sites) in 2016. In total, 17 dragonfly species were recorded. Among them, one partially protected species: Gomphus flavipes." (Authors)] Address: Antczak-Orlewska, Olga, Uniwersytet Lódzki, Katedra Zoologii Bezkrêgowców i Hydrobiologii, ul. Banacha 12/16, 90-237 Lódz, Poland. E-mail: olga.antczak@biol.uni.lodz.pl

16691. Arjangpay, A.; Darvizeh, A.; Tooski, M.Y. (2018): Effects of structural characteristics of a bionic dragonfly wing on its low velocity impact resistance. Journal of Bionic Engineering 15(5): 859-871. (in English) ["The influence of the structural features of dragonfly wings, including the sandwich-type configuration of longitudinal veins and the longitudinal corrugations, on the impact response of a bio-inspired structure is investigated. According to experimental observations of the wing morphology, a novel foam-based composite structure is introduced consisting of E-glass/epoxy face-sheets bonded to a polyurethane foam core. A finite element model is employed to simulate the structural responses of the biomimetic structure under low velocity impact. The initiation and evolution of the impact-induced damage in composite skins are simulated by applying a user-defined progressive damage model together with the interfacial cohesive law for intra- and inter-laminar damages, respectively. To simu-

late the nonlinear behavior of the foam core, a crushable plasticity model is implemented. The numerically obtained results are found to correlate with the experimentally measured ones, acquired by drop-weight testing on a bio-inspired structure. It is numerically predicted that reinforcing the structure with the veins gives the more impact load-bearing capacity and the longitudinal corrugation can increase the stiffness and damage resistance of the structure. Effects of the change in impact location, the configuration of the veins and the corrugated angle on damage resistance of the structures are fully discussed." (Authors)] Address: Arjangpay, A., Department of Mechanical Engineering, University of Guilan, Rasht, Iran

16692. Arnaudova, D.N.; Bechev, D.N. (2018): Checklists of Insects of the City of Plovdiv. Part 1: "Otdih i kultura" Park. Bull. Nat. Hist. Mus. Plovdiv, 2018, Supplement 1: 81-93. (in English, with Bulgarian summary) [The checklist of insects of "Otdih i kultura" Park, city of Plovdiv (Bulgaria) contains 442 species from 87 families and including 10 odonate species. (Authors)] Address: Arnaudova, Desislava, Univ. Plovdiv "Paisii Hilendarski", Dept of Zoology, 24 Tzar Assen Str., 4000 Plovdiv, Bulgaria. E-mail: desiarnaudova23@abv.bg

16693. Aroudj, N.; Touati, N. (2018): Recensement des odonates dans certaines zones humides dans la région de Bejaia. MSc thesis, Faculté des Sciences de la Nature et de la Vie, Département des Sciences Biologiques et d'Environnement, Spécialité Biologie Animale, Université A. MIRA - Bejaia: 54 pp. (in French, with English summary) ["A preliminary list on odonates from lentic environments in the Bejaia region has been established. Despite the short period of surveys on this taxon, this study reveals that these aquatic habitats are relatively rich in species because with 19 species they represent almost 1/3 of the Algerian odonatafauna. The Betlou hill dam (El kseur) is a biotope more diversified in species (17 species) than the Tamelaht marsh, which contains only 12 species. The month of June seems the richest and most favourable for dragonflies development. These two environments share 10 species, 03 of them are omnipresent in all carried ou surveys. The ecological structure indices applied to odonatological stands reveal that hill dam is the one that presents the best structured and most stable stands." (Authors)] Address: not stated

16694. Asensio-González, R. (2018): Primera cita de Trithemis annulata (Palisot de Beauvois, 1807) (Odonata, Libellulidae) para Bizkaia (País Vasco, España). First record of Trithemis annulata (Palisot de Beauvois, 1807) (Odonata, Libellulidae) in Bizkaia (Basque Country, Spain). Munibe, Cienc. nat. 66: 7 pp. (in Spanish, with English and Euskarian summaries) ["The first record of T. annulata in Bizkaia (Basque Country, Spain) is reported, confirming its peninsular expansion. Data on the habitat and the accompanying odonata fauna are included." (Author) Laukariz reservoir (Mungia, Bizkaia) on 20.10.2017] Address: cuestasensio@gmail.com

16695. Babu, R.; Srinivasan, G.: Subramanian, K.A. (2018): Range extension of Ictinogomphus decoratus (Selys, 1854) (Insecta: Odonata: Gomphidae) to India. Rec. zool. Surv. India 118(4): 426-429. (in English) ["I. decoratus is widely distributed in South East Asia. Here we report the range extension of the species to Indian Territory and new addition to the Indian Odonate fauna from the Little Andaman, Andaman and Nicobar Islands." (Authors)] Address: Babu, R., Southern Regional Centre, Zoological Survey of India, Chennai – 600028, Tamil Nadu, India

16696. Barbosa, M.S.; Rodrigues Borges, L.; Vilela, D.S.; Venâncio, H.; Santos, J.C. (2018): Comunidade de odonatas de um trecho do Reservatório Sucupira, Rio Uberabinha, Uberlândia, Minas Gerais. Trabalho de Conclusão de Curso (Graduação em Ciências Biológicas) – Universidade Federal de Uberlândia, Uberlândia: 36 pp. (in Portuguese, with English summary) ["Dragonflies (Insecta: Odonata) are widely distributed among freshwater ecosystems of tropical and temperate environments and are sensitive to anthropogenic changes. The objective of this study was to inventory the odonate fauna of a section of the Scupira Reservoir on the Rio Uberabinha, Uberlândia, Minas Gerais, Brazil, and to analyze if seasonal patterns influence its diversity. In addition, the studied proposed to describe the Brazilian distribution of the species sampled. Sampling took place during the dry (August-September 2017) and rainy (February-March 2018) seasons, and recorded 860 individuals of 42 species belonging to 26 and six families. Seven new records for the Triângulo Mineiro Region were recorded, representing the families Gomphidae, Libellulidae and Coenagrionidae. 17 species were exclusive to the rainy season and seven to the dry season, while 18 species were found in both. The rainy season had greater abundance, with four times as many individuals as the dry season. This study contributes by increasing the number of records for odonate species in the Cerrado of Minas Gerais, and reinforces the trend for a greater predominance of this group during the rainy seasons in this biome." (Author)] Address: Silva Barbosa, Marcela, Universidade Federal de Uberlândia (UFU), Instituto de Biologia (INBIO), Laboratório de Ecologia, Evolução e Biodiversidade (LEEBIO). Avenida Amazonas, 20, CEP 38405-302, Uberlândia, MG, Brasil. E-mail: marcela.2802@outlook.com

16697. Barbotte, Q.; Ruffoni, A. (2018): Réflexion sur l'utilisation de l'autochtonie des odonates à différentes échelles. Revue scientifique Bourgogne-Franche-Comté Nature 27: 277-290. (French, with English summary) ["At this time, regional Odonata datasets are substantial (usually thousands of data; around 100 000 for Burgundy-Franche-Comté), especially with monitoring for atlas or programs on endangered species. It becomes diffi cult to analyze such data, particularly concerning the establishment of populations on aquatic environment, because dragonflies tend to move away from their reproduction sites. The aim of the methodology is to identify high stakes stations and to create sophisticated regional maps. This work, based at first on bibliography, provides an autochthony level for species, like reproduction clues for birds, at different scales (station, plot level). In its application, the qualification of an autochthony level is more flexible at plot level than station level where it's strict. To be realized semi-automatically, data needs to be refined (biotopes, numbers, mating,

exuvia, etc.), presence of potential biotopes for dragonflies listed, and computer requests need to be done. The methodology works fairly well for the burgundy dataset and more easily on non streaming environments than on streaming environments, but it may need some requirements modifications." (Authors)] Address: Barbotte, Q., Société d'histoire naturelle d'Autun, France. E-mail: shna.quentin@orange.fr

16698. Barnard, A.A.; Masly, J.P. (2018): Divergence in female damselfly sensory structures is consistent with a species recognition function but shows no evidence of reproductive character displacement. Ecology and Evolution 8(23): 12101-12114. (in English) ["Males and females transmit and receive signals prior to mating that convey information such as sex, species identity, or individual condition. In some animals, tactile signals relayed during physical contact between males and females before and during mating appear to be important for mate choice or reproductive isolation. This is common among odonates, when a male grasps a female's thorax with his terminal appendages prior to copulation, and the female subsequently controls whether copulation occurs by bending her abdomen to complete intromission. It has been hypothesized that mechanosensory sensilla on the female thoracic plates mediate mating decisions, but is has been difficult to test this idea. Here, we use North American damselflies in the genus Enallagma (Odonata: Coenagrionidae) to test the hypothesis that variation in female sensilla traits is important for species recognition. Enallagma anna and E. carunculatum hybridize in nature, but experience strong reproductive isolation as a consequence of divergence in male terminal appendage morphology. We quantified several mechanosensory sensilla phenotypes on the female thorax among multiple populations of both species and compared divergence in these traits in sympatry versus allopatry. Although these species differed in features of sensilla distribution within the thoracic plates, we found no strong evidence of reproductive character displacement among the sensilla traits we measured in regions of sympatry. Our results suggest that species-specific placement of female mechanoreceptors may be sufficient for species recognition, although other female sensory phenotypes might have diverged in sympatry to reduce interspecific hybridization." (Authors)] Address: Barnard, Alexandra, Ecology and Evolutionary Biology Program, Dept of Biology, University of Oklahoma, Norman, OK. USA. Email: alex.barnard@ou

16699. Batzer, D.P.; Murray, K.M. (2018): How important are aquatic predators to mosquito larval populations in natural wetlands? A case study from Carolina bays in Georgia. Wetlands Ecology and Management 26: 391-397. (in English) ["Predation is believed to be an important natural control on larval mosquito populations. However, empirical evidence for predator impacts is lacking, especially from natural wetlands (swamps and marshes). Over a 2-year period, we sampled larval mosquito populations and naturally co-occurring predator assemblages (aquatic invertebrates, fishes) from ten depressional wetlands (Carolina bays) located on a wildlife management area in east central Georgia. We collected a diversity of mosquito larvae and predators (odonates, bugs, beetles, flies, and fishes) from the wetlands, with However, using a community ecology approach with multivariate ordination and correlation techniques, we found no compelling evidence that these predators were controlling mosquito larval distributions (i.e. significant negative Coquillettidia perturbans, Anopheles crucians) appear well adapted to co-exist with a plethora of naturally occurring predators." (Authors)] Address: Murray, Kelly, Dept of Entomology, University of Georgia, Athens, USA

16700. Baux, V.; Krieg-Jacquier, R. (2018): Leucorrhinia pectoralis dans l'Ain: rigueur dans les inventaires, conséquences sur la gestion des habitats et la pérennité des populations. 2018. Revue scientifique Bourgogne-Franche-Comté Nature 27: 179-190. (in French, with English summary) ["Registred in Annex II and IV of the Habitats Directive, L. pectoralis is a protected species in France included in the Plan national d'actions en faveur des Odonates (PNAO) and regarded as « Near Threatened ». In Auvergne-Rhône-Alpes, it is included in the regional implementation of the PNAO and has the same status. To date, knowledge on the distribution of the species in the department of Ain is fragmentary and based mainly on observation of imagos. With the exception of one research, the data concerning reproduction and therefore the presence of perennial populations do not make it possible to decide on the conservation status of the species considered « Near Threatened » in 2013. For two years, after the announcement of a one year drying up of a major site for this species, we study the distribution and behavior of this species in the department. The poor results obtained against the prospecting endeavour suggest that the species is at serious risk of extinction. Today there are possible threats on the species (destruction, drying up of sites, habitat changes) and it is possible that its current status in Ain and hence in Rhône-Alpes is too optimistic. The risk is weighed down since the managers of the departmental natural areas seem to have underestimated the precarious situation of this species that they are supposed to protect." (Authors)] Address: Krieg-Jacquier, R., Groupe de recherche et de protection des Libellules Sympetrum. E-mail: regis.krieg.jacquier@gmail.com

16701. Bechly, G. (2018): First record and a new species of the fossil dragonfly genus Proinogomphus (Odonata: Liassogomphidae) from the Early Jurassic of Bascharage in the Grand Duchy of Luxembourg. Zootaxa 4450(1): 108-114. (in English) ["A new species of fossil dragonfly, Proinogomphus kreuzerorum sp. nov. (Liassogomphidae), is described from the Early Jurassic black shale of Bascharage in the Grand Duchy of Luxembourg, based on a very well-preserved isolated female hind wing. This genus was previously only known from the Liassic of Braunschweig region in Germany, and is here recorded for the first time for this fossil locality. The classification of the family Liassogomphidae Tillyard, 1935 and the genus Proinogomphus Cowley, 1942 is briefly discussed and the diagnosis of the latter is emended." (Author)] Address: Bechly, G., Biologic Institute, Redmond, WA, USA. E-mail: gbechly@biologicinstitute.org

16702. Bechly, G. (2018): Chrismooreia michaelbehei gen. et sp. nov. (Insecta: Odonata: Asiopteridae), a new fossil damsel-dragonfly from the Early Jurassic of England. BIO-Complexity 2018(1): 1–10. doi:10.5048/BIO-C.2018.1. (in English) ["A new fossil damsel-dragonfly Chrismooreia michaelbehei gen. et sp. nov. (Insecta: Odonata: Asiopteridae) is described from the Early Jurassic of Charmouth in England. This fossil is the best preserved and first complete specimen of the Mesozoic family Asiopteridae, which was previously only known from isolated wings, and actually represents one of the most complete Liassic odonates known. Body characters are described for the first time and include compound eyes that meet dorsally, robust thorax, legs with short spines, and very long leaf-like cerci. The forewing venation features a short fusion of AA+Cu with MP near the tip of the discoidal cell, which is an absolutely unique character state within the order Odonata, here described for the first time. The wing venation shows a mixture of sphenophlebiid and asiopterid characters, with the latter characters dominating. The classification of Sphenophlebiidae is discussed and its synonymy with Asiopteridae is tentatively rejected, but not ruled out. As further addition to the Liassic odonate fauna from the Charmouth fossil locality, a specimen of Protomyrmeleon cf. brunonis is featured but not formally described as first record of the suborder Archizygoptera and the family Protomyrmeleontidae." (Author)] Address: Bechly, G., Biologic Inst., Redmond, Washington, USA.E-mail: gbechly@biologicinstitute.org

16703. Bernard, R.; Daraz, B.; Dabert, M. (2018): Redescription of Ceriagrion mourae with notes on its position in the genus Ceriagrion (Odonata: Coenagrionidae). International Journal of Odonatology 21(2): 151-163. (in English) ["The poorly known C. mourae is redescribed based on the first material from Zambia and compared with the similar C. banditum, C. junceum and C. suave. Molecular data place C. mourae as a sister taxon to the clade (C. bakeri (C. banditum, C. junceum)). Genetic distances between the above-mentioned species are similar at c.7–9% (K2P). Analysis of all published Ceriagrion COI sequences revealed a barcoding gap (c.2–6.5%) in the pairwise distance distribution and grouped African sequences according to the known species, except C. suave and C. glabrum. C. mourae was only found at a pool on a temporary stream, which differed from others in the study area by its combination of vegetation and shading. The Zambian locality and two earlier known sites in Mozambique and Tanzania are scattered across the plains and low hills of eastern and southern central Africa." (Authors)] Address: Bernard, R., Dept Nature Education & Conservation, Fac. Biology, Adam Mickiewicz Univ. in Poznan, Poland. E-mail: rbernard@amu.edu.pl

16704. Blanke, A. (2018): Analysis of modularity and integration suggests evolution of dragonfly wing venation mainly in response to functional demands. J. R. Soc. Interface 15: 20180277. http://dx.doi.org/10.1098/rsif.2018.0277. 10 pp. (In English) ["Insect wings show a high variability in wing venation. Selection for function, developmental pathways and phylogeny likely influenced wing vein diversification, however, quantitative data to estimate these influences and their interplay are missing. Here, it is tested how dragonfly wing vein configuration is influenced by functional demands, development, phylogeny and allometry using the concepts of modularity and integration. In an evolutionary context, modules are sets of characters that evolve in relative independence to other characters, while integration refers to a high degree of association between subparts of a structure. Results show allometric and phylogenetic signal in the wing shape variation, however, patterns of integration and modularity are not influenced by these two factors. Overall, dragonfly wings are highly integrated structures with almost no modular signal. Configuration changes in one wing vein or wing area thus influence wing shape as a whole. Moreover, the fore- and hindwings correlate with each other in their evolutionary shape variation supporting biomechanical data of wing interdependence. Despite the overall high degree of evolutionary integration, functional hypotheses of modularity could be confirmed for two wing areas, the arculus–triangle complex at the base of the wing which is responsible for passive wing folding especially during flapping flight and the location of the pterostigma, a coloured wing cell which is more heavy that other wing cells and passively regulates wing pitch as well as critical flight speeds during gliding. Although evolving as distinct modules, these specific vein regions also show high integration and evolve at the same rates like the whole wing which suggests an influence of these structures on the shape evolution of the rest of the wing. Their biomechanical role as passive regulators of wing corrugation and wing pitch suggests that these structures decisively influenced the evolution of advanced modern flight styles and explains their retention once they had evolved early within the lineage Odonatoptera." (Author)] Address: Blanke, A., Inst. Zoology, Biocenter Cologne, Univ. Cologne, Zülpicher Str. 47b, 50674 Köln, Germany

16705. Bössneck, U.; Hampel, I. (2018): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil XXVI: Flora und Fauna des GLB „Geraaue Kühnhausen“. Vernate 37: 63-92. (in German, with English summary) [During widespread floristic and faunistic investigations in the area of the “Geraaue Kühnhausen” reserve, 972 animal and plants species were verified including five odonate species. (Authors)] Address: Hampel, Inga, Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt Stauffenbergallee 18, 99085 Erfurt, Germany. E-mail: inga.hampel@erfurt.de

16706. Borisova, N.V.; Karolinsky, E.A. (2018): The annotated list of dragonflies (Insecta: Odonata) of the state Nature Reserve "Prisursky". Scientific works of the Prisursky State Nature Reserve 33: 86-90. (in Russian, with English summary) ["A preliminary list of 36 dragonfly species belonging to eight families from the State Nature Reserve «Prisursky» is given. The list is based on original and literature data obtained in 2010–2018. Seven dragonfly species are registered at the reserve for the first time. Orthetrum albistylum (Selys, 1848) is a new find for the fauna of the Chuvash Republic." (Authors)] Address: Borisova, N.V. Russia, Cheboksary, FSBI “Prisursky State Reserve”, Chuvash Branch of the Russian Entomological Society, Russia. E-mail: natborisova18@yandex.ru

16707. Bossley, J.P.; Smiley, P.C. (2018): Effects of student-induced trampling on aquatic macroinvertebrates in

agricultural headwater streams. Water 2018, 10(1), 77; doi:10.3390/w10010077: 15 pp. (in English) ["Outdoor education (OE) stream classes provide students with an opportunity to gain hands-on experience with sampling methods for evaluating stream water quality. Trampling by students as a result of stream classes may disrupt the substrate and negatively impact aquatic macroinvertebrates. The impact of student-induced trampling in headwaters as a result of stream classes on aquatic macroinvertebrates has not been evaluated. Our aim was to document the short-term macroinvertebrate responses to an experimental disturbance that simulated the impacts of trampling by students in riffles within small headwater streams. We measured hydrologic variables, visually estimated substrate composition and sampled aquatic macroinvertebrates within control and experimental riffles in three agricultural headwater streams in central Ohio one day prior to experimental disturbance, immediately after disturbance and one day after disturbance. Hydrologic variables and substrate type did not differ daily or between riffle types. Macroinvertebrate abundance, percentage of Ephemeroptera Plecoptera Trichoptera and percentage of Leuctridae increased after experimental disturbance, while diversity, evenness, percentage of clingers and non-metric multidimensional scaling (NMS) axis 1 site scores declined after disturbance. Macroinvertebrate diversity, percent clingers and NMS axis 1 site scores were lower in experimental riffles than control riffles. None of the macroinvertebrate response variables exhibited a significant interaction effect of day × riffle type that is indicative of an effect of the experimental disturbance. Our results suggest the one-time use of an undisturbed riffle within an agricultural headwater stream for an OE stream class is not likely to impact aquatic macroinvertebrates."] Address: Bossley, J.P., Environmental Science Graduate Program, The Ohio State University, 3138A Smith Lab, 174 West 18th, Columbus, OH 43210, USA

16708. Bota-Sierra, C.A.; Sánchez-Herrera, M.; Palacino-Rodréguez, F. (2018): Odonata from protected areas in Colombia with new records and description of Cora verapax sp. nov. (Zygoptera: Polythoridae). Zootaxa 4462(1): 115-131. (in English) ["Colombia is one of the megadiverse countries in the world, but paradoxically it is one of the less explored. The recent red list assessments show the country has the highest number of endangered species in the Neotropical region. Nevertheless, the sampling effort is low especially in protected areas, which probably can harbor some of the rare species included in the red list. As a result of recent surveys in six protected areas of Colombia, we report twelve new records and describe Cora verapax sp. nov., a rare species, collected after more than 300 days of field surveys at the National Natural Park Tatamá. In addition, we compiled and mapped published Odonata records from 2001 until now for Colombian protected areas (136 spp.). Among the new records, some species were formerly known as endemics from Panama and Ecuador, and five species are reported for the first time inside protected areas, showing the importance of surveys in these special territories and bringing new data for conservation actions, as red list assessment or future management plans." (Authors)] Address: Sánchez-Herrera, Melissa, Facultad de Ciencias Naturales y Matemáticas. Universidad del Rosario, Bogotá, Colombia. E-mail: melsanc@gmail.com

16709. Bouiedda, N.; Amari, H.; Guebailia, A.; Zebsa, R.; Boucenna, N.; Hadjadji, S.; Mayache, B.; Houhamdi, M.; Khelifa, R. (2018): Reproductive behaviour of Erythromma lindenii in Northeast Algeria (Odonata: Coenagrionidae). Odonatologica 47(3/4): 267-276. (in English) ["The reproductive behaviour of the Atlanto-Mediterranean E. lindenii has been studied before in Europe, but not in North Africa where the climate is warmer. We investigated the reproductive behaviour in a natural population in Northeast Algeria. We found that the species is non-territorial with quasi-exclusive underwater oviposition. The duration of underwater oviposition was positively correlated to the maximum water depth. We suggest that females predominantly lay eggs underwater to avoid water evaporation, which is common in North Africa. We discuss the differences in the reproductive behaviour between European populations and one in North Africa." (Authors)] Address: Bouiedda, N., Dept Environ. & Agronomic Sciences, Fac. of natural & life sciences, Univ. of Mohamed Essadik Ben Yahia, Jijel 18000, Algeria. E-mail: aminaguebailia@gmail.com; nbouiedda@yahoo.com

16710. Brand, P.; Robertson, H.M.; Lin, W.; Pothula, R.; Klingeman, W.E.; Jurat-Fuentes, J.J.; Johnson, B.R. (2018): The origin of the odorant receptor gene family in insects. eLife doi: 10.7554/elife.38340: 13 pp. (in English) ["The origin of the insect odorant receptor (OR) gene family has been hypothesized to have coincided with the evolution of terrestriality in insects. Missbach et al. (2014) suggested that ORs instead evolved with an ancestral OR co-receptor (Orco) after the origin of terrestriality and the OR/Orco system is an adaptation to winged flight in insects. We investigated genomes of the Collembola, Diplura, Archaeognatha, Zygentoma, Odonata, and Ephemeroptera, and find ORs present in all insect genomes but absent from lineages predating the evolution of insects. Orco is absent only in the ancestrally wingless insect lineage Archaeognatha. Our new genome sequence of the zygentoman firebrat Thermobia domestica reveals a full OR/Orco system. We conclude that ORs evolved before winged flight, perhaps as an adaptation to terrestriality, representing a key evolutionary novelty in the ancestor of all insects, and hence a molecular synapomorphy for the Class Insecta." (Authors)] Address: Brand, P., Dept of Evolution and Ecology, Center for Population Biology, University of California, Davis, Davis, USA. E-mail: pbrand@ucdavis.edu

16711. Broyer, J.; Richier, S.; Renaud, C.; Riotton-Roux, B.; Vade, J.-Y. (2018): Consequences of fish farming demise for bird and Odonate species richness in French fishponds. Revue d'Ecologie 73(4): 462-473. (in English, with French summary) ["Fishponds are anthropogenic aquatic ecosystems where biodiversity is shaped by fish farming practices. Little is known on the consequences of fish farming cessation. This study describes the variation of species richness in breeding birds and Odonates, between ponds either managed for fish farming, or abandoned, for 4-10 years or > 10 years, in

Sologne (Centre Val-de-Loire region, central France). … Odonate richness seems to depend on the development of low emergent vegetation. The absence of carp stocking did not correlate with higher frequency for any species. Conservation of low helophyte belts then seems to be the proper management to meet Odonate requirements." (Authors)] Address: Broyer, J., Office National de la Chasse et de la Faune Sauvage, Direction de la Recherche et de l'Expertise, Montfort, 01330 Birieux, France. E-mail: joel.broyer@oncfs.gouv.fr

16712. Buczynski, P. (2018): Recenzja – Review. Andrzej Staskowiak, Ryszard Sowa: Wazki Ziemi Skarżyskiej [Damselflies and dragonflies of Skarżysko Land]. PiS Agencja Reklamowo-Wydawnicza, Skarżysko-Kamienna 2018, 126 s. ISBN 978-83-63423-42-1. Odonatrix 14_15 (2018): 3 pp. (in Polish, with English summary) ["The review deals with a book about the odonates of the Skarżysko County (Central Po-land, north of Kielce). This book is an interesting combination of a photo album, a popular science book and a faunistic monograph. In the years 2010-2017, the authors have found 52 species; some of them are threatened, legally protected and/or interesting for faunistic and zo-ogeographic reasons (e.g. Nehalennia speciosa, Aeshna subarctica, Ophiogomphus cecilia, Epitheca bimaculata, Cordulegaster boltonii, Crocothemis erythraea, Sympetrum fonscolombii, Leucorrhinia albifrons, L. pectoralis). The occurrence of each species is commented on and illustrated by pictures of imagines and their habitats. This book enriches the knowledge about the occur-rence of dragonflies in Poland and Central-Eastern Europe. It should also contribute to the in-crease of environmental consciousness and education in the studied region." (Author)] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

16713. Buczynski, P.; Obloza, P. (2018): First record of the introducing of exotic dragonfly Ischnura senegalensis (RAMBUR, 1842) (Odonata: Coenagrionidae) into Poland. Odonatrix 14_1: 8 pp. (in Polish, with English summary) ["Four females and two males of I. senegalensis emerged in March 2018 in Siedlce (Central-Eastern Poland) in a home aquarium with tropical plants, strongly illuminated, with a constant water temperature of 26 °C, with water enriched with CO_2 and fertilized. They probably entered the aquarium as eggs on plants imported from Asia via the Netherlands, which were planted during the so-called restart of this aquarium. The developmental time to the imaginal stage lasted from 38 to 45 days, which is consistent with the data from the breeding at room temperature in Taiwan. This is hardly the third known case of the introduction of an exotic dragonfly into Poland. Earlier, Mecistogaster sp. and Crocothemis servilia were recorded. There is probably a very large "dark figure" of such cases, due to the fact that odonatologists usually work in the field and the reared dragonflies rarely get out of the closed rooms. So far, none of the introduced species has been acclimatized in Europe, but it cannot be excluded that this will happen if a species from a similar climatic zone arrives here, or if the current increase in air temperatures will continue. Therefore, it is worth observing this phenomenon by visiting distribution centres of aquarium plants and cooperating with aquarists." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

16714. Büsse, S.; Heckmann, S.; Hornschemeyer, T.; Bybee, S.M. (2018): The phylogenetic relevance of thoracic musculature: a case study including a description of the thorax anatomy of Zygoptera (Insecta: Odonata) larvae. Systematic Entomology 43(1): 31-42. (in English) ["New morphological techniques allow for the evaluation of novel character systems that are potentially important for phylogenetic analysis. Only a few studies so far have used character systems from the insect thorax for phylogenetics; the reasons for this might include a lack of common terminology or established homology for pterygote insect thorax musculature. Still, recent studies have proposed common terminology and hypotheses of homology, now allowing for an evaluation of thoracic morphological character systems among the groups of winged insects. Using X-ray microtomography (µCT) we present a detailed study of the thorax musculature of Odonata as an important phylogenetic character system, with a matrix of 298 characters with 697 character states, including novel data from the thoracic anatomy of eight damselfly larvae. We also included additional Odonata, Ephemeroptera and Neoptera taxa from the literature and demonstrate the phylogenetic relevance of this character system by reproducing phylogenetic topologies of established relationships.We also compared high-resolution data from Odonata larvae from our study and from recent literature with data from older literature in the adult Odonata. All major clades were successfully recovered, (e.g. Odonata, Epiprocta, Anisoptera and Zygoptera) with high node support, but obtained higher phylogenetic resolution with the larval data. The best phylogenetic resolution was achieved by combining the adult and larval characters. The taxon sampling and character matrix is the largest to date and underlines the potential relevance of the thorax musculature as an important phylogenetic character system." (Authors)] Address: Büsse, S., Functional Morphology and Biomechanics, Zoological Inst., Christian-Albrechts-Univ., Am Botanischen Garten 9, 24118 Kiel, Germany. E-mail: sbuesse@zoologie.uni-kiel.de

16715. Büsse, S.; Gorb, S.N. (2018): Material composition of the mouthpart cuticle in a damselfly larva (Insecta: Odonata) and its biomechanical significance. Royal Society Open Science 5: 172117. http://dx.doi.org/10.1098/rsos.172117: 15 pp. (in English) ["Odonata larvae are key predators in their habitats. They catch prey with a unique and highly efficient apparatus, the prehensile mask. The mandibles and maxillae, however, play the lead in handling and crushing the food. The material composition of the cuticle in the biomechanical system of the larval mouthparts has not been studied so far. We used confocal laser scanning microscopy (CLSM) to detect material gradients in the cuticle by differences in autofluorescence. Our results show variations of materials in different areas of the mouthparts: (i) resilin-dominated pads within the membranous transition between the labrum and the anteclypeus, which support mobility and might provide shock absorption, an adaptation against mechanical damage; (ii) high degrees of sclerotization in the incisivi of the mandibles, where

high forces occur when crushing the prey's body wall. The interaction of the cuticle geometry, the material composition and the related musculature determine the complex concerted movements of the mouthparts. The material composition influences the strength, mobility and durability of the cuticular components of the mouthparts. Applying CLSM for extracting information about material composition and material properties of arthropod cuticles will considerably help improve finite-element modelling studies." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

16716. Buss, N.; Hua, J. (2018): Parasite susceptibility in an amphibian host is modified by salinization and predators. Environmental Pollution 236: 754-763. (in English) ["Secondary salinization represents a global threat to freshwater ecosystems. Salts, such as NaCl, can be toxic to freshwater organisms and may also modify the outcome of species interactions (e.g. host-parasite interactions). In nature, hosts and their parasites are embedded in complex communities where they face anthropogenic and biotic (i.e. predators) stressors that influence host-parasite interactions. As human populations grow, considering how anthropogenic and natural stressors interact to shape host-parasite interactions will become increasingly important. We conducted two experiments investigating: (1) the effects of NaCl on tadpole susceptibility to trematodes and (2) whether density- and trait-mediated effects of a parasite-predator (i.e. damselfly) and a host-predator (i.e. dragonfly), respectively, modify the effects of NaCl on susceptibility to trematode infection. In the first experiment, we exposed tadpoles to three concentrations of NaCl and measured parasite infection in tadpoles. In the second experiment, we conducted a 2 (tadpoles exposed to 0 g L^{-1} NaCl vs. 1 g L^{-1} NaCl) x 4 (no predator, free-ranging parasite-predator (damselfly), non-lethal host-predator (dragonfly kairomone), and free-ranging parasite-predator + dragonfly kairomone) factorial experiment. In the absence of predators, exposure to NaCl increased parasite infection. Of the predator treatments, NaCl only caused an increase in parasite infection in the presence of the parasite-predator. However, direct consumption of trematodes caused a reduction in overall infection in the parasite-predator treatment. In the dragonfly kairomone treatment, a reduction in tadpole movement (i.e. trematode avoidance behavior) led to an increase in overall infection. In the parasite-predator + dragonfly kairomone treatment, antagonistic effects of the parasite-predator (reduction in trematode abundance) and dragonfly kairomone (reduction in parasite avoidance behavior) resulted in intermediate parasite infection. Collectively, these findings demonstrate that NaCl can increase amphibian susceptibility to parasites, and underscores the importance of considering predator-mediated interactions in understanding how contaminants influence host-parasite interactions." (Authors)] Address: Buss, N., Biological Sciences Department, Binghamton University (SUNY), Binghamton, NY 13902, USA. E-mail: nbuss1@binghamton.edu.

16717. Buttstedt, L.; Zimmermann, W.; Serfling, C. (2018): Langzeituntersuchung eines gemeinsamen Vorkommens von Helm- und Vogel-Azurjungfer in Nordthüringen. Landschaftspflege und Naturschutz in Thüringen 55(1): 11-19. (in German, with English summary) ["In Thuringia the evidence of the rare C. ornatum was first successfully proven in 1998 in the Helme-Unstrut lowland near Artern. At that time this area was a highly frequented and extended incidence of C. mercuriale. In 1999 the Natura 2000 site „Mönchenried und Helmegräben bei Artern" was designated to protect this species. From 1999 until 2014 a long-term monitoring in this Natura 2000 site took place supported by the Thuringian State Office for Environment and Geology. Of the 14 Stretches of water that were inhabited by C. mercuriale by 2014 only eight had remained. These incidences showed strong fluctuations in population sizes. By 2016 three more of those habitats had gone. For C. ornatum by 2014 only one out of the original seven incidences had survived. Throughout the whole study area a severe decline in the overall frequency of both species was recorded and these initially trans-regionally important population densities had seriously declined (population densities from up to 560 individuals of C. mercuriale and up to 130 individuals of C. ornatum per 100 m). The larvae prefer slightly flooded mud ponds in which the hatching also takes place. The main waterway is barely populated. Reasons for the decline are the uncertain yearly flow of many of the ditches, profile changes to the Kleine Helme that were implement-ed for flood protection as well as the changes in the water Vegetation due to nutrient discharges (eutrophication) and insufficient Conservation of water bodies. Furthermore, the Nutria Myocastor coypus feeds on the wintergreen submerged Vegetation, which then prevents successful laying of eggs (oviposition). The imple-mentation of an existing species-assistance concept and of the Natura 2000 management plan as well as further reaching measures dealing with large-scale drying-up and eutrophication are urgently needed as is the involvement of experts." (Authors)] Address: Büttstedt, L., Ziegeleistr. 26 OT Roßla • 06365 Südharz, Germany. E-mail: lothar-buttstedt@t-online.de

16718. Cabana, M.; Cordero-Rivera, A.; Romeo, A. (2018): Brachytron pratense (Odonata: Aeshnidae) en la Península Ibérica: distribución, fenología y estado de conservación. Boln. S.E.A. 63: 343-347. (in Spanish, with English summary) ["B. pratense is a quasi-endemic species of the European continent, distributed in a large part of central Europe, where it is abundant and frequent. However, in the Iberian Peninsula it is scarce and very localized, being found exclusively in the coast. During the last years we have carried out specific samplings for the detection of new populations of this species in Galicia, considerably expanding its distribution area in the region. A bibliographic review of the Iberian records of the species has been carried out, which has allowed us to establish a coastal Eurosiberian distribution pattern, with Galicia being the autonomous region with the largest number of populations and UTM squares of 10x10 km with presence of B. pratense." (Authors)] Address: Cabana, M., Grupo de Investigación en Bioloxía Evolutiva (GIBE), Depto de Bioloxía, Fac. de Ciencias, Univ. da Coruña, Campus da Zapateira, s/n, 15071 A Coruña, Spain. E-mail: mcohyla@gmail.com

16719. Cabuga Jr, C.C.; Dedel, J.I.C.; Delabahan, I.C.B.; Ayaton, M.A.; Busia, M.A.; Billuga, N.P.; Angco, M.K.A.; Havana, H.C. (2018): Wing shape variations in Calopteryx splendens along a latitudinal gradient using geometric morphometric analysis. J. Bio. Env. Sci. 12(3): 73-92. (in English) ["Fluctuating asymmetry (FA) quantifies the degree of variations from a perfect symmetry and therefore expected to reflect the state of genomic and ecological stress undergone by the single species and or populations throughout its development. It identifies the extent of differences from the symmetry of left and right sides of the organisms, as both sides are expected to be identical from its genetic activity and within the environment they inhabit. In this study, geometric morphometric was utilized to measure wing shape variation in the populations of Calopteryx splendens. A total of 120 samples consisting of 30 males and 30 females were randomly collected each of the latitudinal gradient and subjected to Procrustes ANOVA and Principal Component Analysis (PCA) by means of Symmetry and Asymmetry in Geometric Data (SAGE) software. In the three factors analyzed: individuals, sides, and individual × sides result shows that the collected samples from the high altitude displayed high significant difference (P<0.0001) in the female forewings and hindwings while male forewings and hindwings showed partly non-significant. Whereas, the collected samples from the lower altitude result shows high significant difference (P<0.0001) in the female and male forewings while female and male hindwings shown partly non-significant. It implies that latitudinal gradients could influence wing shape pattern and phenotypic variability was evident between species of the same lineage. Further, utilizing geometric morphometrics is essential in identifying wing shape variations and co-variations among species relatively of the same ancestry." (Authors)] Address: Cabuga Jr, C.C., Biol. Dept, Caraga State Univ., Ampayon, Butuan City, Philippines

16720. Cai, Y.-Y.; Gao, Y.-J.; Zhang, L.-P.; Yu, D.-N.; Storey, K.B.; Zhang, J.-Y. (2018): The mitochondrial genome of Caenis sp. (Ephemeroptera: Caenidae) and the phylogeny of Ephemeroptera in Pterygota. Mitochondrial DNA Part B 3(2): 477-579. (in English) ["The phylogenetic relationship between Ephemeroptera (mayflies) and Odonata remains hotly debated in the insect evolution community. We sequenced the complete mitochondrial genome of Caenis sp. to discuss the phylogenetic relationship of Palaeoptera. The mitochondrial genome of Caenis sp. is a circular molecule of 15,254 bp in length containing 37 genes (13 protein-coding genes, 22 tRNAs, and 2 rRNAs), which showed the typical insect mitochondrial gene arrangement. In BI and ML phylogenetic trees using 71 species of 12 orders, our results support the Ephemeroptera as the basal group of winged insects." (Authors)] Address: Cai, Y.-Y., College of Chemistry and Life Science, Zhejiang Normal University, Jinhua, Zhejiang Province, China

16721. Camuñas Mohinelo, F.; Álvarez Fidalgo, M. (2018): Primer registro de Anax ephippiger (Burmeister, 1839) en la provincia de Albacete (Castilla-La Mancha, sureste de España) (Odonata: Aeshnidae). First record of Anax ephippiger (Burmeister, 1839) in the province of Albacete (Castilla-La Mancha, southeastern Spain) (Odonata: Aeshnidae). BVnPC 7(100): 146-149. (in Spanish, with English summary) ["The occurrence of A. ephippiger, a species rarely observed in the community of Castilla-La Mancha, is reported in the province of Albacete for the first time." (Authors) Laguna Salada de Pétrola (Albacete), 17-IV-2017.] Address: Camuñas Mohinelo, F., 1. Miembro de la Asociación Fotografía y Biodiversidad – Almansa, Albacete, Spain. E-mail: fcamunas@gmail.com

16722. Cannell, A.E.R. (2018): The engineering of the giant dragonflies of the Permian: revised body mass, power, air supply, thermoregulation and the role of air density. Journal of Experimental Biology 221 (19): jeb185405. 7 pp. (in English) ["An engineering examination of allometric and analogical data on the flight of giant Permian insects (Protodonata, Meganeura or griffinflies) indicates that previous estimates of the body mass of these insects are too low and that the largest of these insects (wingspan of 70 cm or more) would have had a mass of 100–150 g, several times greater than previously thought. Here, the power needed to generate lift and fly at the speeds typical of modern large dragonflies is examined together with the metabolic rate and subsequent heat generated by the thoracic muscles. This evaluation agrees with previous work suggesting that the larger specimens would rapidly overheat in the high ambient temperatures assumed in the Permian. Various extant mechanisms of thermoregulation are modelled and quantified, including behaviour, radiation and the constraints on convective respiration and evaporation imposed by air flow through spiracles. However, the effects of these on cooling an overheated insect are found to be limited. Instead, an examination of the heat budget in the flight medium indicates that, at about 1.6 bar (160 kPa), thermoregulation supply enters into equilibrium and, even at high ambient temperatures, overheating can be avoided and enough oxygen sourced. This approach indicates how fossil biology can be used to examine past atmospheres." (Author)] Address: Cannell, A.E.R., ISIPU, Rua Major Francisco Hardy 200 Casa 23, Curitiba 81230-164, Brazil. E-mail: alcannell@gmail.com

16723. Cao, L.-z.; Fu, Y.-w.; Hu, C.-x.; Wu, K.-m. (2018): Seasonal migration of Pantala flavesces across the Bohai strait in northern China. Environmental Entomology 47(2): 264-270. (in English) ["P. flavescens is one of the most common species of migratory dragonflies. P. flavescens adults were captured by a searchlight trap on Beihuang Island (BH Island; 38°24'N, 120°55'E) from 2003 to 2016, where there is no freshwater. This inspired our research to analyze the pattern of seasonal migration and population dynamics. Stable hydrogen isotope measurement and the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) were used to simulate the migration pathway of P. flavescens between different breeding habitats. The results showed that there was no significant difference among population numbers of this overseas migration across years ($F_{13, 2161} = 0.85$, $P = 0.604$); however, the numbers were significantly different across months ($F_{5, 2161} = 3.91$, $P = 0.003$). Our geospatial natal assignment model suggested that P. flavescens trapped on BH were originated in different geographical regions and might have three movement strategies: wandering around northern China

and north-bound (positive) and south-bound (negative) movements. Among them, the majority were engaged in wandering around northern China. Model simulations suggested that P. flavescens toured around BH. The results contribute to the knowledge of P. flavescens population ecology in a large-scale geographic region and will aid in the prediction and interpretation of insect migration patterns in response to climate change." (Authors)] Address: Wu, K.-m., State Key Lab. for Biology of Plant Diseases & Insect Pests, Inst. of Plant Protection, Chinese Acad. of Agricultural Sciences, No. 2 West Yuanmingyuan Road, Beijing 100193, China. E-mail: wukongming@caas.cn

16724. Carr, D.M.; Ellsworth, A.A.; Fisher, G.L.; Valeriano, W.W.; Vasco, J.P.; Guimarães, P.S.S: (2018): Characterization of natural photonic crystals in iridescent wings of damselfly Chalcopteryx rutilans by FIB/SEM, TEM, and TOF-SIMS. Biointerphases 13, 03B406 (2018); https://doi.org/10.1116/-1.5019725: 8 pp. (in English) ["The iridescent wings of C. rutilans are investigated with focused ion beam/ scanning electron microscopy, transmission electron microscopy, and time-of-flight secondary ion mass spectrometry. The electron microscopy images reveal a natural photonic crystal as the source of the varying colors. The photonic crystal has a consistent number and thickness (~195 nm) of the repeat units on the ventral side of the wing, which is consistent with the red color visible from the bottom side of the wing in all regions. The dorsal side of the wing shows strong color variations ranging from red to blue depending on the region. In the electron microscopy images, the dorsal side of the wing exhibits varied number and thicknesses of the repeat units. The repeat unit spacings for the red, yellow/green, and blue regions are approximately 195, 180, and 145? m, respectively. Three-dimensional analysis of the natural photonic crystals by time-of-flight secondary ion mass spectrometry reveals that changes in the relative levels of Na, K, and eumelanin are responsible for the varying dielectric constant needed to generate the photonic crystal. The photonic crystal also appears to be assembled with a chemical tricomponent layer structure due to the enhancement of the CH6N3+ species at every other interface between the high/low dielectric constant layers." (Authors)] Address: Carr, D.M., Physical Electronics, Inc., 18725 Lake Drive East, Chanhassen, Minnesota 55317, USA

16725. Carrillo-Lara, D.E.; Novelo-Gutierrez, R. (2018): Description of the larva of Orthemis ferruginea (Fabricius, 1775) (Odonata: Libellulidae). Zootaxa 4455(3): 547-554. (in English, with Spanish summary) ["The last larval stadium of O. ferruginea is described and illustrated in detail based on reared material collected in the municipality of Paso de Ovejas, Veracruz, Mexico. It is compared with larvae of other species of the genus previously described. The main structural features are the number of setae on palp, prementum and palp crenations, the size proportion of cerci respect to epi- and paraprocts, and the number of sclerites on abdominal sternum 5." (Authors)] Address: Novelo-Gutierrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

16726. Casas, P.A.C.; Sing, K.-W.; Lee, P.-S.; Nuñeza, O.M.; Villanueva, R.J.T.; Wilson, J.-J. (2018): DNA barcodes for dragonflies and damselflies (Odonata) of Mindanao, Philippines. Mitochondrial DNA Part A, DNA Mapping, Sequencing, and Analysis 29(2): 206-211. (in English) ["Reliable species identification provides a sounder basis for use of species in the order Odonata as biological indicators and for their conservation, an urgent concern as many species are threatened with imminent extinction. We generated 134 COI barcodes from 36 morphologically identified species of Odonata collected from Mindanao Island, representing 10 families and 19 genera. Intraspecific sequence divergences ranged from 0 to 6.7% with four species showing more than 2%, while interspecific sequence divergences ranged from 0.5 to 23.3% with seven species showing less than 2%. Consequently, no distinct gap was observed between intraspecific and interspecific DNA barcode divergences. The numerous islands of the Philippine archipelago may have facilitated rapid speciation in the Odonata and resulted in low interspecific sequence divergences among closely related groups of species. This study contributes DNA barcodes for 36 morphologically identified species of Odonata reported from Mindanao including 31 species with no previous DNA barcode records." (Authors)] Address: Casas, Princess Angelie S., Dept of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, 9200 Iligan City, Philippines. E-mail: princessangeliecasas48@gmail.com

16727. Cavallaro, M.C.; Liber, K.; Headley, J.V.; Peru, K.M.; Christy A. Morrissey, C.A. (2018): Community-level and phenological responses of emerging aquatic insects exposed to three neonicotinoid insecticides: An in situ wetland limnocorral approach. Environmental Toxicology and Chemistry 37(9): 2401-2412. (in English) ["Seasonal aquatic insect emergence represents a critical subsidy link between aquatic and terrestrial ecosystems. Early and late instar larvae developing in wetlands near neonicotinoid-treated cropland are at risk of chronic insecticide exposure. An in situ wetland limnocorral experiment compared emergent insect community responses to imidacloprid, clothianidin, and thiamethoxam. Over 15 weeks, 21 limnocorrals were dosed weekly for 9 weeks to target peak nominal doses of 0.0, 0.05 or 0.5 µg/L, followed by a 6-week recovery period. Thirty-nine aquatic insect taxa were recorded but 11 taxa groups made up 97% of the community composition. Principal response curves indicated that during the dosing period, community composition among the treatments resembled the controls. During the 6-week recovery period, significant deviance was observed in the high imidacloprid treatment with similar trends in the clothianidin treatment, suggesting that community effects from neonicotinoid exposure can be delayed. Non-biting midges (Diptera: Chironomidae) and Zygoptera also emerged 18 to 25 days earlier in the imidacloprid and clothianidin neonicotinoid treatments, relative to controls. These data suggest that phenology and subtle community effects can occur at measured neonicotinoid concentrations of 0.045 µg/L (imidacloprid) and 0.038 µg/L (clothianidin) under chronic repeated exposure conditions. Synchronization and community dynamics are critical to aquatic insects and consumers; thus, neonicotinoids may have broad

implications for wetland ecosystem function." (Authors)] Address: Morrissey, Christy, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada. E-mail: christy.morrissey@usask.ca

16728. Celiniski, S.; Wolczecka, M.; Kadej, M.; Smolis, A.; Tarnawski, D. (2018): The first record of Leucorrhinia pectoralis (CHARPENTIER, 1825) (Odonata: Libellulidae) in the "Stawy Milickie" Nature Reserve. Przyroda Sudetów 22: 73-78. (in Polish, with English summary) ["We describe observations of males of L. pectoralis in the nature reserve "Stawy Milickie". The observed individuals stayed close to the margins of reed beds and small fragments of open water table surrounded by reeds (the dominant hydrophyte in the site of observation was Myriophyllum spicatum L.). The locality found by us in the nature reserve "Stawy Milickie" (Stawno ponds) is among about a dozen records of L. pectoralis from Lower Silesia. The great majority of the known localities of the species is located in the south-western part of Lower Silesian province, while the above locality is situated in its north-eastern part, near the boundary of Lower Silesia and Wielkopolska." (Authors) Address: Celiniski, S., Pracownia Biologii Konserwatorskiej i Ochrony Bezkrçgowcow, Zaktad Biologii, Ewolucji i Ochrony Bezkrçgowmw, Instytut Biologii Srodowiskowej, Wydziat Nauk Biologicznych, Uniwersytet Wroctawski, ul. Przybyszewskiego 65, 51-148 Wroclaw, Poland. E-mail: damian.celinski@onet.pl

16729. Cezario, R.R.; Viela, D.S.; Guillermo-Ferreira, R. (2018): Final instar larvae of Argia mollis Hagen in Selys, 1865 and Argia smithiana Calvert, 1909 (Odonata: Coenagrionidae) from the Brazilian Cerrado. Zootaxa 4514(1): 137-144. (in English) ["Recent expeditions to the Serra da Canastra and Chapada dos Guimarães National Parks in Brazil resulted in the collection of larvae of A. mollis and A. smithiana. Thus, here we describe the last instar larvae of these two Argia species from the Brazilian Cerrado." (Authors)] Address: Guillermo-Ferreira, R., Laboratory of Ecological Studies on Ethology & Evolution (LESTES), Department of Hydrobiology, Federal University of São Carlos, São Carlos, SP, Brazil.

16730. Cham, S. (2018): Observations of egg development, hatching and early instars of Sympetrum striolatum (Charpentier) Common Darter. J. Br. Dragonfly Society 34(1): 1-18. (in English) ["S. striolatum is a common and widespread species across the United Kingdom with the adult and larval stages well studied. The egg stage however is less well known. Observations on egg development, hatching and early instars during late summer indicate a high level of fertilisation and survivorship under controlled conditions." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Henlow, Bedfordshire, SG16 6LQ, UK. E-mail: stevecham1@aol.com

16731. Chapman, Olivia; Noyd, Martin; Seres, Kareen (2018): Differences in gregarine parasite load between male and female Calopteryx maculata. Biological Station, University of Michigan (UMBS): 12 pp. (in English) ["Damselflies and other insects of the order Odonata are frequently parasitized by gregarine protists. In the trophozoite stage of the gregarine life cycle, the parasite feeds on the contents of the host's gut and negatively affect its reproductive success. Possibly as a result of its impacts on the host's reproductive system, levels of gregarine parasitism has been observed to differ between male and female damselflies. We aimed to measure relative levels of gregarine parasitism of male and female damselflies of the species Calopteryx maculata. In order to do this, we collected damselflies at multiple sites in Michigan's Maple River and dissected individuals to observe the presence of gregarine parasites. Our results indicate that females experience significantly higher levels of gregarine parasitism than their male counterparts. We propose that this difference is the result of increased levels of migratory behavior in female damselflies due to increased parental investment." (Authors)] Address: not stated

16732. Chavez-Kendall, K. (2018): Invertebrate predator effects on California vernal pool community assembly. M.S. thesis, Biological Sciences (Ecology, Evolution, and Conservation))--California State University, Sacramento: IX + 44 pp. (in English) ["Predators can help determine the density and diversity of prey populations. Predators can reduce densities of prey, increase diversity of prey species, lower densities of other predators, and cause changes in the overall biomass production of a community. Schmitz (2007) developed a framework to test multi-predator effects, which included two predictions based on the predators' habitat and hunting mode. The first prediction is that increasing predator pressure causes a risk enhancing effect; multiple predators can be more efficient at removing prey and lowering overall prey densities. The second prediction is that competition among multiple predators develop a risk-reducing effect on prey; predators can interfere with one another by competition or intraguild predation, thus lowering their prey capture abilities. Even though there are many predator-prey studies, few have been focused in seasonal wetlands. The purpose of this study was to evaluate multiple predator effects on invertebrate community structure. I predicted that predators in vernal pools would have a risk-enhancing effect, resulting in the reduction of prey densities and increasing overall diversity. To test this hypothesis, I used two different species of predators, backswimmers (Family Notonectidae) and damselfly nymphs. The experimental mesocosm study consisted of nine treatments arranged in a factorial design. Density treatments consisted of three and six predators of the same species; diversity treatments consisted of equal numbers of Notonectidae and Odonata, as well as double density of predator of either species. I found that treatments containing Notonectidae had a negative effect on prey density, while treatments containing equal numbers of predators had a positive effect on prey density, and predator treatment did not have an effect on prey diversity. Communities were more likely to be similar within each treatment and not between treatments. I conclude that a risk-enhancing effect can occur when there are high densities of Notonectidae, additionally, the results suggest that when two different predator species are present in equal densities they may interfere with one another generating a risk-reduction effect on the prey community." (Author)] Address: not stated

16733. Cheeseman, S.; Owen, S.; Truong, V.K.; Meyer, D.; Ng, S.H.; Vongsvivut, J.; Linklater, D.; Tobin, M.J.; Werner, M.; Baulin,, V.A.; Luque, P.; Marchant, R.; Juodkazis, S.; Crawford, R.J.; Ivanova, E.P. (2018): Pillars of life: Is There a relationship between lifestyle factors and the surface characteristics of dragonfly wings? ACS Omega 2018, 3: 6039-6046. (in English) ["Dragonfly wings are of great interest to researchers investigating biomimetic designs for antiwetting and antibacterial surfaces. The waxy epicuticular layer on the membrane of dragonfly wings possesses a unique surface nanoarchitecture that consists of irregular arrays of nanoscale pillars. This architecture confers superhydrophobic, selfcleaning, antiwetting, and antibiofouling behaviors. There is some evidence available that suggests that lifestyle factors may have influenced the evolution of the wing nanostructures and, therefore, the resulting properties of the wings; however, it appears that no systematic studies have been performed that have compared the wing surface features across a range of dragonfly species. Here, we provided a comparison of relevant wing surface characteristics, including chemical composition, wettability, and nanoarchitecture, of 7 species of dragonfly from three families including Libellulidae, Aeshnidae, and Gomphidae. The characteristic nanopillar arrays were found to be present, and the chemical composition and the resultant wing surface superhydrophobicity were found to be well-conserved across all of the species studied. However, subtle differences were observed between the height, width, and density of nanofeatures and water droplet bouncing behavior on the wing surfaces. The results of this research will contribute to an understanding of the physical and chemical surface features that are optimal for the design of antiwetting and antibacterial surfaces." (Authors)] Address: Ivanova, Elena, School Sci., College Science, Engineering & Health, RMIT Univ., GPO Box 2476, Melbourne, Victoria 3001, Australia

16734. Cheng, Y.-C.; Chen, M.-Y.; Wang, J.-F.; Liang, A.-P.; Lin, C.-P. (2018): Some mitochondrial genes perform better for damselfly phylogenetics: species- and population-level analyses of four complete mitogenomes of Euphaea sibling species. Systematic Entomology 43(4): 702-715. (in English) ["Animal mitochondrial genes continue to provide an efficient and inexpensive assessment of genetic diversity. However, which mitochondrial genes should be selected to best estimate species phylogeny and population genealogy remains uncertain for most under-sampled taxa. We analysed four complete mitochondrial genomes of sibling species of Euphaea damselflies, E. decorata, E. ornata, E. formosa and E. yayeyamana, to examine the patterns of selection and to evaluate the phylogenetic utility of the mitochondrial genes compared with nuclear genes. The results indicated that mitochondrial protein-coding nad2 (NADH dehydrogenase subunit 2) and noncoding A + T-rich (control region) genes have the highest mutation rates and more phylogenetic utility [higher parsimony-informative sites; higher a (the shape parameter of gamma distribution); lower rates of heterogeneity among sites; and higher relative substitution rates] than all the other mitochondrial and nuclear genes analysed. In contrast, the animal DNA barcoding gene cytochrome c oxidase subunit 1 (cox1) had average values for all estimated parameters of phylogenetic performance and was sometimes outperformed by other mitochondrial genes. The majority of the mitochondrial and nuclear genes in Euphaea damselflies have experienced frequent purifying selection, except for two cases of potential positive selection in NADH dehydrogenase subunit 3 (nad3) and elongation factor 1a (EF1a), and all mitochondrial genes had experienced stronger purifying selection than nuclear genes. Our findings indicated that mitochondrial nad2 and the A + T-rich region should be selected to provide efficient and high-resolution phylogenetic markers for damselflies at the species and population level." (Authors)] Address: Cheng, Y.-C., Dept of Life Science & Center for Tropical Ecology and Biodiversity, Tunghai University, Taichung, Taiwan

16735. Chitsaz, N.; Chahl, JS. (2018): Current knowledge of corrugated dragonfly wing structures and future measurement methodology [online]. In: AIAC 2018: 18th Australian International Aerospace Congress: HUMS - 11th Defence Science and Technology (DST) International Conference on Health and Usage Monitoring (HUMS 2019): ISSFD - 27th International Symposium on Space Flight Dynamics (ISSFD). Melbourne: Engineers Australia, Royal Aeronautical Society., 2019: 412-417. Availability: <https://search.informit.com.au/documentSummary;dn=322393373525963-;res=IELENG> ISBN: 9781925627213. [cited 08 May 19]: 412-417. (in English) ["Dragonflies achieves higher than expected flight performance and manoeuvrability due to aerodynamically significant corrugations and structural complexity of their wings. Their corrugated wings include a combination of various types of the cross vein and of crossvein/ longitudinal vein links that provide high stiffness and low membrane stress. It is paramount to model the aerodynamics of a wing to be able to optimise the aerodynamics of viable flapping wing Micro Air Vehicles (MAVs). This would not be possible without consideration of wing geometry. This paper presents a brief survey of the recently measured geometry of corrugations of dragonflies' wings and their types and initial aerodynamic analysis. It also demonstrates the capability of our new methods for reconstructing the 3D model of the dragonfly wing which illustrates all of the small-scale details and corrugations throughout the wing." (Authors)] Address: Chitsaz, N., School of Engineering, Univ. of South Australia, University Boulevard, Mawson Lakes, South Australia, 5095, Australia. E-mail: nasim.chitsaz@mymail.unisa.edu.au

16736. Choong, C.Y.; Alwen, B.M.; Tan, C.C. (2018): Odonata (Insecta) fauna of Taman Negara National Park, Malaysia. Serangga 23(2): 49-58. (in English) ["Taman Negara National Park is divided into three parts according to states – Taman Negara Pahang, Taman Negara Kelantan and Taman Negara Terengganu. In this study we present the records of Odonata collected at Kuala Kelapoh, Taman Negara Pahang and Gua Bewah, Taman Negara Terengganu. A total of 61 species were recorded from Kuala Kelapoh and 52 species from Gua Bewah. Of these 46 species are the new records for Taman Negara National Park. The high number of new records in this study indicates the Odonata fauna of Taman Negara National Park was not well studied. Notable records from the

study include Coeliccia sameerae, Phyllothemis raymondi and Rhinocypha pelops. The records from Kuala Kelapoh and Gua Bewah are combined with the existing records in literature to produce a checklist of the Odonata for Taman Negara National Park with 101 species from 15 families." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

16737. Choong, C.Y.; Alwen, B.M.; Tan, C.C. (2018): Odonata of Sungai Dusun Wildlife Reserve, Selangor, Peninsular Malaysia. Journal of Wildlife and Parks 33: 57-64. (in English) ["Records of Odonata collected at Sungai Dusun Wildlife Reserve on two field surveys (8-14 June and 15-20 September 2015) are presented. Adult insects were collected in the field surveys. In total, 33 species from 11 families were recorded from both the field surveys. The species list was dominated by family Libellulidae (14 species), followed by family Platycnemididae (five species) and Aeshnidae (four species). The other families (Calopterygidae, Chlorocyphidae, Euphaeidae, Argiolestidae, Philosinidae, Coenagrionidae, Gomphidae and Synthemistidae) were represented only by 1-3 species. Species found abundantly in the sampling site were Tyriobapta torrida and Vestalis amethystina. Interesting species recorded were Gynacantha dohrni, Burmagomphus arthuri, Tetracanthagyna plagiata and Oligoaeschna foliacea. G. dohmi is a new record for Peninsular Malaysia. Published Odonata records from other sources were compiled to produce a species list for Sungai Dusun Wildlife Reserve. At present 38 species from 11 families are known to Sungai Dusun Wildlife Reserve.] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

16738. Chovanec, A. (2018): Beobachtungen zum Sitzverhalten des Südlichen Blaupfeils (Orthetrum brunneum) und anderer Libellulinae (Odonata: Libellulidae). Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 70: 9-18. (in German, with English summary) ["Observations on the perching behaviour of Orthetrum brunneum and other Libellulinae. – At a small wetland in Lower Austria O. brunneum preferably perched on riparian helophytes (93 % of all documented perchings). Horizontal or slightly inclined vegetation structures were preferred. Open littoral ground was used only in few cases. Four-leg perching, which is described in the literature for Libellulinae, was confirmed in this study by evaluating photos: In 92 % of the situations males of O. brunneum used four legs; the number of legs used was higher with increasing instability of the substrate (e. g., Typha leaves). In ten out of 16 copulae, the O. brunneum male perched with six legs while embraced by four legs of the female (6/4-position). In a quite stable horizontal position, one pair showed a 4/2-position. Males of O. cancellatum, Libellula depressa and L. quadrimaculata also used four legs in the majority of the perching situations; L. quadrimaculata showed five- or six-leg perching with larger substrate angles." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

16739. Chovanec, A. (2018): Comparing and evaluating the dragonfly fauna (Odonata) of regulated and rehabilitated stretches of the fourth order metarhithron Gurtenbach (Upper Austria). International Journal of Odonatology 21(1): 15-32. (in English) ["Mitigation measures carried out at the regulated metarhithron Gurtenbach in Upper Austria were evaluated by a survey of the dragonfly fauna. The assessment method developed in this study was based on the longitudinal distribution of dragonflies along riverine biocoenotic regions (the “Rhithron-Potamon-Concept” explains changes in species composition along a river’s length). Numerically expressed habitat preferences led to the definition of a set of six reference species. According to the requirements of the EU Water Framework Directive the current situation of the odonate species was compared with this inventory of river type-specific reference species and assessed in a five-tiered classification system of the “ecologic status”. At the regulated stretch the record of five species (including one reference species) was classified as class IV (“poor ecological status”). At the three rehabilitated stretches a total of 23 species were found. Two stretches were classified as showing “good ecological status” (class II), due to the occurrence of two autochthonous reference species (Calopteryx virgo, Onychogomphus forcipatus). The sensitive method applied not only allowed the evaluation of the differences between regulated and rehabilitated stretches but also the assessment of potamalisation effects within the rehabilitated section due to river bed widening and backwater influences." (Authors)] Address: Chovanec, A., Federal Ministry of Agriculture, Forestry, Environment and Water Management, Department of National and International Water Management, Vienna, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

16740. Chovanec, A. (2018): Beobachtungen zur Wahl des Schlupfsubstrates beim Südlichen Blaupfeil, Orthetrum brunneum (Odonata: Libellulidae). Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 70: 19-23. (in German, with English summary) ["Selection of emergence substrate in Orthetrum brunneum. – The preference of O. brunneum for stands of Sparganium erectum as emergence substrate is shown and discussed. For comparison, positions of exuviae of Libellula quadrimaculata and Sympetrum striolatum are documented." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, A-2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

16741. Chovanec, A. (2018): Nachweise gefährdeter Libellenarten (Odonata) an einem kleinen Fließgewässer-System im Bezirk Mödling (Niederösterreich). Beiträge zur Entomofaunistik 19: 57-70. (in German, with English summary) ["Records of endangered dragonfly species (Odonata) at a small flowing water system in the district of Mödling (Lower Austria). – In 2018, investigations of the Schirgenbach in Perchtoldsdorf (Lower Austria) revealed, inter alia, records of Coenagrion ornatum (listed in Annex II of the EU FFH Directive and “critically endangered” according to the Austrian Red List) and of Orthetrum coerulescens (“vulnerable”). At the Luisenquelle in Kaltenleutgeben, which is hydrologically part of the “Schirgenbach-System”, Cordulegaster bidentata (“vulnerable”) was

found." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

16742. Cillo, D.; Bazzato, E. (2018): Conferma di presenza per la Sardegna di Diplacodes lefebvrii (Rambur 1842) (Odonata Libellulidae). Mediterraneaonline/Naturalistica N. 1/2018: 88-93. (in Italian, with English summary) ["The presence of D. lefebvrii is confirmed for a new station in centralwestern Sardinia. Considerations regarding a possible trend of expansion towards the northernmost territories are given, as observed for several other odonates. Porto Alabe, comune di Tresnuraghes (OR), 25.VIII.2015, L. Fancello legit." (Authors)] Address: Cilio, D., Via Zeffiro 8, 09126, Cagliari (CA), Italy. E-mail: davide.cillo@hotmail.it

16743. Conniff, K.L.; Limbu, M.S. (2018): Description of Microgomphus phewataali sp. nov. from Nepal (Odonata: Gomphidae). Odonatologica 47(3/4): 277-288. (in English) ["M. phewataali sp. nov. is described from Phewa Taal (Lake), Pokhara, Kaski District, Nepal (28°12'9"N, 83057'38"E, 742 m a.s.l.). Type locality is on south-east side of the lake shouldered by dense forest with small wetlands bordering the lake. A seasonal stream and seepages were found inside the forest. This is the first record of Microgomphus sp. from Nepal and it is compared with eleven other Asian species of this genus." (Authors)] Address: Conniff, Karen L., GPO Box 3226, Kathmandu, Nepal. E-mail: karoconniff@grnail.com

16744. Cowan, E.M.; Cowan, P.J. (2018): Ischnura fountaineae (Insecta: Odonata: Zygoptera) in Oman, eastern Arabia. Journal of Threatened Taxa 10(15): 13029-13031. (in English) ["Reviewing our archive of photographs from Oman, we now have eight records of I. fountaineae at Hoota Wadi pool. These are: 11-IX- 2013, 11 and 19-I, 19-VIII, 9, 16-IX- 2015 and 19 and 25-I-2016. We also have three records from Wadi Qtm (23.0720N & 57.6270E, 1,970m), which is on the Saiq plateau of Jebel Akhdar and has an irrigation channel (falaj) and pools. These three records are: 11-IV, 25-VIII-2014 and 18 –IV-2016. The records of 11-IV-2014 and 18-IV- 2016, at Wadi Qtm, were erroneously reported as I. evansi in Cowan & Cowan (2017). The apparent status of I. fountaineae in Oman should be "uncommon Western Hajar and Jebel Akhdar regions" (see Cowan & Cowan 2017 for further information about these regions and sites)." (Authors)] Address: Cowan, Elaine Mary, School of Education, University of Aberdeen, AB24 3FX, Scotland, UK. E-mail: e.m.cowan@abdn.ac.uk

16745. Cristiano, L.; Lantieri, A.; Boano, G. (2018): Comparison of Pallid Swift Apus pallidus diet across 20 years reveals the recent appearance of an invasive insect pest. Avocetta 42: 9-14. (in English) ["The diet of the A. pallidus in a NW Italian breeding colony was examined in the summers of 2012 and 2013 to compare the current diet against those assessed more than 20 years earlier (1987-1990). By screening 5980 prey items found in food boluses brought by adults to nestlings we identified 37 families or superfamilies pertaining to 8 arthropod orders (Araneae, Coleoptera, Diptera, Hymenoptera, Lepidoptera, Mallophaga, Odonata, Hemiptera). The highest percentage of prey was represented by Hemiptera Homoptera (42.9%) and Diptera Brachycera (21.6%), but we also found a good number of Coleoptera (7.0%). We did not find any significant differences in diets after 20 years when comparing prey abundance at higher taxonomic levels, but in the more recent samples, beetles were mostly (above 70%) represented by the allochthonous corn pest Diabrotica virgifera, a species totally absent in Italy before the year 2000. We conclude that swift colonies can destroy a huge number of agricultural insect pests, and perhaps even more importantly, regularly checking the swift`s diet at specific localities could be a useful tool for monitoring changes and the biodiversity of flying insects in anthropized ecosystems." (Authors)] Address: Boano, G., Museo Civico di Storia Naturale - Via San Francesco di Sales 188, Carmagnola (Turin), Italy. E-mail: g.boano@gmail.com

16746. Davies, R.; von Hardenberg, A.; Geary, M. (2018): Recapture rates and habitat associations of Leucorrhinia dubia (Vander Linden), (White-faced Darter), on Fenn's and Whixall Mosses, Shropshire. J. Br. Dragonfly Society 34(2): 89-101. (in English) ["Land-use changes and habitat loss are important drivers of biodiversity decline at both global and local scales. To protect species from the impacts of land-use change it is important to understand the population dynamics and habitat associations across these scales. Here we present an investigation into the survival and habitat preferences of L. dubia, at the local scale at Fenn's and Whixall Mosses, Shropshire, UK. We used Mark-Release-Recapture (MRR) methods to investigate survival and used sightings of individual dragonflies along with habitat data to Investigate habitat preference. We found that survival between capture-vlsits was very low and that L. dubia showed a clear preference for the open moss habitat on this site. We also found that the detectability, either through sightings or recaptures, was potentially very low and suggest that this should be taken into account in future analyses. We suggest that, by encouraging recorders to submit complete lists and to repeat visits to sites, detectability could be easily estimated for dragonfly species. Incorporating this into analyses would improve estimates of population trends and habitat associations." (Authors)] Address: Davies, Rachel, Conservation Biology Research Group, Department of Biological Sciences, University of Chester, Chester, CH1 4BJ, Polen. E-mail: m.geary@chester.ac.uk

16747. de Almeida, T.R.; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2018): Female colour form has no effect on copulation duration of the polymorphic Ischnura fluviatilis (Odonata: Coenagrionidae). Odonatologica 47(3-4): 229-243. (in English) ["We studied a population of Ischnura fluviatilis Selys, 1876 in Mato Grosso do Sul (Brazil), to establish the range of female colour polymorphism and associated mating behaviour. We found three female colour forms: orange and brown, which were the immature and mature coloration of the commoner gynochrome morph, and a blue androchrome morph. We observed mating couples and analysed the relationship between copulation duration and phenotypic characteristics of males and females. There were significant differences between colours for female body size, fecundity, egg

size and copulation duration, and in most cases the most deviant colour form was the immature orange. These females were significantly larger, and had the highest fecundity. Androchrome females produced smaller eggs. Copulations lasted on average 65 min, with the shortest copulation durations observed for brown females. Male size and the order of observation (indicative of seasonal effects) explained a significant proportion of variation in copulation duration, but female colour form, fecundity and size were not significant. We found evidence for assortative mating by size. Our results indicate that female colour does not explain variation in copulation duration, and therefore the possibility of cryptic male choice seems unlikely." (Authors)] Address: de Almeida, T.R., Fed Univ Grand Dourados, Grad Program Entomol & Biodivers Conservat, Dourados, MS - Brazil

16748. De Knijf, G. (2018): First evidence of reproduction of Trithemis kirbyi Selys, 1891 (Odonata: Libellulidae) in Portugal. Boletín Rola nº 11: 19-24. (in English, with Spanish summary) ["On 18 July 2017 a population of T. kirbyi was found at the Ribeira de Asseca in Tavira, Algarve, Portugal. In addition to adult males a newly emerged male was seen. This is the first proof of reproduction of T. kirbyi in Portugal and the third record for the country." (Author)] Address: De Knijf, G., Research Inst. of Nature and Forest (INBO), Havenlaan 88 bus 3, 1000 Brussels, Belgium. E-mail: Geert.deknijf@inbo.be

16749. de Souza, M.M.; dos Anjos, C.S.; Milani, L.R.; Brunismann, A.G. (2018): Libélulas (Odonata) predadas por moscas-assassinas (Diptera: Asilidae) no estado de Minas Gerais, sudeste do Brasil. Revista Brasileira de Zoociências 19(1): 77-81. (in Portuguese, with English summary) ["Dragonflies preyed by robber flies (Diptera: Asilidae) in the state of Minas Gerais, southeastern Brazil. Insects of the Odonata order are important in aquatic ecosystems, acting sometimes as predators and sometimes as prey to birds, fish and other insects, such as the robber flies of the Asilidae family. However, records of this interaction are scarce for Brazil. The purpose of this report is notify the occurrence of predation of the Odonata species Hetaerina longipes and Argia claussenii by Archilestris capnoptera (Wiedemann, 1828). The records were occasionally made at the Parque Estadual Serra do Papagaio and at the Parque Estadual do Ibitipoca, in the years 2015 and 2017. Predation may be a reflection of the frequency of odonate species at the time of the registrations, because the asilids are opportunistic and generalist predators. New studies are however needed to assess the impacts of predation on dragonfly populations." (Authors)] Address: de Souza, M.M., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas Gerais – Campus Inconfidentes, Inconfidentes, Minas Gerais, Brasil. E-mail: marcos.souza@ifsuldeminas.edu.br

16750. de Vega del Val, L.; Aldama Murga, A. (2018): Primeras citas de Lestes dryas (Kirby, 1890) (Odonata: Lestidae) y Gomphus simillimus (Selys, 1840) (Odonata: Gomphidae) en Cantabria (norte de la Península Ibérica) (Odonata: Aeshnidae, Corduliidae). Boletín de la Sociedad Entomológica Aragonesa 63: 355-356. (in Spanish, with English summary) [The first records of L. dryas and G. simillimus from Cantabria province (Spain) are provided.] Address: de Vega del Val, L., Técnico de medio ambiente en el P.N. Marismas de Santoña, Victoria y Joyel. (Ayuntamiento de Noja y Sociedad Española de Ornitología SEO/BirdLife). Carretera de Soano, nº 3, 39180 Noja, Cantabria, Spain. E-mail: ludovicodevega@hotmail.com

16751. Debata, S.; Swain, K.K. (2018): Odonata (Insecta) diversity of Kuldiha Wildlife Sanctuary and its adjoining areas, Odisha, eastern India. Journal of Threatened Taxa 10(15): 12969-12978. (in English) ["A study was carried out to assess the Odonata fauna of Kuldiha Wildlife Sanctuary, Odisha, eastern India from November 2012 to October 2013. During the study a total of 54 species of odonates including 37 species of Anisoptera and 17 species of Zygoptera were recorded. Among the dragonflies, the family Libellulidae was well represented with 30 species whereas among the damselflies, Coenagrionidae was well represented with seven species. Overall, the odonate fauna of Kuldiha Wildlife Sanctuary accounted for 49.09% of the odonate species known from Odisha and 10.73% of India. Therefore, further long-term studies on these lesser-known insect fauna in Kuldiha Wildlife Sanctuary will be useful in understanding their status over time." (Authors)] Address: Aranya Foundation, Plot No-625/12, Mars Villa, Panchasakha Nagar, Dumduma, Bhubaneswar, Odisha 751019, India. E-mail: subrat.debata007-@gmail.com

16752. Del Palacio, A.; Lozano, F.; Muzon, J. (2018): Description of the final instar larva of Argia serva Hagen in Selys, 1865 (Odonata Coenagrionidae). Anais da Academia Brasileira de Ciências 90(3): 3017-3022. (in English) ["The American genus Argia, with more than 100 species described, is the most speciose genus of Odonata in the world. In this contribution, the final stadium larva of Argia serva, the southernmost distributed species of Argia, is described and diagnosed based on reared material from Martín García Island, Buenos Aires, Argentina. The larva of this species can be easily separated from the other Argentinean Argia by the following combination of characters: sternum of S8 covered with spines (bare in A. translata); antennal segment 3 longer than 1+2 (equal to or shorter than 1+2 in A. joergenseni and A. jujuya); palpal setae absent (present in A. croceipennis). A key to the known larvae of Argia of the Southern Cone is provided." (Authors)] Address: Del Palacio, A., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nacional de Avellaneda, Mario Bravo 1460 esq. Isleta, C.P. 1870, Piñeyro, Buenos Aires, Argentina. E-mail: adelpalacio@undav.edu.ar

16753. Denis, A.; Payet, O.; Danflous, S.; Gouix, N.; Santoul, F.; Buisson, L.; Pélozuelo, L. (2018): Intraspecific variability of the phenology and morphology of three protected dragonflies between natural and artificial habitats. Journal of Insect Conservation 22: 419-431. (in English) ["Changes in phenology and in body size are two of the three main consequences of global warming on organisms. We investigated whether living in a warm artificial habitat would induce changes in the phenology and body size of dragonflies. We monitored in natura the emergence pattern of three protected and red-

listed dragonfly species in three geographically close systems which differ in thermal profiles: a medium-sized river, one of its tributaries and an artificial lake fed by the water of the tributary. We also investigated the morphological variability of one of the species between the three systems. We showed an asynchrony of emergence for the three species, as well as morphological variability between the lake and the two rivers. Individuals from the lake emerged earlier and were smaller than those from the two rivers. These results are in agreement with a temperature-induced response hypothesis as the lake is warmer than the two rivers. Asynchrony of emergence between neighbouring populations triggers questions related to metapopulation functioning and about the fitness and the fate of the early-emerging individuals. Understanding the response of these species to local thermal conditions will help to improve population monitoring and conservation." (Authors)] Address: Denis, Alice, Conservatoire d'Espaces Naturels Midi-Pyrenees, 75, France. E-mail: alice.denis@espaces.naturels.fr

16754. Denis, A.S. (2018): Impacts de l'anthropisation sur la diversité odonatologique au sein des cours d'eau: vers une meilleure prise en compte des espèces de la directive habitats faune flore. Laboratoire écologie fonctionnelle et environnement, Sciences de l'Univers, de l'environnement et de l'espace, Université Toulouse III: 174 pp. (in French, partly in English) ["Title: Anthropisation impacts on dragonfly diversity within streams: towards better assessment of anthropogenic impacts upon riverine species of European Community interest. Abstract: In a context of global biodiversity crisis, reconciling the development of wealthgenerating industry and agriculture with nature conservation is a crucial issue. Economic stakeholders are legally obliged to apply the mitigation hierarchy doctrine and thus "avoid, mitigate, and compensate" for their project's impacts. However, for invertebrate protected species, and particularly dragonfly species, basic knowledge on their ecology and population dynamics is lacking. It is thus difficult to accurately anticipate the impacts and propose efficient avoidance and compensation measures. This is particularly true on rivers, which are ecosystems under high pressure owing to their utility for human beings (i.e. water and food resources, transport, energy production, leisure). The aim of this work is to improve knowledge of three protected riverine species of dragonflies: Oxygastra curtisii, Gomphus graslinii and Macromia splendens, and to provide better assessment methods to evaluate the impacts of the anthropisation of streams on their populations. We sought in particular (1) to improve environmental impact assessments and management of these species within Natura 2000 sites by proposing a standardised survey protocol, (2) to assess the consequences of habitat change, especially water temperature warming, on their phenology and morphology, and (3) to describe and evaluate the impacts of weirs and hydroelectric dams on their populations. This work took place in the Midi-Pyrénées region in southern France, where populations of these three species are still present. It was carried out in close partnership with the Conservatoire d'Espaces Naturels de Midi-Pyrénées, which coordinates the Regional action plan for Odonata, and the Functional Ecology Laboratory EcoLab to ensure direct transfer of the scientific knowledge acquired to the ecosystems managers, economic stakeholders and public authorities responsible for biodiversity conservation." (Author)] Address: not stated

16755. Diarra, B.; Konan, K.J.; Yapo, L.M.; Kouassi, K.P. (2018): Aquatic macroinvertebrates associated with free-floating macroinvertebrates associated with free-floating macrophytes in a marginal lentic ecosystem (Ono Lagoon, Côte d' Ivoire). Journal of Entomology and Zoology Studies 6(3): 1432-1441. (in English) ["This study aims to investigate macroinvertebrate communities associated with floating macrophytes of Ono lagoon (Côte d'Ivoire). Samples were monthly collected from September 2015 to August 2016. Similarly, abiotic variables (temperature, transparency, depth, conductivity, TDS, pH, dissolved oxygen, NH4+, NO3-, NO2- and PO43-) were measured. A total of 150 macroinvertebrates belonging to 46 families and 15 orders were identified. Specifically, 125 taxa were found on Eichhornia crassipes, 77 on Salvinia molesta and 62 on Pistia stratiotes of which 52 taxa were exclusively associated with E. crassipes, 15 with S. molesta and 7 with P. stratiotes. Libellulidae (14.39-22.42%) and Corduliidae (10.56-16.47%) exhibited the highest densities. Higher values of taxonomic richness, Shannon index and evenness were recorded for macrophytes stands with a significant difference between invasive plants (E. crassipes and S. molesta) and native plant (P. stratiotes). In flood season, E. crassipes was greatly colonised by Odonata and Arachnida and was highly correlated with dissolved oxygen, temperature, PO43- and depth. The rainy season was characterised by Coleoptera, Diptera, and Gasteropoda as well as highest levels of pH and NO3-. This season was correlated with S. molesta and P. stratiotes. In dry season, Heteroptera, Decapoda, Lepidoptera and Ephemeroptera were abundant and correlated with transparency." (Authors)] Address: Diarra, B., Lab. Ecol. Tropicale, UFR Biosciences, Univ. Félix Houphouët-Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire

16756. Dias-Silva, L.; Teixeira Duarte, G.; Alves, R.; Ramos Pereira, M.J.; Paglia, A. (2018): Feeding and social activity of insectivorous bats in a complex landscape: The importance of gallery forests and karst areas. Mammalian Biology 88: 52-63. ["Worldwide, increasing human activity, such as agriculture and mining, and decreased landscape complexity, are negatively affecting numerous mammal species. For example, bat communities are becoming threatened in many locations mostly due to the loss of their preferred roosting and foraging habitats. Brazilian landscapes and their associated bat communities are no exception, with the situation being further exacerbated by recently adopted permissive environmental laws that have resulted in reduced biodiversity protection and conservation. Therefore, there is an urgent need to understand how landscape and environmental variables relate to bat activities in Brazil in order to support efforts for their conservation. We used acoustic monitoring data to investigate differences in foraging and social activity of insectivorous bats among four habitat types in a heterogeneous landscape in the Cerrado-Atlantic forest ecotone in southeastern Brazil.

We also sampled insect availability and measured temperature at the same sites. Our results showed increased social activity and a greater number of species emitting social calls in karst, and increased feeding activity with a greater number of species emitting feeding buzzes in gallery forest. We also found a positive influence of both temperature and insect abundance on foraging and social activity. Our study provides new insights regarding habitat use by bats in a heterogeneous landscape, and demonstrates the importance of preserving different habitats in heterogeneous landscapes for the conservation of bat species and the ecological functions they perform." (Authors)] Address: Dias-Silva, L., Laboratorio de Ecologia & Conservacao, Depto de Biologia Geral, Instituto de Ciencias Biologicas, Universidade Federal de Minas Gerais, Avenida Antonio Carlos 6.627, 31270-901, Belo Horizonte, MG, Brazil. E-mail: leohenriqueds@gmail.com

16757. Díaz-Martínez, C.; Cardo-Maeso, N.; Bernardino Toledo-Sevilla, B.; Simarro-Tórtola, J.; Brotóns-Padilla, M. (2018): Catálogo provisional de los odonatos (Insecta: Odonata) de Castilla-La Mancha (Centro de Espana). Boln. S.E.A. 63: 325-335. (in Spanish, with English summary) ["Provisional checklist of the Odonata of Castilla-La Mancha (central Spain). The key intention of this paper is to gather all of the available information on Odonata in Castilla-La Mancha, as a starting point for future studies in this administrative region. A dataset of 8439 records of adults, larvae and exuviae from published (44.9%) and unpublished data (55.1%) were gathered, providing information about 34% of the regional territory, with large differences in data coverage between provinces. We present a provisional checklist with 64 species for Castilla-La Mancha, a region with a mainly Mediterranean fauna. It includes the first records of five species from Albacete, three from Toledo, two from Cuenca and two from Ciudad Real; some are threatened taxa, like Lestes macrostigma and Gomphus simillimus." (Authors)] Address: Díaz-Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha (SEACAM). C/ Londres, 7. 45003 Toledo, Spain. E-mail: cdiaz.cuenca@gmail.com

16758. Dolmen, D.; Pedersen, J. (2018): Coenagrion hastulatum and C. lunulatum – their responses to the liming of acidified lakes and the release of fish (Odonata: Coenagrionidae). Odonatologica 47(1/2): 101-120. (in English) ["The rare and acidification-tolerant C. lunulatum became extinct in Romundstadtjern, a small acidic lake in southern Norway, at some time between 1950 and 1980. The reason was suspected to be liming of the lake to raise the pH level before releasing fish (trout). To substantiate the hypothesis, in 1998–2001 we experimentally limed two other small acidic lakes, Øynaheia A (pH 4.6) and B (pH 4.8), which were also inhabited by C.lunulatum. Instead of being made extinct by the liming and the rise of the pH to 7.0, the C.lunulatum population at Øynaheia grew strongly during the experimental period. However, when fish (perch) were released later, before 2011, the invertebrate fauna became tremendously impoverished, and C.lunulatum was not observed there in 2012, 2014 or 2016. Therefore, liming of lakes does not seem to be a threat to C. lunulatum, but the release of fish may probably lead to its extinction. A coexisting population of C. hastulatum also grew during the years of liming, but not as much as C. lunulatum. However, it survived the introduction of fish, although in low numbers." (Authors)] Address: Dolmen, D., Norwegian Univ. of Science and Technology (NTNU), The Museum, NO 7491 Trondheim, Norway. E-mail: dag.dolmen@ntnu.no

16759. dos Santos, J.; Kroth, N.; Breaux, J.; Albeny-Simões, D. (2018): Do container size and predator presence affect Culex (Diptera: Culicidae) oviposition preferences? Revista Brasileira de Entomologia 62(1): 40-45. (in English) ["Organisms with complex life cycles typically do not exhibit parental care. Hence, the ability of adult females to choose quality oviposition sites is critical for offspring success. Gravid females of many insect taxa have the capability to detect environmental conditions in water-holding containers (e.g., resource level, presence of competitors or predators) and to choose the sites that are most suitable for offspring growth and development. Mosquitoes may also detect physical container characteristics related to water permanence such as surface area, volume, or container size, and some species such as those in the genus Culex have been shown to prefer larger containers. However, predators may also preferentially colonize larger containers; thus, ovipositing females may face decisions based on cues of site quality that balance costs and benefits for offspring. We used a field experiment to determined the oviposition preferences of two Culex species in response to experimental container size and predator abundances within the containers. We found that both species avoided ovipositing in the largest containers, which have high abundances of Chaoborus sp. and dragonfly larvae (predators). However, the container size most commonly chosen for oviposition (15-L buckets) also had high mean abundance per liter of dragonfly larvae. These results suggest either prey naiveté or reduced vulnerability of these species to dragonflies compared to Chaoborus sp. Other potential mechanisms for the observed patterns of are discussed." (Authors)] Address: dos Santos, J., Univ. Comunitária da Região de Chapecó, UNOCHAPECO, Curso de Graduação em Ciências Biológicas, Chapecó, SC, Brazil

16760. Dosi, E.M.; Grinang, J.; Nyanti, L.; Khoon, K.L.; Harun, M.H.; Kamarudin, N. (2018): A preliminary study of the macroinvertebrate fauna of freshwater habitats in Maludam National Park, Sarawak. Mires and Peat 22, Article 06: 1-7. (in English) ["Macroinvertebrates are diverse and widespread, and they play important ecological roles in aquatic ecosystems; yet little is known about the macroinvertebrate fauna of the peat swamp forests of Borneo. In light of this knowledge gap, we present a preliminary species list of macroinvertebrates in the peat swamp forest of Maludam National Park, Sarawak, Malaysia. Macroinvertebrates were sampled between April 2011 and November 2014 from three stations on the Maludam River, which flows through the National Park. In total, 3,257 individual macroinvertebrates were examined, representing 37 morpho-species from 20 families and eight orders. Of the total number of individuals captured, 51 % were aquatic beetles (Order Coleoptera), 26 % were aquatic bugs (Hemiptera), 10 % were dragonflies (Odonata), 5 % were flies (Diptera) and 4 % were mayflies (Ephemeroptera). Other orders contributed less than 5 % of the total. The dominant species

was the whirligig beetle Dineutus unidentatus (36 % of all individuals caught) which may, thus, be a stenotopic habitat specialist. Despite the harsh environmental conditions of Maludam, where aquatic habitats are acidic and low in dissolved oxygen, the area was found to be inhabited by a diverse macroinvertebrate fauna which is likely to contribute to maintaining the important ecosystem services that the peat swamp forest provides." (Authors) Address: Dosi, E.M., Malaysian Palm Oil Board, 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia. E-mail: ellamichael@mpob.gov.my

16761. Dossi, F.; Leitner, P.; Pauls, S.; Graf, W. (2018): In the mood for wood-habitat specific colonization patterns of benthic invertebrate communities along the longitudinal gradient of an Austrian river. Hydrobiologia 805: 245-258. (in English) ["Instream large wood (LW) constitutes an indispensable element of natural river ecosystems. It affects local hydraulics, morphology, nutrient budget, overall habitat complexity, and dynamics. Despite numerous studies about LW as a habitat for benthic communities, information on the varying importance along the longitudinal gradient of a river is lacking. The focus of this study is therefore to investigate general differences between lithal and xylal colonizers and to further investigate trends along the river course. We analyzed lithal and xylal communities at ten sites along the medium-sized Lafnitz River in Southeast Austria. Our results significantly show (1) a general differentiation between lithal and xylal communities, (2) an increasing distinction of the lithal and xylal fauna along the longitudinal gradient of the river, and (3) a distinct correlation between the distance from source and the number of exclusive xylal and nowadays predominantly rare taxa. The presence of LW is therefore directly linked to higher aquatic biodiversity compared to rocky substrates and presents a unique element for river restoration, especially in lower river sections." (Authors)] Address: Dossi, F., IHG - Institute of Hydrobiology and Aquatic Ecosystem, Management, BOKU – Univ. of Natural Resources & Life Sciences, Gregor-Mendel-Str. 33, 1180 Vienna, Austria. E-mail: florian.dossi@boku.ac.at

16762. Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2018): Re-description of Coeliccia erici Laidlaw, and the description of Coeliccia sameerae sp. nov. from Peninsular Malaysia (Odonata: Zygoptera: Platycnemididae). Zootaxa 4413(2): 351-367. (in English) ["Coeliccia erici Laidlaw, 1917 is re-described and illustrated for both sexes; its taxonomic history and the confusion surrounding it is discussed. Coeliccia kimurai Asahina, 1990 is shown to be a junior synonym of C. erici. Coelicca sameerae sp. nov. (holotype ♂, small stream near Sungai Lasir, Tasik Kenyir, Terengganu, Malaysia, deposited in the Natural History Museum, London) is described from both sexes from Peninsular Malaysia; this species had been confused with C. erici until now. A remark on the status of C. simillima Laidlaw, 1917 is made." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands; Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

16763. Dow, R.A.; Choong, C.Y.; Robi, N.J.; Butler, S.G.; Ngiam, R.W.J.; Reels, G.T. (2018): Odonata from the Lanjak Entimau Wildlife Sanctuary, Sarawak. International Dragonfly Fund - Report 115: 1-50. (in English, with Bahasa Melayu abstract) ["Records of Odonata from the Lanjak Entimau Wildlife Sanctuary (LEWS) in Sarawak, Malaysian Borneo are presented. Previous records of Odonata from LEWS are critically examined. One hundred and ten species have been recorded within the sanctuary, including three that have yet to be found outside (Drepanosticta adenani, Telosticta iban and "Elattoneura" mauros); records of four more species are regarded as in need of confirmation, those of another six are incorrect. In addition to the three species only known from LEWS, other notable records include: Drepanosticta sbong, Dysphaea lugens, Euphaea sp. cf basalis, Pericnemis kiautaurum, Burmagomphus insularis, Gomphidia caesarea, Merogomphus species, Phaenandrogomphus safeii, Macromia callisto and Idionyx montana. A fresh illustration of the anal appendages of Drepanosticta sbong in lateral view is provided to make up for inaccuracies in the original illustration. The taxonomy of Phaenandrogomphus safeii is briefly discussed. Zygonyx errans Lieftinck, 1953 is considered a subspecies of Z. ida not Z. iris. Additional records from areas adjacent to LEWS are given in an appendix." (Authors)] Address: Dow, R.A.Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia

16764. Dow, R.A.; Zhang, H.-M. (2018): Yunnanosticta gen. nov., from Yunnan, a new genus from the Sinostictinae, with the description of two new species (Odonata: Zygoptera: Platystictidae). Zootaxa 4375(4): 567-577. (in English) ["Yunnanosticta gen. nov. in the platystictid subfamily Sinostictinae is described from Yunnan, China. The genotype is Y. wilsoni sp. nov., described here (holotype ♂ from Tongbiguan, Yingjiang County, Dehong Dai & Jingpo Autonomous Prefecture, Yunnan, China, 23 vi 2015, leg. H.M. Zhang, to be deposited in the Natural History Museum, London). Y. cyaneocollaris sp. nov. (holotype ♂ from Tongbiguan, Yingjiang County, Dehong Dai & Jingpo Autonomous Prefecture, Yunnan, China, 23 vi 2015, leg. H.M. Zhang, to be deposited in the Natural History Museum, London) is also described." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

16765. Dow, R.A.; Reels, G.T. (2018): Drepanosticta adenani sp. nov., from the Lanjak Entimau Wildlife Sanctuary in Sarawak (Odonata: Zygoptera: Platystictidae). Zootaxa 4379(3): 429-435. (in English) ["D. adenani sp. nov. (holotype ♂, from a tributary of Sungai Jela, Nanga Segerak area, Lanjak Entimau Wildlife Sanctuary, Sri Aman Division, Sarawak, Malaysian Borneo, 18 vii 2016, deposited in the Natural History Museum, London) is described from both sexes." (Authors)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

16766. Dow, R.A.; Kompier, T.; Phan, Q.T. (2018): Drepanosticta emtrai sp. nov. from Vietnam with a discussion of Drepano-

sticta vietnamica Asahina, 1997 (Odonata: Zygoptera: Platystictidae). Zootaxa 4374(2): 273-282. (in English) ["D. emtrai sp. nov. is described from Vietnam (holotype ♂ Ha Tinh Province, 9 vi 2015, to be deposited in RMNH). The new species is allied to D. carmichaeli (Laidlaw, 1915) and a number of other species of Drepanosticta including D. vietnamica Asahina, 1997. New illustrations of the paratype of D. vietnamica are provided and the species is discussed. The Drepanosticta carmichaeli-group, to which the above mentioned species belong, is defined and discussed." (Authors)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

16767. Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2018): Re-description of Coeliccia erici Laidlaw, and the description of Coeliccia sameerae sp. nov. from Peninsular Malaysia (Odonata: Zygoptera: Platycnemididae). Zootaxa 4413(2): 351-367. (in English) ["Coeliccia erici Laidlaw, 1917 is re-described and illustrated for both sexes; its taxonomic history and the confusion surrounding it is discussed. C. kimurai Asahina, 1990 is shown to be a junior synonym of C. erici. C. sameerae sp. nov. (holotype ♂, small stream near Sungai Lasir, Tasik Kenyir, Terengganu, Malaysia, deposited in the Natural History Museum, London) is described from both sexes from Peninsular Malaysia; this species had been confused with C. erici until now. A remark on the status of C. simillima Laidlaw, 1917 is made." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

16768. Dow, R.A.; Advento, A.D.; Turner, E.C.; Caliman, J.-P.; Foster, W.A.; Naim, M.; Snaddon, J.L.; Ps, S. (2018): Odonata from the BEFTA Project area, Riau Province, Sumatra, Indonesia. Faunistic Studies in South-East Asian and Pacific Island Odonata 24: 1-22. (in English) ["The Odonata found during work on the Biodiversity and Ecosystem Function in Tropical Agriculture (BEFTA) Project in Riau Province, Sumatra, Indonesia are reported. Prior to the BEFTA project we are only aware of published records of 37 species of Odonata from Riau Province (these are listed in an appendix). 75 species have been recorded during the BEFTA project, including five that have not (Archibasis incisura, A. rebeccae and Pseudagrion williamsoni), or not definitely (Argiocnemis species and Mortonagrion species cf aborense), been recorded in Sumatra before. Macromia dione is recorded for the first time since its description. The number of species now known from Riau Province is 88; 51 of these are reported from the province for the first time here." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

16769. Dwari, S.; Patra, A.; Mondal, A.K. (2018): First report of Libellago lineata (Burmeister, 1839) from South West Bengal, India. International Journal of Entomology Research 3(5): 1-3. (in English) ["The first record of L. lineata from South West Bengal, India is presented in this paper. During the biodiversity survey of Chotonagpur Plateau regions of West Bengal this species photographed and identified first time for the Southern part of West Bengal. Previously its distribution was restricted only in North West Bengal. L. lineata commonly known as River Heliodor recorded in September, 2017. Small sized damselfly documented from stream of Duarsini forest area, Bundwan and Turga dam, Baghmundi of Purulia District West Bengal, India." (Authors)] Address: Dwari, S., Plant Taxonomy, Biosystematics and Molecular Taxonomy Laboratory UGC-DRS-SAP Department, Dept of Botany & Forestry Vidyasagar University, Midnapore, West Bengal, India

16770. Dyatlova, E.S. (2018): Note on the dragonfly fauna of Moldova – Progress report 2011. International Dragonfly Fund - Report 114: 1-20. (in English) ["New field sampling was carried out in June 2011 in northern Moldova, the most unstudied area in the Republic of Moldova. A total of 19 Odonata species was recorded during a field trip, with Libellula fulva and Gomphus flavipes new for Moldova. The presence of species of European concern is discussed. Photos of all visited habitats are included. The fauna of Moldova mostly consists of species which are able to survive in biotopes with high anthropogenic pressure."] Address: Dyatlova, Elena S., Independent Researcher, French boulevard 37/3, Odessa 65044, Ukraine. E-mail: lena.dyatlova@gmail.com

16771. El Haissoufi, M.; Bennas, N.; Hernández, M.A.; Casanueva, P.; Campos, F. (2018): Biometrics of exuviae of Cordulegaster boltonii algirica Morton, 1916 (Odonata: Cordulegastridae). Aquatic Insects 39(4): 407-413. (in English) ["This study provides the first biometrics analysis of exuviae from Moroccan populations of the Ibero-Maghrebian endemic dragonfly Cordulegaster boltonii algirica Morton, 1916 collected in the Rif Mountains. Among the biometric variables that were measured, tibia length was highly correlated with the exuviae body length (BL), and can, therefore, be used to calculate the BL of partially broken exuviae. The head width exhibited the smallest coefficient of variation for both males and females and, therefore, is a valuable measurement that can be used for biometric comparison of different populations. The data presented herein will be used for future comparison with other North African and European populations of C. boltonii algirica." (Authors)] Address: El Haissoufia, M., Polydisciplinary Fac. of Taza, Sidi Mohamed Ben Abdellah University, Fes, Morocco. E-mail: med.elhaissoufi@gmail.com

16772. Endah Hari Utari (2018): Dragonfly community (Odonata) in Sokokembang Forest, Pekalongan, Jawa Tengali. Undergraduete Thesis. Biologi Majors, Faculty- of Science and Technology, State Islamic University Syarif Hidayatullah, Jakarta: XIII + 53 pp. (in English) ["Odonata hold pivotal roles, as a bio indicator of water quality and as predators in the food chain. The availability of optimal environmental conditions and food resources effect the community structure in the habitat. This research want to find out the dragonfly community structure, to define its distribution patterns, and to describe the influence of the biotic factors. The method used in this research is survey. It was by determining the residential area. In taking the sample, the researcher used line transects along 200 m and insect net. Dragonflies were found 8 types in both observation

sites with a total of 625 individuals belonging to the Libellulidae, Platystictidae, Euphaeidae, Coenagrionidae, and Calopterygidae families. The most common types of dragonfly are Orthetrum sabina, Vestalis luctuosa, Euphaea variegata, and Drepanosticta spatulifera. D. spatiilifera is a Javanese endemic dragonfly with conservation stratum DD = Data Deficient based on IUCN RedList data. Highest species diversity index (H *) was found in the latrine river with a value of 1 605. the index (E) of the highest heter value was hair river with a value of 0.860. the index of type of similarity of 77%. the distribution pattern in both locations grouped, uniform and random, and the highest (Di) index of dominance index is 28%. CCA Canonica Corespondence Analysis) shows the pH of the water and the intensity of light gives a real effect on the dragon community in the smoked forest area. The community of dragonfly was organized based on species diversity, evenness type, similarity rype, distribution pattern and index of type dominance." (Author)] Address: not stated

16773. Erdakov, L.N. (2018): Cyclicity of perennial changes in the density of the dragonfly population Libellula quadrimaculata L., 1758 (Odonata, Libellulidae). Eurasian Journal of Entomology 17(3): 216-222. (in Russian, with Englis summary) ["Based on the data published in 1969-2009 [Popova, Kharitonov, 2010], a spectrum of the density population fluctuation of L. quadrimaculata has been calculated. The resulted spectrum shows seven harmonic components, of which the 6.7-year periodicity predominates by its strength. In the middle frequencies, there is an 11.8-year rhythm. The remaining harmonic components are typical of the high-frequency region of the spectrum. In the order of decreasing their strength, these are 4.3, 3.4-, 2.7- and 2.3-summer rhythms. The dragonfly population is well-coordinated with changes of both the weather and hydrological conditions that are important for it. The dynamics of its density is in agreement with perennial precipitation fluctuations, as well as with changes in the surface area size of Lake Chany. Even external influences, of which the course is not synchronous with density fluctuations, may have harmonic components that could be Adjustable for corresponding rhythms of the dragonfly.] Address: Erdakov, L.N., Institute of Systematics and Ecology of Animals, Russian Acad. of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk, 630091 Russia. E-mail: microtus@yandex.ru.

16774. Escoto-Moreno, J.A.; Hernández-Hernández, A.; Hernández-Hernández, J.A.; Márquez Luna, J.; Silva-Briano, M.; Novelo-Gutiérrez, R. (2018): The northernmost record of the Neotropical giant damselfly Megaloprepus caerulatus (Drury, 1782) (Odonata: Coenagrionidae) in the American continent. Gayana 82(1): 90-93. (in Spanish, with English summary) ["M. caerulatus is one of the largest damselflies in the world and it is recorded here for the first time in Acomul, state of Hidalgo, Mexico, being this the northernmost record known in the American Continent, which allows us to discuss its current geographic distribution and its taxonomic status." (Authors)] Address: Novelo-Gutiérrez, R., Red Biodiversidad y Sistemática, Inst. Ecol., A. C. Carretera antigua a Coatepec # 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

16775. Eslami, Z., Ebrahimi, M.; Sadeghin, S. (2018): Late spring records of Odonata from the west margin of the Namak Lake, Northwest of Central Plateau of Iran. IDF-Report 125: 1-18. (in English) ["A total of 20 Odonata species were recorded from 15 water bodies (3 natural water bodies and 12 man-made reservoirs) in a desert landscape west of the Namak Lake in the northwest of the Central Plateau of Iran, from 27 May to 20 June, 2017. The study area included Qom province and the northern part of Esfahan province (34.07 to 35.14 N, 51.33 to 50.89 E). For Qom province, 17 out of 18 species found are new provincial records. In addition Selysiothemis nigra, Orthetrum chrysostigma and Orthetrum taeniolatum are new findings for Esfahan province. The species around the man-made reservoirs are characterized by a broad ecological amplitude ("generalists") while species assemblages of natural water bodies consisted of more sensitive species. In the arid climate of central part of Iran, man-made reservoirs are major habitats for Odonata species. Although these reservoirs have increased the amount of habitat for generalist species, they do not foster sensitive and specialist species. Furthermore, considering the more intense droughts predicted for these areas in the future, and the current scenario of environmental degradation, some sensitive species may be in danger of local extinction." (Authors) Address: Sadeghi, S., Dept of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran. E-mail: hsabersadeghi@gmail.com

16776. Ewuim, S.C.; Ogbuozobe, G.O. Ezeonyejiaku, D.C.; Mogbo. T.C. (2018): Wet season insect population of an arable land at Ifite-Ogwari Campus of Nnamdi Azikiwe, University, Awka, Nigeria. Animal Research International 15(3): 3065-3069. (in English) ["A study on insect fauna in a fallow plot at Ifite-Ogwari was carried out in rainy season between April and June 2018 using the sweep net. On each sampling occasion thirty sweeps were made across the vegetation of the 39920 m2 plot to monitor the insects on the foliage. A total of 63 insect species and their larvae comprising 12 families and 16 species were recorded during the sampling period. There was a preponderance of Camponotus acvapimensis followed by Pheidole sp., Orthetrum icteromelas, Attractomorpha acutipennis, Heteropternis thoracica and Sphenoptera sp., with the singletons including Phaneropterat nana, Cardiochiles sp., Leptoglossus memberanaceus and Anoplocnemis curvipes. There was no significant difference (p>0.05) in the environmental factors between the three months. The relationships between sweep net catches were not significant (p>0.05). Pheidole and species of Odonata served as faunal indicators. Factors that influence the sweep net catches included types of the plant species in the habitat, anthropogenic activities, management practices, locomotor activities and reproductive cycles of insect species. Other factors affecting sweep net catches were also discussed." (Authors)] Address: Ewuim, S. C. Dept Zool. Nnamdi Azikiwe Univ., Awka, Anambra State, Nigeria. Email: cewuim@gmail.com

16777. Feindt, W.; Oppenheim, S.J.; DeSalle, R.; Goldstein, P.Z.; Hadrys, H. (2018): Transcriptome profiling with focus on potential key genes for wing development and evolution in Megaloprepus caerulatus, the damselfly species with the world's

largest wings. PloS one [12 Jan 2018, 13(1):e0189898]: 17 pp. ["The evolution, development and coloration of insect wings remains a puzzling subject in evolutionary research. In basal flying insects such as Odonata, genomic research regarding bauplan evolution is still rare. Here we focus on the world's largest odonate species-the "forest giant" M. caerulatus, to explore its potential for looking deeper into the development and evolution of wings. A recently discovered cryptic species complex in this genus previously considered monotypic is characterized by morphological differences in wing shape and color patterns. As a first step toward understanding wing pattern divergence and pathways involved in adaptation and speciation at the genomic level, we present a transcriptome profiling of M. caerulatus using RNA-Seq and compare these data with two other odonate species. The de novo transcriptome assembly consists of 61,560 high quality transcripts and is approximately 93% complete. For almost 75% of the identified transcripts a possible function could be assigned: 48,104 transcripts had a hit to an InterPro protein family or domain, and 28,653 were mapped to a Gene Ontology term. In particular, we focused on genes related to wing development and coloration. The comparison with two other species revealed larva-specific genes and a conserved 'core' set of over 8,000 genes forming orthologous clusters with Ischnura elegans and Ladona fulva. This transcriptome may provide a first point of reference for future research in odonates addressing questions surrounding the evolution of wing development, wing coloration and their role in speciation." (Authors)] Address: Hadrys, Heike, ITZ – Forschungsstätte 'Alter Bahnhof Schapen' Braunschweig, Univ. of Veterinary Medicine Hannover, Hannover/Braunschweig, Germany. E-mail: Heike.Hadrys@ecolevol.de

16778. Fekete, J.; Ézsöl, T.; Kloknicer, T.; Katona G. (2018): Further data on Cordulegaster bidentata Selys, 1873 from the territory of Bükk National Park. Folia Historico-Naturalia Musei Matraensis 42: 11-14. (in English) ["Our paper presents 34 larva and 10 imago records of Cordulegaster bidentata Selys, 1873 from the Bükk Mountains, Northern Hungary from the year 2017 as a continuation of our previous work. Our samplings merely based on the survey of the larvae but some data about adults are also presented." (Authors)] Address: Fekete, Judit, University of Pannonia, Dept of Limnology, Egyetem utca 10, H-8200 Veszprém, Hungary. E-mail: fekete.judit@okologia.mta.hu

16779. Festi, A. (2018): Wiederfund von Orthetrum albistylum (De Selys-Longchamps, 1848) für Südtirol nach 150 Jahren (Odonata, Anisoptera). Gredleriana 18: 127. (in German) [Italy, Etsch near Salurn (11,190729°E, 46,239053°N), juvenile, 7-IV-2018] Address: Festi, A., Penegalstr. 7, 39100 Bozen, Italy. E-mail: alex.festi@rolmail.net

16780. Fincke, O.M.; Xu, M.; Khazan. E.S.; Wilson, M.; Ware, J.L. (2018): Tests of hypotheses for morphological and genetic divergence in Megaloprepus damselflies across Neotropical forests. Biological Journal of the Linnean Society 125(4): 844-861. (in English) ["Differences in sexual signalling may initiate speciation by limiting gene flow among diverging populations. M. caerulatus exhibits two, visually obvious 'wing types' across its range. Males from one subspecies have sexually dimorphic, white-banded wings whereas males from the other subspecies lack the sex-specific white wing band. Using mitochondrial (cytochrome c subunit I and 16S) and nuclear (H3) markers, and measures of body size, wing ratio and secondary genitalia, we identified distinct genetic and morphological clades from Mexico to Panama; absence of a wing band was ancestral. To determine if relative reflectance properties of male and female wing tips cue sexual and competitor identity, as they do for wing dimorphic males, we noted reactions of males lacking wing bands to conspecifics with manipulated wings. Isolation by distance explained only 18% of the molecular variation among clades. Relative to wing dimorphic demes, wing monomorphic populations showed lower adult density, lower resource defence and fewer male–male interactions, suggesting lower sexual selection on males. However, not all were less sexually dimorphic in body size. Males lacking wing bands reacted to conspecifics with manipulated wings in ways suggesting that signals for potential mates and competitors do not differ across wing types, a conclusion that awaits more data. Wing mono- and dimorphic demes in Megaloprepus occur allopatrically over relatively short distances and may be isolated via secondary genitalia or unknown physiological constraints." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

16781. Fischer, I.; Sittenthaler, M.; Chovanec, A. (2018): Zum Vorkommen von drei Arten der Gattung Leucorrhinia in Wien (Österreich) mit dem Erstnachweis von L. albifrons (Odonata: Libellulidae). Libellula 37(3/4): 79-90. (in German, with English summary) ["Occurrence of three Leucorrhinia species in Vienna (Austria) with the first record of L. albifrons (Odonata: Libellulidae) - In 2017, L. albifrons was recorded in Vienna for the first time. The locations were situated at backwater remnants of the former Danubian floodplains. This area, which is called Lobau, is part of the National Park "Donau-Auen". In the Lobau two other species of the genus Leucorrhinia were detected: L. caudalis and L. pectoralis. Accordingly, the inventory of dragonfly species recorded in Vienna comprises 62 species." (Authors)] Address: Fischer, Iris, Naturhistorisches Museum Wien, Zentrale Forschungslaboratorien, Burgring 7, 1010 Wien, Austria. E-mail: iris.fischer@nhm-wien.ac.at

16782. Fischer, S. (2018): Haussperlinge Passer domesticus nutzen Massenautreten des Vierflecks Libellula quadrimaculata als Nahrungsquelle. Ornithologische Mitteilungen Jahrgang 70(7/8): 199-201. (in German, with English summary) ["P. domesticus exploiting a mass occurrence of L. quadrimaculata as food source. On 05.05.2018, and probably the days immediately preceding and following, House Sparrows intensively exploited the uncommon high density of L. Quadrimaculata, in the Linum Pond complex area. On the whole, dragonflies appear to be a somewhat rare source of food for House Sparrows. However, under favourable conditions, the profitability of this prey can indeed encourage them to exploit this food source mire intensively." (Author)] Address: Fischer, S., Unter den Eichen 1a, 14641 Paulinenaue, Germany. E-Mail: miliaria@t-online.de

16783. Frantsevich, L.; Frantsevich, L. (2018): Leg deformation during imaginal ecdysis in the downy emerald, Cordulia aenea (Odonata, Corduliidae). Zoology 127: 106-113. (in English) ["Highlights: •A molting dragonfly pulls its legs through immobile flexed exuvial legs. •Shapes of imaginal legs were viewed in instantly fixed specimens. •Transient intrapodomere bendings repeat angles in exuvial joints. •Bending sites shift distad during the whole molt. •Legs in molting dragonflies must be pliable (as in most arthropods). A dragonfly larva migrates from the water to the shore, perches on a plant stem and grasps it with strongly flexed legs. Adult legs inside the larval exoskeleton fit to the larval legs joint-to-joint. The adult emerges with stretched legs. During the molt, an imaginal leg must follow all the angles in exuvial joints. In turn, larval apodemes are withdrawn from imaginal legs. We visualized transient shapes of the imaginal legs by the instant fixation of insects at different moments of the molt, photographed isolated exuvial legs with the imaginal legs inside and then removed the exuvial sheath. Instant shapes of the imaginal tibia show sharp intrapodomere bends copying the angle in the larval femoro-tibial joint. The site of bending shifts distad during the molt. This is possible if the imaginal leg is pliable. The same problem of leg squeezing is also common in hemimetabolous insects as well as in other arthropods, whereas holometabolous insects overcome problems of a tight confinement either by using leg pliability in other ways but not squeezing (cyclorrhaphan flies, mosquitoes) or by pulling hardened legs out without change of their pupal zigzag configuration (moths, ants, honey bees). The pupal legs are not intended to grasp any external substrate." (Authors)] Address: Frantsevich, L., Schmalhausen Institute of Zoology, B. Chmielnicky str. 15, Kiev-30, 01601, Ukraine. E-mail: frantsevych@nas.gov.ua

16784. Friedritz, L.; Joest, R.; Kamp, J. (2018): Abundanz und Habitatwahl von Imagines von Ophiogomphus cecilia an renaturierten und ausgebauten Abschnitten der Lippe, Nordrhein-Westfalen (Odonata: Gomphidae). Libellula 37(3/4): 1-22. (in German, with English summary) ["Abundance and habitat selection of imagines of Ophiogomphus cecilia at restored and unrestored sections of the river Lippe, North Rhine Westphalia, Germany – O. cecilia is an indicator species of near-natural streams and rivers. It is listed under appendix II and IV of the FFH-Directive and protected under German law. Since the beginning of the 2000s, the species has been extending its ränge in many regions. At the river Lippe in the district of Soest, North Rhine-Westphalia it has been found in increasing numbers since 2012. In 2017, densities of adult dragonflies as well as habitat parameters were recorded systematically along restored and unrestored Stretches of the Lippe. The highest densities were recorded along restored Stretches, but this difference was not statistically significant. Adult dragonflies preferred Stretches with low Vegetation along the bank and clayey substrates in the river. They avoided stretches with overhanging vegetation, turbulent water surface and muddy sediments. Regarding these parameters, the restored sections were significantly, or tendentially more suitable for colonization." (Authors)] Address: Friedritz, L., Arbeitsgruppe Biodiversität und Ökosystemforschung, Institut für Landschaftsökologie, Westfälische Wilhelms-Universität Münster, Heisenbergstr. 2, 48149 Münster, Germany. E-mail: lennart.friedritz@googlemail.com

16785. Fujita, M.; Yoshioka, T.; Iwata, T.; Ohta, M. (2018): Research report of nature in mountain region in Toyama City (2017). Bulletin of the Toyama Science Museum 42: 61-64. (in Japanese, with English summary) ["The geology, topology, fauna, and flora of the alpine and subalpine zone between Tarobeidaira and Kumonotaira in Toyama city were researched. Volcanic landforms such as the lava plateau and andesite with platy joint at Kumonotaira were recognized. Cirques in the west slope of the southeast ridge of Yakushidake was recognized as glacial landforms.About 30 species of insects were observed during the research. In general, Erebia neriene (Böber), Aeshna crenata Hagen, Cicindela sachalinensis Morawitz, Leucorrhinia dubia (Vander Linden), Nicrophorus vespilloides (Herbst) are species observed at places with high altitudes, which were unique results of research of mountainous areas. Rock ptarmigans were observed on the trail of Taroyama and Jii-dake. And more than 2300 plant distribution data were extracted from Exif information of photographs." (Authors)] Address: Fujita, M., Toyama Science Museum, 1-8-31 Nishinakano-machi, Toyama, 939-8084, Japan

16786. Fukaya, Y.; Takemura, M.; Koyanagi, T.; Maoka, T.; Shindo, K.; Misawa, N. (2018): Structural and functional analysis of the carotenoid biosynthesis genes of a Pseudomonas strain isolated from the excrement of Autumn Darter. Bioscience, Biotechnology, and Biochemistry 82(6): 1043-1052. (in English) ["There are many reports about carotenoid-producing bacteria and carotenoid biosynthesis genes. In databases for Pseudomonas genome sequences, there are genes homologous to carotenoid biosynthesis genes, but the function of these genes in Pseudomonas has not been elucidated. In this study, we cloned the carotenoid biosynthesis genes from a Pseudomonas sp. strain, named Akiakane, which was isolated from the excrement of the Autumn Darter dragonfly. Using an Escherichia coli functional expression system, we confirmed that the idi, crtE, crtB, crtI, and crtY gene products of the Akiakane strain show predictable catalytic activities. A cluster of six genes was also found, which was comparable to other carotenoid-producing bacteria that belong to the α-Proteobacteria or γ-Proteobacteria class. The carotenoid biosynthesis genes of a Pseudomonas sp. atrain Akiakane isolated from the excrement of the Autumn Darter, were isolated and analyzed." (Authors)] Address: Takemura, M., Research Institute for Bioresources & Biotechnology, Ishikawa Prefectural University, Nonoichi, Japan. mtake@ishikawa-pu.ac.jp

16787. Gainzarain, J.A.; Manzano, J. (2018): Primera cita de Trithemis annulata (Palisot de Beauvois, 1807) (Odonata, Libellulidae) para la provincia de Álava (norte de la Península Ibérica). Boln. S.E.A. 63: 353-354. (in Spanish, with English summary) [T. annulata $\sigma^{\prime}$, Álava province (northern Spain), Vitoria-Gasteiz, 4-X- 2017." (Authors)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

16788. Gainzarain, J.A. (2018): Primeras citas para la provincia de Burgos (España) de Aeshna affinis Vander Linden, 1820, Anax ephippiger (Burmeister, 1839) y Oxygastra curtisii (Dale, 1834) (Odonata: Aeshnidae, Corduliidae). Boln. S.E.A. 63: 351-352. (in Spanish, With English summary) ["The first records of A. affinis, A. ephippiger and O. curtisii from Burgos province (northern Spain) are reported." (Author)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

16789. Gaona Ríos, J.M. (2018): Catálogo provisional de los odonatos de la comarca del Campo de Gibraltar, provincia de Cádiz (Sur de España) (Insecta: Odonata) - Provisional catalogue of the odonates of the Campo de Gibraltar region, province of Cádiz (Southern Spain) (Insecta: Odonata). BVnPC 7(88): 21-34. (in Spanish, with English summary) ["The provisional catalogue of the odonates of the Campo de Gibraltar (province of Cádiz) is presented, based upon an exhaustive bibliographic review and samplings made by the author between 2014 and 2017. The work is complemented with local data concerning preferred habitat and flight period of the cited species." (Author)] Address: Gaona Ríos, J.M., Usuario de BiodiversidadVirtual.org – Los Barrios, Cádiz, Spain. E-mail: ergaona1@hotmail.com

16790. Garnika, I.; Artika, E. (2018): Primeros datos de reproducción confirmada de Anax ephippiger (Burmeister, 1839) (Odonata: Aeshnidae) en País Vasco y Navarra. First records of confirmed reproduction of Anax ephippiger in the Basque Country and Navarre. Munibe, Cienc. nat. 66: 9 pp. (in Spain, with English summary) ["The discovery of a teneral specimen in a reed bed in Navarre in August 2017 and of several exuviae of A. ephippiger in an urban pond in Álava (Basque Country) in September 2017, confirm the first reproduction of this species in Navarre and in the Basque Country, respectively." (Authors)] Address: Garnika, Isabel, Plaza Santa Bárbara, 6 – 5 I. 01004 Vitoria-Gasteiz, Spain. E-mail: isabelgarnika@gmail.com

16791. Garrison, R.W.; von Ellenrieder, N. (2018): Damselflies of the genus Argia (Odonata: Coenagrionidae) from Ecuador with descriptions of five new species. Zootaxa 4470(1): 1-69. (in English) ["A total of 31 species of Argia are reported as present in Ecuador, of which two, A. huanacina Förster and A. jocosa Hagen, constitute first records for the country, and five are new to science and are described here: Argia acridens n. sp. (Holotype ♂: ECUADOR, Manabi Prov., 79 km west of Santo Domingo de los Colorados, approximately 0°20' S, 79°46' W, 260 m, 7 May 1975, Paul J. Spangler et al. leg., in USNM), Argia cuspidata n. sp. (Holotype male: ECUADOR, Santo Domingo de los Tsachilas Prov.: 19 km east of Santo Domingo de los Colorados, approximately 0°18'49" S, 79°1'44" W, 740 m, 7-V- 1975, A. Langley & J. Cohen leg., in USNM), A. philipi n. sp. (Holotype ♂: BOLIVIA, Cochabamba Dept., Chapare Prov.: stream 5 km south of Villa Tunari, noon, 16°59'49" S, 65°24'28" W, 350 m, 4-XI-2001, Jerrell J. Daigle leg., in FSCA), Argia selysi n. sp. (Holotype ♂: ECUADOR, Napo Prov.: Jatun Yacu, Napo River watershed, approximately 1°1' S, 77°50' W, 700 m, 18 April 1935, William Clarke-Macintyre leg., in UMMZ) and A. tennesseni n. sp. (Holotype ♂: ECUADOR, Orellana Prov.: stream 8.5 km east of Loreto, 0°37' 6" S, 77°17' 42" W, 360 m, 14-IX-1997, Kenneth J. Tennessen leg., in FSCA). The new species are illustrated and diagnosed from their congeners and their known distribution areas are mapped. To aid in identification, illustrations needed for diagnosis and / or distribution maps of closely related species are also provided, including: A. adamsi Calvert, A. difficilis Selys, A. dives Förster, A. huanacina Förster, A. fulgida Navas, A. infrequentula Fraser, A. jocosa Hagen in Selys, A. joergenseni Ris, A. limitata Navas, A. medullaris Selys, A. orichalcea Hagen in Selys and A. ulmeca Calvert. Argia columbiana Navas and A. rectangula Navas are treated as subjective junior synonyms of Argia medullaris Selys. A key to the eight known metallic red Argia species from South America is provided." (Authors)] Address: von Ellenrieder, Natalia, Plant Pest Diagnostics Center, California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail: natalia.ellenrieder@gmail.com

16792. Garrouste, R.; Lapeyrie, J.; Steyer, J.-S.; Giner, S.; Nel, A. (2018): Insects in the Red Middle Permian of Southern France: first Protanisoptera (Odonatoptera) and new Caloneurodea (Panorthoptera), with biostratigraphical implications. Historical Biology 30(4): 546-553. (in English) ["The Permian odonatopteran Protanisoptera are discovered for the first time in the playa palaeoenvironments of Gonfaron and Lodève (Southern France). The new genus and species Bansheepteron gonfaronensis is erected and described on the basis of a distal half of a wing from the Guadalupian of Gonfaron. It is compared with all the previously described protanisopterans. Another specimen consisting of a basal half of a wing from the Guadalupian of Lodève, attributed to cf. Bansheepteron gonfaronensis, is also described. Furthermore, three new panorthopteran Caloneurodea are described from the Early to Middle Permian (Cisuralian and Guadalupian) of Southern France, viz. Gallogramma galadrieli gen. et sp. nov. from the le Luc Basin (Gonfaron, Var), and Paleuthygramma cf. acuta Carpenter, 1943 from the Lodève Basin (Hérault). These new fossils increase the palaeodiversity of the Caloneurodea, an interesting clade which now gathers six species in the red Permian of the Southern France, making it one of the most diverse clade in these palaeoenvironments after the Odonatoptera. The present discoveries better support a Guadalupian age for the Gonfaron Formation, even if a Late Cisuralian affinities remains possible." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16793. Gavalas, I.; Salteri, A.; Alexiou, S. (2018): The Odonata fauna of Naxos and Iraklia Islands, Greece. Libellula 37(3/4): 181-186. (in German, with English summary) ["The Odonata fauna of the islands Naxos and Iraklia was inventoried from 2011 to 2018, resulting in 22 species for Naxos and five for Iraklia. Two species are added as new to Naxos and all records for Iraklia are new. An updated species list'for both islands is presented." (Authors)] Address: Alexiou, S., Deutsches Institut für Lebensmitteltechnik, Prof.-von-Klitzing-Straße 7, 49610, Quakenbrück, Germany. E-mail: s.alexiou@dil-ev.de

16794. Gazzola, A.; Russo, G.; Balestrieri, A. (2018): Embryonic and larval defensive responses of agile frog (Rana dalmatina) to alien crayfish. Ethology 124(5): 347-356. (in English) ["Red swamp crayfish Procambarus clarkii, a widespread invasive alien crayfish, represents a serious threat for several freshwater species, including amphibians, which are declining at a global scale. As a shared coevolutionary history is the main factor determining the emergence of antipredator responses, Anuran tadpoles may not be able to cope effectively with this introduced predator. We performed two experiments to assess R. dalmatina defensive responses to both P. clarkii and native dragonfly larvae (Anax imperator). First, we conditioned embryos (collected from two ponds 30 km away from each other) with predators' chemical cues to explore possible variation in hatching time caused by predation risk. In the second experiment, to evaluate how predators' diet affects tadpole behavior, we conditioned tadpoles for a 5-week period with cues from tadpole-fed and gammarid-fed predators and recorded behavioral and morphological responses. Embryos did not alter hatching time in the presence of any predator cue, while tadpoles from both populations strongly reduced activity and visibility when raised in the presence of tadpole-fed dragonfly larvae. Morphological changes were less straightforward and were induced only in one population, for which broader tails and a slight increase in body size of tadpoles exposed to tadpole-fed predators were observed. The lack of defensive responses in crayfish-exposed tadpoles suggests that the spreading of this invasive species in agricultural lowlands of northern Italy may represent a further threat to their conservation." (Authors)] Address: Gazzola, A., Eco-Ethology Lab., DSTA-Department of Earth and Environmental Sciences, University of Pavia, Pavia, Italy

16795. Gesriantuti, N.; Herlina, N.; Yunita, N. (2018): Jenisjenis Odonata di Kawasan Stadion Utama Riau, Pekanbaru. Jurnal Photon 9(1): 197-202. (in Indonesian, with English summary) ["The study was conducted from April to May 2017 at Riau Main Stadium, Pekanbaru. The purpose of this research is to know the diversity and distribution Odonata at Riau Main Stadium. Odonata capture is done using the field by field method. The results were found 15 species of Odonata i.e. Ictinogomphus decoratus, Pantala flavescens, Rhyothemis phyllis, Orthetrum sabina, Crocothemis servilia, Neurothemis fluctuans, Brachythemis contaminata, Diplacodes trivialis, Tholymis tillarga, O. testaceum, Trithemis sp., T. aurora., Lestes concinnus, Ceriagrion auranticum and C. aeruginosum. The highest distribution of Odonata is in Station I compared Station II and Station III." (Authors)] Address: Gesriantuti, N., Fakultas MIPA dan Kesehatan Universitas Muhammadilah Riau, Pekanbaru, Indonesia. E-mail: noviagesriantuti@umri.ac.id

16796. Govenor, H.; Krometis, L.A.H.; Willis, L.; Angermeier, P.L.; Hessiony, W.C. (2018): Macroinvertebrate sensitivity thresholds for sediment in Virginia streams. Integrated Environmental Assessment and Management 15(1): 77-92. (in English) ["Sediment is the most commonly identified pollutant associated with macroinvertebrate community impairments in freshwater streams nationwide. Management of this physical stressor is complicated by the multiple measures of sediment available (e.g., suspended, dissolved, bedded) and the variability in natural "healthy" sediment loadings across ecoregions. Here we examine the relative importance of 9 sediment parameters on macroinvertebrate community health as measured by the Virginia Stream Condition Index (VSCI) across 5 ecoregions. In combination, sediment parameters explained 27.4% of variance in the VSCI in a multiregion data set and from 20.2% to 76.4% of variance for individual ecoregions. Bedded sediment parameters had a stronger influence on VSCI than did dissolved or suspended parameters in the multiregion assessment. However, assessments of individual ecoregions revealed conductivity had a key influence on VSCI in the Central Appalachian, Northern Piedmont and Piedmont ecoregions. In no case was a single sediment parameter sufficient to predict VSCI scores or individual biological metrics. Given the identification of embeddedness and conductivity as key parameters for predicting biological condition, we developed family-level sensitivity thresholds for these parameters, based on extirpation. Resulting thresholds for embeddedness were 68% for combined ecoregions, 65% for the Mountain bioregion (composed of Central Appalachian, Ridge and Valley, and Blue Ridge ecoregions), and 88% for the Piedmont bioregion (composed of Northern Piedmont and Piedmont ecoregions). Thresholds for conductivity were 366 mS/cm for combined ecoregions, 391 mS/cm for the Mountain bioregion, and 136 mS/cm for the Piedmont bioregion. These thresholds may help water quality professionals identify impaired and at-risk waters designated to support aquatic life and develop regional strategies to manage sedimentimpaired streams. Inclusion of embeddedness as a restoration endpoint may be warranted; this could be facilitated by application of more quantitative, less time-intensive measurement approaches. We encourage refinement of thresholds as additional data and genus-based metrics become available. Integr Environ Assess Manag 2019; 15:77–92. Published 2018. This article has been contributed to by US Government employees and their work is in the public domain in the USA." (Authors)] Address: Govenor, Heather, Dept of Biological Systems Engineering, Virginia Tech, Blacksburg, Virginia, USA

16797. Grainger, N.; Harding, J.; Drinan, T.; Collier, K.; Smith, B.; Death, R.; Makan, T.; Rolfe, J. (2018): Conservation status of New Zealand freshwater invertebrates, 2018. New Zealand threat classification series 28: 29 pp. (in English) ["The conservation status of 675 New Zealand freshwater invertebrate taxa was assessed using the New Zealand Threat Classification System (NZTCS). A full list is presented, along with a statistical summary and brief notes on the most important changes. This list replaces all previous NZTCS lists for freshwater invertebrates." (Authors)] 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

16798. Gros, P.; Chovanec, A. (2018): Erste Nachweise der Westlichen Keiljungfer Gomphus pulchellus Sélys, 1840 (Odonata: Gomphidae) in Oberösterreich. Beiträge zur Entomofaunistik 19: 35-42. (in German, with English summary) ["G. pulchellus is a southwest European endemic expanding its

range to north and east since about 100 years. The present paper deals with the first records of this species in Upper Austria, and the locations, the Holzöster lake and the mouth of the Gurtenbach, are described. In the westernmost part of Austria, in Vorarlberg, the species was found in the mid 1980ies and in Salzburg in 2005. Upper Austria is the third Austrian province, where G. pulchellus is recorded." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

16799. Gurinder Kaur, W.; Neha, K.; Jaspreet Kaur, G. (2018): Chromosomes of Libellago lineata lineata (Chlorocyphidae: Odonata). Indian Journal of Entomology 80(3): 737-740. (in English) ["Linear characterization and course of meiosis in L. lineata lineata are described by conventional staining, C-banding, silver nitrate staining and sequence specific staining. There are two complements n=12 and n=13, without m chromosomes. Increase in chromosome number is due to the fragmentation of medium sized autosome pair. Dark terminal C-bands are present on 9 autosomal bivalents, while remaining 3 bivalents and X chromosome show less amount of C-heterochromatin; 10 autosomal bivalents show terminal NOR-bands; while X chromosome is NOR-negative. All the autosomes and X chromosome possess less intense DAPI and bright CMA3 signals, which indicate complement is rich in GC rich regions than AT rich regions." (Authors)] Address: Gurinder Kaur, Walia, Dept of Zoology and Environmental Sciences, Punjabi Univ., Patiala, 147002, India. Email: gurinderkaur_walia@yahoo.co.in

16800. Hallworth, M.T.; Marra, P.P.; McFarland, K.P.; Zahendra, S.; Studds, C.E. (2018): Tracking dragons: stable isotopes reveal the annual cycle of a long-distance migratory insect. Biol. Lett. 14: 20180741. http://dx.doi.org/10.1098/rsbl.2018.-0741: 5 pp. (in English) ["Insect migration is globally ubiquitous and can involve continental-scale movements and complex life histories. Apart from select species of migratory moths and butterflies, little is known about the structure of the annual cycle for migratory insects. Using stable-hydrogen isotope analysis of 852 wing samples from eight countries spanning 140 years, combined with 21 years of citizen science data, we determined the full annual cycle of a large migratory dragonfly Anax junius. We demonstrate that darners undertake complex long-distance annual migrations governed largely by temperature that involve at least three generations. In spring, the first generation makes a long-distance northbound movement (further than 650 km) from southern to northern range limits, lays eggs and dies. A second generation emerges and returns south (further than 680 km), where they lay eggs and die. Finally, a third resident generation emerges, reproducing locally and giving rise to the cohort that migrates north the following spring. Since migration timing and nymph development are highly dependent on temperature, continued climate change could lead to fundamental changes in the biology for this and similar migratory insects." (Authors)] Address: Hallworth, M.T., Migratory Bird Center, Smithsonian Conservation Biology Institute, Washington, DC 20008, USA. E-mail: mhallworth@gmail.com

16801. Hecca, D.; Arinafril, A.; Novia, N. (2018): Diversity of Odonata and aquatic environmental conditions in lake area (water ski and OPI) Jakabaring Palembang - South Sumatra. Biovalentia 4(2): 7 pp. (in English) ["Odonata are considered to be good indicators of enviromental health and water quality with it's presence and diversity in the Jakabaring lake are (Water Ski and OPI). The research location (Water Ski and OPI) untilized by the community as water catchment areas (flood control), recreation and habitat. The Activity in the lake area can affect the benefit of the lake, affecting the quality of the lake waters as a living habitat for animals and plants.However, to describe the diversity of odonata as indicator of the waters in the area of Water Ski and Lake OPI lakes, there is no such thing, therefore the researchers to look at Odonata diversity in the area of Water Ski Lake and Lake OPI Jakabaring Palembang-South Sumatera. The location of the study was determined using the purposive sampling method conducted in April 2018. The species found to identified at the FMIPA Animal Taxonomy Laboratory of Sriwijaya University. Sampling in the morning (07.00 – 10.00 AM) and afternoon (15.00 – 18.00 AM). The results of research in the lake area found 2 families, 11 genere, and 18 species, the total number of all 984 individual species. Odonata species data obtained in the analysis using Past3 software. The diversity index in the Water Ski lake is 1.992 and the diversity index in the OPI lake is 1.758. Diversity index value (2.014), dominance index (0.7922) and evenness index (0.4165). Odonata and enviromental conditions of the lake (Water Ski and OPI) still have relationship, the condition of lake water quality is still below water quality criteria threshold. This is what makes the diversity on both lakes has a moderate value." (Authors)] Address: Hecca, Desven, Study Program of Management Enviromental, Graduate Program at Sriwijaya University. E-mail: desvenhecca-@student.pps.unsri.ac.id

16802. Helebrandová, J.; Pyszko, P.; Dolný, A. (2018): Large net cage for captive breeding and behavioural studies of damselfly Lestes sponsa (Hansemann, 1823) (Odonata: Lestidae): submerged oviposition as a model behaviour. Aquatic Insects 39(1): 43-53. (in English) ["Odonata have a strong potential as model organisms for testing ecological and evolutionary hypotheses because of their short life history, relative ease and cost-effectiveness of care. Unfortunately, very few studies have examined how to create a semi-natural environment for odonates, limiting the biological validity of laboratory manipulation. To better study odonate life cycle and behaviour under controlled conditions, we designed a large net cage that imitated the natural terrestrial as well as aquatic habitat of L. sponsa. This species is thought to be capable of submerged oviposition, an unusual behaviour in odonates. We compared multiple variables across natural conditions and the net cage. We demonstrated that between-year variability under natural conditions was generally greater than variability between natural and artificial environments. Overall, semi-natural conditions did not substantially change the L. sponsa life cycle (including the unique behaviour of submerged oviposition), suggesting that results from the net cage are likely generalisable to the field." (Authors)] Address: Dolny, A., Dept of Biology & Ecology, Fac. of Science, Univ. of Ostrava, Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

16803. Henarejos-Gonzálvez, J.M.; Sánchez-Balibrea, J.M.; Martínez-Saura, C.M.; Requena-Aznar, C.; Arnaldos-Giner, I.; Fernández-Sempere, M.; López-Barquero, P.; Martínez-López, P.; Ramos, J.; López-Cañizares, C.; Sánchez-Sánchez, M.A.; Ballesteros-Pelegrín, G.A. (2018): Catálogo y distribución geográfica de los Odonatos en la Región de Murcia (SE España). - Catalogue and geographical distribution of Odonata in the Region of Murcia (SE Spain). Munibe, Cienc. nat. 66: 137-143. (in Spanish, with English and Euskarian summaries) ["The catalogue and distribution of the Odonata order in the Murcia Region has been updated, comparing this to an earlier one made in the 1950s. The results indicate that 40 species were located in 17 localities in the mid-20th century, while the 2087 citations collected between 1991-2017 confirm the presence of 47 species in 191 localities. 11 new species have been identified for the Region of Murcia, which may have been favoured by the construction of ponds, reservoirs and other infrastructures to supply 225,000 hectares of irrigated land. Of these, the distribution areas of 9 species are expanding towards northern Europe and / or Asia, an effect that may relate to the current climate change process. On the contrary, in the current review 4 species cited in the study conducted in the mid-twentieth century have not been detected." (Authors)] Address: Ballesteros-Pelegrín, G.A., Univ. de Murcia. Depto de Geografía, Spain. E-mail: gabp1@um.es

16804. Higashikawa, W.; Yoshimura, M.; Yagi, T.; Maeto, K. (2018): Grass and water preference during oviposition by Sympetrum pedemontanum elatum in Japan (Odonata: Libellulidae). Odonatologica 47(1/2): 161-178. (in English) ["S. pedemontanum is regionally endangered or extinct in several countries despite having a wide distribution across the Eurasian continent and its neighboring islands. Its subspecies S. p. elatum in Japan has been decreasing rapidly with the loss of larval habitat in rural areas since the 1970s. Previous studies have detailed habitat use by larvae and mature adults, but information on grass and water preferences during oviposition is still lacking. In this study, we tracked adults as they performed reproductive behaviors and documented the grass height and water conditions preferred for oviposition in a lowland, mid-slope river in Japan. Our results showed that females dipped their abdomens significantly more into stagnant than into flowing water for oviposition and that short surrounding grass and shallow water enhanced oviposition behavior. These findings emphasize the importance of riparian grass management and water flow regulation for the conservation of S. p. elatum." (Authors)] Address: Higashikawa, W., Lab. of Insect Biodiversity & Ecosystem Science, Graduate School of Agricultural Science, Kobe University, Hyogo 657-8501, Japan. E-mail: higashi_n34@yahoo.co.jp

16805. Hjalmarson, E. (2018): On the use of Odonata as ecological indicators. M.Sc. thesis, University of Oklahoma, Norman, Oklahoma: X + 49 pp. (in English) ["The insect order Odonata is unique to use as an ecological indicator for water quality because of its close relationship with aquatic ecosystems and relative ease of observation and species-level identification. My goal was to explore ways in which odonates can respond to, and therefore indicate, sites with higher water quality. Determining where odonates breed as opposed to where they "merely" occur is key to an understanding of the importance of water quality. It has been asserted that one should conclude that an odonate species breeds if and only if physical (exuvia, tenerals) or behavioral (tandem pairing, oviposition) evidence is obtained, yet gathering such evidence requires specialized observational and technical skills. In contrast, reliable observations and counts of adults can be had readily, creating a dilemma over which data to use. For my first chapter, I examined whether adult surveys and reproductive behaviors could predict breeding residency status, represented by presence of tenerals (newly emerged odonates), using a large, multi-year dataset from across Oklahoma. Using an occupancy model combined with piecewise regression, I found thresholds and associated Bayesian credible intervals for a suite of odonate taxa. I found similar general thresholds across species but found specific indicator thresholds exist when examining groups on the family and genus level. Thresholds differed among taxonomic groups and decreased in models that included counts of females rather than just of counts of adults any (or unknown) sex. My results can guide future survey protocol: adult observations can remain the primary focus, which broadens the scope of potential observer skill levels (e.g., citizen scientists) while indirectly ensuring breeding to identify sites for water quality surveys. For my second chapter, I examined odonate biodiversity at urbanized water features to determine factors that promote species diversity and abundance, with a goal of using findings to make beneficial improvements to park management to increase water quality. I conducted surveys April–October 2016–2017 at 14 urban sites in central Oklahoma that varied in human use and habitat structure. I compared diversity and species composition among sites and tested which features best predicted higher abundance and species totals. Several variables were good predictors but use of a site for fishing purposes was an overarching indicator of both high species richness and high odonate abundance. Despite higher human use, presence of infrastructure, and increased management of these sites (which are typically negatively associated with biodiversity), odonates (and humans) benefit from maintaining them and ensuring proper water quality persists (i.e., if it is good for fish, it is good for insects)." (Author)] Address: not stated

16806. Huang, D.; Azar, D.; Nel, A. (2018): The oldest 'Megapodagrionidae' (Odonata, Zygoptera) discovered in the Lower Cretaceous Yixian Formation, China. Cretaceous Research 84: 426-430. (in English) ["Cretapodagrion sibelleae gen. et sp. nov., oldest representative and first Mesozoic 'Megapodagrionidae', is described on the basis of a complete wing from the Lower Cretaceous of Yixian Formation (ca. 124.6 Ma) in China. It shows some similarities with the three extant genera of the 'Megapodagrioninae' and the enigmatic genus Mesopodagrion." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16807. Huang, D.; Fu, Y.; Nel, A. (2018): The first amber stenophlebiid damsel-dragonfly (Odonata, Epiproctophora, Stenophlebiidae) from mid-Cretaceous amber of northern Myanmar.

Cretaceous Research 94: 40-44. (in English) ["Burmastenophlebia flecki gen. et sp. nov., first stenophlebiid damsel-dragonfly in mid-Cretaceous Burmese amber is described and illustrated. It allows to show structures proper to this family, previously unknown. In particular, the subnodus is enforced by a dorsal chitinous bracket and the nodal furrow is very weak, suggesting that the stenophlebiid nodal complex is very particular and did not functioned as in other Odonata." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16808. Huang, D.; Fu, Y.; Gao, J.; Nel, A. (2018): A new damsel-dragonfly of the small family Selenothemistidae from the earliest Late Jurassic of China (Odonata: Isophlebioptera). Palaeoentomology 1(1): 37-41. (in English) ["The Mesozoic 'anisozygopteran' clade Isophlebiida Bechly, 1996 is quite diverse with more than 48 described genera, especially in the two families Campterophlebiidae Handlirsch, 1920 and Isophlebiidae Handlirsch, 1906, in which numerous new genera have been recently described mainly from China (see Fossilworks: Gateway to the Paleobiology Database at http://fossilworks.org/). However, this is not the case for the more inclusive isophlebiopteran clades Euthemistidae Pritykina, 1968, Parazygoptera Bechly, 1997, and Selenothemistidae Handlirsch, 1939, that comprise ca. 25 described genera. These last groups comprise relatively small and delicate damsel-dragonflies, compared to the Isophlebiida. Thus, their lower diversity is possibly a result of taphonomic bias. They are mainly known from Europe, Central Asia and China." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16809. Huang, D.; Cai, C.; Nel, A. (2018): A new damsel-dragonfly of the small family Selenothemistidae from the Late Jurassic of China (Odonata, Isophlebioptera). Journal of Paleontology 92(6): 1049-1053. (in English) ["Sinothemis difficilis new genus new species, youngest and first accurate Chinese representative of the small family Selenothemistidae, is described and illustrated. It is closely related to the genus Turanothemis, known from the Karatau outcrop in Kazakhstan. The genus Caraphlebia, known from the Middle Jurassic of Antarctica, seems to strongly differ from the other representatives of this family and may belong to another family. The fossil was collected from the Upper Jurassic (157.3 ± 1.5 Ma; near Oxfordian/Kimmeridgian boundary) Guancaishan locality, Jianping County, Western Liaoning, NE China. It belongs to the late assemblage of the Yanliao biota, while the early assemblage is represented by the putatively close damsel-dragonfly Paraliassophlebia from the Jiulongshan Formation of northern Hebei Province." (Authors)] Address: Huang, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Inst. of Geology & Palaeontology, Chinese Acad. Sci., Nanjing 210008, People's Republic of China. E-mail: dyhuang@nigpas.ac.cn

16810. Hykel, M.; Harabiš, F.; Dolný, A. (2018): Diel changes in habitat use by dragonflies: Nocturnal roosting site selection by the threatened dragonfly Sympetrum depressiusculum (Odonata: Libellulidae). Entomological Science 21(1): 154-163. (in English) ["Although it is well recognized that insects' habitat use and requirements may change during the season, very little attention has been devoted to diel habitat changes in most insects. In this study, we compared habitat utilization patterns of S. depressiusculum) adult dragonflies between daytime activities and nocturnal roosting. During daytime, we captured and marked adult individuals with fluorescent paint in different habitats. At night, we searched, using UV light, for marked individuals that remained on the habitats. We found that habitat selection for daytime activities and that for nocturnal roosting differed significantly. Adults clearly avoided ponds and their immediate surroundings for nocturnal roosting whereas this habitat type was frequently utilized for daytime activities. We suggest that nocturnal avoidance of the riparian area is associated with lower temperatures, which adversely affect thermoregulation, and that selection of specific habitats for nocturnal roosting is closely associated with vegetation structure providing stability during windy nights and serving as a suitable shelter. Such habitat properties are found especially on fallow land, a habitat type whose representation in agricultural areas has been gradually decreasing in recent decades." (Authors)] Address: Hykel, M., Department of Biology and Ecology, Faculty of Science, University of Ostrava, Slezská Ostrava, Czech Republic

16811. Ilvonen, J.J.; Kaunisto, K.M.; Suhonen, J. (2018): Odonates, gregarines and water mites: why are the same host species infected by both parasites? Ecological Entomology 43: 591-600. (in English) ["1. Odonata are widely parasitised insects and numerous studies have tried to understand this host–parasite relationship. However, most of these studies have concentrated on a single host species, neglecting the larger pattern within the Odonata order. 2. The aim of this paper was to examine different Odonata species for common endo- and ectoparasites and whether a general infection pattern can be found. Additionally, the goal was to investigate whether the phylogeny of the host species could explain these possible infection patterns. To this end, a dataset from the existing literature was compiled and the prevalence of endoparasitic gregarines and ectoparasitic water mites was analysed for 46 different odonate species. 3. Three distinct patterns were found: (i) most of the odonate host species had both gregarines and water mites, rather than only either one or neither; (ii) there appears to be a positive association between gregarine and water mite prevalences across host species; (iii) a weak phylogenetic signal was detected in gregarine prevalence and a strong one in water mite prevalence. 4. It is hypothesised that, due to the infection and transmission mechanisms by which water mites and gregarines infect different odonate host species, parasitism is aggregated to common, high-density species. However, much research is needed in order to fully understand this relationship between odonates and their parasites, especially within the same host populations and host species assemblages." (Authors)] Address: Ilvonen, J.J., Dept Biol., 20014 Univ.y of Turku, Turku, Finland. E-mail: jjilvo@utu.fi

16812. Immerschitt, I.; Martens, A. (2018): Ejection, ingestion and fragmentation of mesoplastic fibres to microplastics by Anax imperator larvae (Odonata: Aeshnidae). Odonatologica

47(3/4): 57-66. (in English) ["Exposure to plastic litter in ecosystems is increasing globally. Marine and terrestrial ecosystems, as well as freshwater ecosystems, are affected. Despite this, the impact of increased exposure to plastics on the freshwater fauna is largely unexplored. The present work investigates the reactions of 42 Anax imperator larvae to plastics in their habitat. Mesoplastic fibres (ca 8 mm long) were presented with a Chironomus sp. larva that was placed behind the fibre. In the majority of the observations, ejection attempts using the labium and the front legs were observed. When ingestion occurred, macerated plastic fibres (0.5-3.5 mm) appeared in the faeces of several individuals. Consequently, Odonata larvae turned meso-plastics into microplastics. It is assumed that the mechanical comminution was achieved by the action of the gizzard, which contains strong chitinous teeth." (Authors)] Address: Immerschitt, Isabelle, Institute of Biology, University of Education Karlsruhe, BismarckstraBe 10, 76133 Karlsruhe, Germany. E-mail: isabelle.immerschitt@t-online.de

16813. Islam, S.U.; Qasim, M.; Lin, W.; Islam. W.; Arif, M.; Ali, H.; Wu, Z. (2018): Genetic interaction and diversity of the families Libellulidae and Gomphidae through COI gene from China and Pakistan. Acta Tropica 182: 92-99. (in English) ["Highlights: •There are 67 sequences of Odonates, comprising two families, 15 genera and 21 species in the present study. •Crocothemis servilia had maximum population in the entire collection. •Cytochrome oxidase subunit I (COI) gene was used for whole molecular work. A total of 300 Odonata were collected from six different localities of China and Pakistan. 67 representative samples were selected to sequence their mitochondrial cytochrome oxidase subunit I (COI). An examination of the resultant sequences identified 21 different dragonfly species, belonging to 15 distinct genera, two families, Libellulidae and Gomphidae. Sequence alignment was executed using Clustal-W in BioEdit v6. The phylogenetic tree was constructed through Neighbor-joining method by using Jukes-Cantor model, and genetic divergence was calculated via Kimura 2-parameter using MEGA7, while Genetic diversity was calculated by DnaSP v5. The maximum genetic divergence was observed for C. servilia, at 20.49%, followed by Libellulidae sp. with 22.30% while minimum divergence (0.82%) was observed for Melligomphus ardens. Likewise, a significant genetic diversity was observed for all species. However, C. servilia species presented maximum value (176 mutations) followed by Libellulidae spp. (150 mutations), whereas minimum value (3 mutations) was observed by Orthetrum testaceum. Interestingly, the diversity of C. servilia, all of which are collected from a single location of China, is much higher than those from Pakistan, which were collected from 5 different places with a spatial distance exceeding 500 Kms. Our results are useful in gaining a full appreciation of the global diversity of dragonflies and the development of conservation measures of this insect." (Authors)] Address: Wu, Z., State Key Lab. of Ecological Pest Control for Fujian and Taiwan Crops, Fuzhou, China. E-mail: wuzujian@126.com

16814. Iswandaru, D. (2018): Diversity of dragonflies (Odonata) in swamp ecosystem university of Lampung. Agricultura 105-106: 101-109. (in English) ["Swamp is a unique wetland ecosystem with waterlogged conditions, overgrown with distinctive vegetation types. Swamp ecosystem in University of Lampung are freshwater swamps that are well watered throughout the year and overgrown with aquatic vegetation, making it ideal for the habitat of various types of Odonata. The life cycle of the dragonfly is in two environments, pre-adult phase is aquatic and adult life around the waters, so the dragonflies can be used as an environmental bioindicator. The study aims to find the species of dragonflies with conservation status and trading status, analyzing the relative abundance and diversity of dragonflies founded in the swamp ecosystem at the University of Lampung. This research conducted with exploration method or (field to field) in three locations (R1, R2, R3), the random exploration was done two times at morning and afternoon. The results showed that 12 species of dragonflies from 3 famillies ecountered during study. The highest abundance of dragonfly species Orthetrum sabina with 20.14% and the smallest was Acisoma panorpoides and Zyxomma obtusum with 2.16%. Conservation status of the 12 species are Least Concern (IUCN), unprotected (UU / PP) and non-appendix (CITES). The value of diversity index shows a moderate scale with 2.26, which means the condition of swamp ecosystem in University of Lampung still has good productivity as a habitat to support the life of dragonfly." (Author)] Address: Iswandaru, D., Dept of Forestry, Fac. of Agriculture, Univ. of Lampung. E-mail: univasahanpress@gmail.com

16815. Itagawa, S.; Ichinose, T. (2018): Factors affecting the migration range of Calopteryx atrata in urban small and medium- sized rivers. Landscape Research 11: 32-38. (Japanese, with English summary) ["We investigated the migration range of C. atrata using the mark and recapture method in Akuwa River and Ooka River which run through the urban area of Yokohama City, Kanagawa Prefecture, Japan. 286 individuals were marked and released at four spots, and 64 marked individuals were recaptured after several days. Initial findings showed that the maximum total migrant distance was 1319 meters, and the average was 323 meters. The individuals that migrated upper stream were more than those in the lower stream, and the migration range to upper was significantly longer than to the lower. Secondly, we analyzed the factors that promote or stunt the migration of C.atrata by GLMM with random effect. Results showed that survival days from release, the area of lower riverbed and coverage of shade were positively correlated with total migration distance. Meanwhile, the coverage of three types of the aquatic plant commonly had a negative correlation with the total migration distance. Also, the coverage area ratio of forest around rivers partly promotes the migration distance of C.atrata, if values of factors were added up in a more wide range from the release spot. The study's results showed that continuously establishing preferred riparian habitats with aquatic vegetation and a conservation of forests close to rivers enhance C.atrata's large migration and expanded habitats." (Authors) Address: not stated

16816. Jackson, C.; McCalla, S.G.; Amberg, J.; Soluk, D.; Britten, H. (2018): The complete mitochondrial genome of Hine's emerald dragonfly (Somatochlora hineana Williamson) via NGS sequencing. Mitochondrial DNA Part B 3(2=: 562-563.

(in English) ["Data were generated via next generation sequencing (NGS) and assembled using a mitochondrial baiting and iterative mapping approach. The full length circular genome is 15,705 bp with 26.6% GC content. It contains the typical metazoan set of 37 genes: 13 protein-coding genes, 22 transfer RNA (tRNA) and 2 ribosomal RNA (rRNA) genes, and an A + T-rich control region. To our knowledge, this is the first report of the complete S. hineana mitogenome." (Authors)] Address: Jackson, C., UMESC, 2630 Fanta Reed Road, La Crosse, WI 54603, USA. E-mail: cjackson@usgs.gov

16817. Jacquelin, L.; Desutter-Grandcolas, L.; Chintauan-Marquier, I.; Boistel, R.; Zheng, D.; Prokop, J.; Nel, A. (2018): New insights on basivenal sclerites using 3D tools and homology of wing veins in Odonatoptera (Insecta). Scientific Reports 8, Article number: 238 (2018). 7 pp. (in English) ["Being implied in flight, mimetism, communication, and protection, the insect wings were crucial organs for the mega diversification of this clade. Despite several attempts, the problem of wing evolution remains unresolved because the basal parts of the veins essential for vein identification are hidden in the basivenal sclerites. The homologies between wing characters thus cannot be accurately verified, while they are of primary importance to solve long-standing problems, such as the monophyly of the Palaeoptera, viz. Odonatoptera, Panephemeroptera, and Palaeozoic Palaeodictyopterida mainly known by their wings. Hitherto the tools to homologize venation were suffering several cases of exceptions, rendering them unreliable. Here we reconstruct the odonatopteran venation using fossils and a new 3D imaging tool, resulting congruent with the concept of Riek and Kukalová-Peck, with important novelties, viz. median anterior vein fused to radius and radius posterior nearly as convex as radius anterior (putative synapomorphies of Odonatoptera); subcostal anterior (ScA) fused to costal vein and most basal primary antenodal crossvein being a modified posterior branch of ScA (putative synapomorphies of Palaeoptera). These findings may reveal critical for future analyses of the relationships between fossil and extant Palaeoptera, helping to solve the evolutionary history of the insects as a whole." (Authors)] Address:Jacquelin, Lauriane, Institut de Systématique, Évol., Biodiversité, ISYEB - UMR 7205 – CNRS, MNHN, UPMC, EPHE, Mus. Nat. d'Histoire naturelle, Sorbonne Univ., 57 rue Cuvier, CP 50, Entomologie, 75005, Paris, France

16818. Jang, J.H.; Yang, G.-H. (2018): Design of wing root rotation mechanism for dragonfly-inspired micro air vehicle. Applied Sciences 2018, 8, 1868; doi:10.3390/app8101868 www.mdpi.com/journal/. 18 pp. (in English). ["This paper proposes a wing root control mechanism inspired by the drag-based system of a dragonfly. The previous mechanisms for generating wing rotations have high controllability of the angle of attack, but the structures are either too complex or too simple, and the control of the angle of attack is insufficient. In order to overcome these disadvantages, a wing root control mechanism was designed to improve the control of the angle of attack by controlling the mean angle of attack in a passive rotation mechanism implemented in a simple structure. Links between the proposed mechanism and a spatial four-bar link-based flapping mechanism were optimized for the design, and a prototype was produced by a 3D printer. The kinematics and aerodynamics were measured using the prototype, a high-speed camera, and an F/T sensor. In the measured kinematics, the flapping amplitude was found to be similar to the design value, and the mean angle of attack increased by approximately 30 at a wing root angle of 0. In the aerodynamic analysis, the drag-based system implemented using the wing root control mechanism reduced the amplitude of the force in the horizontal direction to approximately 0.15 N and 0.1 N in the downstroke and upstroke, respectively, compared with the lift-based system. In addition, at an inclined stroke angle, the force in the horizontal direction increased greatly when the wing root angle was 0 at the inclined stroke angle, while the force in the vertical direction increased greatly at a wing root angle of 30. This means that the flight mode can be controlled by controlling the wing root angle. As a result, it is shown that the wing root control mechanism can be applied to the MAV (micro air vehicle) to stabilize hovering better than the MAV using a lift-based system and can control the flight mode without changing the posture." (Authors) Address: Jang, J.H., Robotics Group, Korea Institute of Industrial Technology, Ansan-si 15588, Gyeonggi-do, Korea. E-mail: jhjang7@kitech.re.kr

16819. Jeong, S.Y.; Kim, M.J.; Wang, A.R.; Kim, S.-S.; An. J.; Kim, I. (2018): Complete mitochondrial genome sequence of the tiny dragonfly, Nannophya pygmaea (Odonata: Libellulidae). Conservation Genet. Resour. 10: 355-358. (in English) ["N. pygmaea has been listed as an endangered insect in South Korea. We sequenced the complete 15,112-bp-long mitochondrial genome (mitogenome) of the species. The genome included a typical set of genes (13 protein-coding genes [PCGs], two rRNA genes, and 22 tRNA genes) and one non-coding region with an arrangement identical to that found in most insects. Among the 13 PCGs, only ND1 started with the atypical TTG. The 441-bp-long A+T-rich region possessed the highest A/T content (84.6%) in the genome. N. pygmaea was placed as the sister to Orthetrum species belonging to Libellulidae. Unlike conventional phylogenetic results, the suborders Anisozygoptera and Zygoptera formed a strong sister group in both Bayesian inference (BI) and maximum likelihood (ML) methods (BI, BPP = 1 and ML, 88–94%), justifying the use of different types of molecular markers for phylogenetic analysis." (Authors)] Address: Kim, I., Dept Appl. Biol., Coll. Agricult. & Life Sciences, Chonnam National Univ., Gwangju 61186, Republic of Korea. E-mail: ikkim81@chonnam.ac.kr

16820. Jiao, J.; Zhang, F.; Jiao, T,M Gu, Z.; Wang, S. (2018): Bioinspired superdurable pestle-loop mechanical interlocker with tunable peeling force, strong shear adhesion, and low noise. Advanced Science 5(4), 1700787: 7 pp. (in English) ["Velcro, the most typical hook-loop interlocker, often suffers from undesirable deformation, breaking, and noise because of the structure of the hook. Inspired by the arrester system of dragonfly, a new mechanical interlocker with a nylon pestle instead of the traditional hook is developed. The pestle-loop mechanical interlocker shows a tunable peeling force from 0.4 ± 0.14 to 6.5 ± 0.72 N and the shear adhesion force of pestle-loop mechanical interlocker is about twice as much as

that of velcro. The pestle tape can be separated and fastened with the loop tape up to 30 000 cycles while keeping the original adhesive force and the pestle structure. In comparison, only after 4000 cycles most hooks of the commercial velcro are deformed and even broken, completely losing their adhesive function and their hook structure. These experimental results are further supported by finite element simulitions—the base of pestle mainly bears the separation-caused strain while the middle of hook does. Notably, the sound volume during the separation of pestle-loop mechanical interlocker is merely 49 ± 7.4 dB, much lower than 70 ± 3.5 dB produced by the velcro." (Authors)] Address: Wang, S., CAS Key Lab. Bio-inspired Materials & Interfacial Science, CAS Center for Excellence in Nanoscience, Technical Inst. of Physics and Chemistry, Chinese Academy of Sci., Beijing 100190, P. R. China. E-mail: stwang@mail.ipc.ac.cn

16821. Jinguji, H.; Sawada, D.; Morimoto, M. (2018): Suppression of Aedes mosquito larvae using dragonfly larvae released into ovitraps (Diptera: Culicidae; Odonata: Libellulidae). Odonatologica 47(3/4): 67-84. (in English) ["There has been a marked increase in the number of dengue cases reported in Japan. In 2014, 162 people contracted dengue fever from the virus transmitted by Aedes albo-pictus. The increased prevalence of the disease in Japan implies that climate change and globalization have accelerated the risk of dengue fever spreading to Japan. This study aimed to develop a method for using dragonflies as biocontrol agents for mosquito control. We conducted a field study to determine whether dragonfly larvae could suppress populations of A. albopictus larvae. Eighth instar larvae of Sympetrum frequens were released into an ovitrap in which they preyed upon mosquitos. Compared to the control treatment, mosquito larvae decreased significantly in ovitraps containing S.frequens and S. infuscatum (i.e., experimental treatment). The mean number of mosquito larvae remaining in S. frequens and S. infuscatum ovitraps was 1.5±4.6 (mean±SD) and 0.6±1.1, respectively. The results showed that S. frequens and S. infuscatum preyed on 410 to 710 and 339 to 592 mosquito larvae per ovitrap at each site. Based on estimates of the number of mosquito eggs laid in ovitraps during the field trial, S. frequens larvae consumed approximately 20.3 to 45.0 % of mosquito eggs in the ovitrap. Suppression effects of S. frequens and S. infuscatum lasted 41 ± 13 and 35± 13 days, respectively. The results obtained suggest that S. frequens in ovitraps is effective for regulating larval populations of mosquito vectors." (Authors)] Address: Jinguji, H., School of Food, Agricultural & Environmental Sciences, Miyagi Univ., 2-2-1 Hatatate, Taihaku-ku, Sendai, Miyagi 982-0215, Japan. E-mail: jinguji@myu.ac.jp

16822. Jocque, M.; Geeraert, L.; Jones, S.E.I. (2018): Odonata from highlands in Niassa, Mozambique, with two new country records. Notulae odonatologicae 9(2): 72-77. (in English) ["'Afromontane' ecosystems in Eastern Africa are biologically highly valuable, but many remain poorly studied. We list dragonfly observations of a Biodiversity Express Survey to the highland areas in north-west Mozambique, exploring for the first time the Njesi Plateau (Serra Jecci/Lichinga plateau), Mt Chitagal and Mt Sanga, north of the provincial capital of Lichinga. A total of 13 species were collected. Allocnemis cf. abbotti and Gynacantha immaculifrons are new records for Mozambique." (Authors)] Address: Jocque, M., Biodiversity Inventory for Conservation NPO (BINCO), Walmersumstraat 44, 3380 Glabbeek, Belgium. E-mail: merlijn.jocque@gmail.com

16823. Johannsson, O.E. (2018): A key for separating early larval instars of four common cooccurring damselfly species in the U.K.: Ischnura elegans (Vander Linden), Erythromma najas (Hansemann), Coenagrion pulchellum (Vander Linden) and Enallagma cyathigerum (Charpentier). J. Br. Dragonfly Society 34(1): 19. (in English) ["Ecological studies of species assemblages require the identification of all individuals. This becomes difficult in aquatic insect assemblages where traites change continuously throughout development and separation of similar species is difficult, especially in earlier instars. A key was developed and is presented here to separate the majority of instars of a common assemblage of four damselfly species (I. elegans, E. najas, C. pulchellum and E. cyathigerum) in the U.K.. This was part of a study on the factors leading to their co-existence." (Author)] Address: Johannsson, Ora E., Dept of Zoology, University of British Columbia, Vancouver, B.C., Canada, V7R 4A5

16824. Johnson, J.T. (2018): Redetermination of select dragonfly specimens (Insecta: Odonata). Catalog: Oregon State Arthropod Collection 2(3): 1. (in English) ["16 historical specimens in the Oregon State Arthropod Collection were redetermined by Mr. Johnson during a visit to the collection on November 16, 2018. The redetermined material include specimens now identified as: Sympetrum sp., Plathemis lydia (Drury, 1773), Libellula forensis Hagen, 1861, Ophiogomphus occidentis (Hagen, 1885), Aeshna interrupta (Walker, 1904), Aeshna umbrosa Walker, 1908, Rhionaeschna californica (Calvert, 1895), Aeshna constricta Say, 1839, and Aeshna tuberculifera Walker, 1908.] Address: Johnson, J.T., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: gomphusjim@gmail.com

16825. Jude, D.J.; Hensler, S.R.; Murray, M.M. (2018): Round goby and zebra mussel interactions with darters in a warmwater stream community in southern Michigan, USA. Journal of Freshwater Ecology 33(1): 395-412. (in English) ["The non-indigenous round goby (Neogobius melanostomus) entered the Flint River, Michigan, USA around 1996 while zebra mussels (Dreissena polymorpha) invaded in late 1998. We wanted to identify if there were round goby or darter (Etheostoma/Percina spp.) diet or density alterations by comparing 1998 data with our 2002 data after mussel colonization. Chironomids dominated the round goby's pre-zebra mussel diet in August 1998 (89% by number), followed by hydropsychids (10%). After zebra mussels arrived, diets diversified; chironomids declined to 52%, hydropsychids stayed the same, gastropods were more prominent (22%) and 4% were zebra mussels. Data from a site upriver (with no round gobies or zebra mussels) showed darters consumed mostly chironomids (49%), mayflies (11%) and hydropsychids (9%), suggesting

reliance on chironomid prey and other interactions compromised the ability of darters to coexist with round gobies downstream, since only one of three species present during 1998 was collected in 2002. Benthic assemblages on rocks changed dramatically (R-values =0.95) from 1998 to 2002. Blackside darter (Percina maculata) density in the presence of round gobies increased eightfold compared with 1998. We hypothesized zebra mussels fostered the growth of macrophytes, resulting in odonates composing 42% by volume of blackside darter diets in 2002 compared with 10% in 1998. Diet overlaps between small and large round gobies and blackside darters were high (Schoener Index =0.55–0.59, R-values =0.11–0.24), suggesting potential negative competitive interactions. Zebra mussel-mediated ecosystem changes may have decreased interspecific competition for food with blackside darters, allowing coexistence with round gobies. Native darters with varied diets feeding in mid-water, are most likely to coexist with round gobies, especially where dreissenids potentially mediate competitive interactions." (Authors)] Address: Jude, D.J., School for Environment & Sustainability, University of Michigan, Ann Arbor, MI, USA. E-mail: djude@umich.edu

16826. Jusys, V.; Gliwa, B. (2018): First record of Sympetrum meridionale (Odonata, Libellulidae) in Lithuania. Lietuvos Entomologu Draugijos Darbail 1(29): 5-7. (in English, with Lithuanian summary) [Ventes Ragas, bird traps at the ornithological station, 55.3414N 21.1917E. A single ♀ (25.09.2017) and a ♂ (27.09.2017) were captured in the bird traps of Ventes Ragas and documented with pictures.] Address: Jusys, V., Ornithological Station Ventes Ragas, Mariu g. 24, LT-99361 Vente, Lithuania. E-mail: vrventragis@gmail.com

16827. Kalfayan, M.; Krieg-Jacquier, R. (2018): First records of Trithemis arteriosa and Brachytron pratense on the island of Samos, Greece (Odonata: Anisoptera). Notulae odonatologicae 9(1): 31-36. (in English) ["T. arteriosa is reported from the island of Samos in the East Aegean (Greece) and is shown to be reproducing in Greece for the first time. B. pratense is recorded for the first time in Samos but no evidence of local breeding was recorded. The significance of these findings is discussed." (Authors)] Address: Kalfayan, M., 5 rue Thiers 77124, Villenoy, France. E-mail: mathias.kalfayan@gmail.com

16828. Kalkman, V.J.; Boudot, J.-P.; Bernard, R.; De Knijf, G.; Suhling, F.; Termaat, T. (2018): Diversity and conservation of European dragonflies and damselflies (Odonata). Hydrobiologia 811: 269-282. (in English) ["Based on a distribution database brought together for the recently published Atlas of the European dragonflies and damselflies, we describe the patterns of diversity and endemism of these insect groups. Highest species richness, as well as richness of predominantly lentic species, occurs in central and western-central Europe. Strictly lotic species have their centre of diversity in southwest France and parts of the Iberian Peninsula. The highest number of endemic species is found in southwest France, the Iberian Peninsula and the Balkan Peninsula. A comparison of the diversity patterns of Odonata species listed in the EU Habitats Directive with those listed in the European Red List highlights a strong mismatch between species threatened in Europe, which are mainly found in the Mediterranean, and species legally protected by the European Union, which are concentrated in central and western Europe. This mismatch has a historical origin, as the species listed in the Habitats Directive were mostly selected in the 1970s and 1980s when water quality in western and central Europe was poor. Since the 1990s, water and habitat quality has improved in these parts of Europe while in the same period the pressure on aquatic habitats in the Mediterranean has increased greatly." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey/Naturalis Biodiversity Center, The Netherlands, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: Vincent.kalkman@naturalis.nl

16829. Kalyoncu, H.; Salur, A. (2018): Odonata fauna of Alara and Karpuz streams and their relalations with physico-chemical variables. Fresenius Environmental Bulletin 27(1): 187-195. (in English) ["In this study, it was aimed to determine the Odonata fauna of Karpuz and Alara streams and prevail their relationships with physiochemical parameters. For this purpose, a total of twenty sampling points were chosen on streams. As a result of field studies nine species of Odonata were recorded in Alara Stream and four Odonata species were recorded in Karpuz Stream. Caliaeshna microstigma, Epallage fatime, Ischnura elegans and Platycnemis pennipes were described as common species in both streams. Calopteryx virgo festiva, I. elegans, P. pennipes were sampled only in 10th sampling point while Onychogomphus forcipatus albotialis and E. fatime were sampled in all other sampling points. Gomphus schneideri was recorded only at 7th sampling point. E. fatime was found in all sampling points except 10th sampling point. C. microstigma, I. elegans and P. pennipes were found in 10th station. E. fatime was determined dominant taxon in Karpuz Stream while C. microstigma and O. forcipatus were dominant in Alara Stream. In both streams water quality of first 8 sampling points were included in quality level I while 9th sampling point was included in quality level I-II and 10th sampling point in quality level II according to physical-chemical variables. 9th and 10th sampling point of each stream were affected by pollutants while the others were less affected." (Authors)] Address: Kalyoncu, H., Ege Univ., Fac. of Science, Dept of Biology, Izmir – Turkey. E-mail: hasan.kalyoncu@ege.edu.tr

16830. Kamps, A.; Scieszka, C.; Westmoreland, B. (2018): Effect of body size and Zebra Mussel attachment on exuviae emergence-site selection in five dragonfly species (Hagenius brevistylus, Didymops transvera, Macromia illinoiensis, Dromogomphus spinosus, Epitheca sp.). University of Michigan: 14 pp. (in English) ["Emergence-site selection in dragonflies is an important factor for their survival during metamorphosis because of possible predation and other factors that may end the dragonfly life cycle during this vulnerable process. This study examined the emergence-site selection of exuviae in five dragonfly species from a lake in Northern Michigan to identify whether or not body size or presence of zebra mussels has a significant impact on site selection. We found that as length increased in proportion to body area, dragonflies were able to travel farther away from the shore. Individual species showed differing trends, when it came to body size relating to distance travelled from the shore. Understanding trends in emergence-site selection is

important to understanding how dragonfly larvae have adapted to their individual environments in order to increase their chances of surviving to adulthood.] Address: Kamps, A., Univ. of Michigan Biol. Station, EEB 392 and Natural History & Evolution

16831. Karube, H.; Kosterin, O.E. (2018): Mattigomphus gen. nov., a new gomphid genus from Indochina region, separated from Anisogomphus (Odonata: Gomphidae). Tombo 60: 61-65. (in English) ["A new gomphid genus Mattigomphus gen. nov. is described. The new genus consists of two species (M. tamdaoensis (Karube, 2001) distributed in northern Vietnam and M. pinratani (Hämäläinen, 1991) distributed in northern Thailand) first described and so far placed in Anisogomphus Selys, 1858. The genus is characterized mainly by a peculiar male penis (prolonged median segment, reduced posterior lobe and very simple depressed glans) and cerci." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jpb

16832. Karube, H.; Kompier, T. (2018): Two new species of the genus Periaeschna from northern Vietnam, with additional notes on the genus (Odonata: Aeshnidae). Tombo 60: 71-78. (in English) ["Two new species of the genus Periaeschna Selys, 1883 are described from northern Vietnam: P. sanoi sp. nov. and P. furukawai sp. nov. from Yen Bai Province. The former species resembles P. unifasciata Fraser, 1935, but can be distinguished by details of body maculation and the shape of the male caudal appendages. The latter looks similar to P. magdalena Martin, 1909, but is easily distinguished by its large size, abdominal maculation and the shape of the male caudal appendages. Information is provided on other species of Periaeschna occurring in Vietnam." (Authors)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, Odawara, Kanagawa, Japan. E-mail: paruki@nh.kanagawa.museum.jp

16833. Kastner, F.; Buchwald, R.; Biedermann, R. (2018): Occurrence of Aeshna viridis in marsh ditches in relation to habitat conditions (Odonata: Aeshnidae). International Journal of Odonatology 21(3/4): 205-219. (in English) ["Habitat loss and fragmentation induce a decline and endangerment of freshwater organisms such as A. viridis, an endangered dragonfly species characterised by a specific insect–plant association to the macrophyte Stratiotes aloides. In order to implement conservation measures, a good level of knowledge about the occurrence, habitat requirements and quality, as well as patch size of the species is important. We analysed the influence of several habitat parameters on the presence/absence and abundance of A. viridis exuviae using habitat models (generalised linear mixed-effect models). The ditches populated by A. viridis were classified as moderately polluted and meso- to eutrophic with a high cover of emerged S. aloides stands. The main factor contributing to the presence of A. viridis was the coverage of emerged S. aloides combined with the ditch width. The 90% probability of the presence of A. viridis was achieved at a cover of 14% (8.4 m²) and/or 77% (46.2 m²) of emerged S. aloides. The number of A. viridis exuviae was positively affected by the cover of emerged S. aloides and negatively affected by the sediment thickness, water maintenance and water temperature in March and August. The habitat parameters – water temperature and sediment thickness – are associated with S. aloides in the beginning of siltation of ditch succession. If ditch cleaning takes place during larvae development, eggs and larvae are removed by these procedures. In an optimal situation, the S. aloides populations occur in a mosaic of different states of siltation, which is managed by adapted water maintenance." (Authors)] Address: Kastner, Friederikel, Institut für Biologie und Umweltwissenschaften, Carl von Ossietzky Universität Oldenburg, Oldenburg, Germany. E-mail: friederike.kastner@uni-oldenburg.de

16834. Kaunisto, K.M.; Morrill, A., Forbes, M.R. (2018): Negative covariance between water mite and gregarine parasitism for adult dragonflies, Leucorrhinia intacta (Hagen): an age-related pattern? Parasitology Research 117(12): 3909-3915. (in English) ["Studies on parasite-mediated selection often focus on single parasite taxa infecting single species of hosts. However, host populations experience infections by multiple parasite taxa simultaneously; coinfection is expected to influence how host- and/or parasite-related factors affect host exposure and susceptibility to various parasites, and the resulting patterns of infection. We sampled adult dragonflies from a population of L. intacta in eastern Ontario, Canada. Dragonflies were exposed to parasitism by both water mites (Arrenuridae) and gregarines (Eugregarinidae). We tested for covariation between these ecto- and endoparasites, while considering potential sex and age biases in host sampling and patterns of infection. Mite parasitism differed dramatically between host sexes: nearly all collected males were parasitized, whereas only half of females were infested. This was likely due to differences in age distributions between sexes in sampled dragonflies. Water mite and gregarine parasitism showed strong, negative covariation, and coinfection occurred far less often than expected by chance, although these patterns were restricted to samples of females which, unlike male samples, likely included many old and young dragonflies. We report the first observation of negative covariation between internal and external parasite taxa in an anisopteran host and suggest this relationship between water mites and gregarines may be more widespread among Odonata and perhaps other insects than previously surmised. We advance hypotheses based on host age-parasitism relationships as well as variable parasite-mediated selection to help explain the sex specificity of observed coinfection patterns in our samples." (Authors)] Address: Kaunisto, K.M., Zool. Mus., Biodiversity Unit, Univ. of Turku, Turku, Finland

16835. Kaur, W.G.; Chahal, S.S. (2018): Cytogenetic characterization of Macromia moorei Selys, 1874 of family Macromiidae (Odonata: Anisoptera) from India by C-Banding, Silver Nitrate Staining and Sequence Specific Staining. International Journal of Life Sciences Research 6(2): 64-68. (in English) ["Live adult male specimens of M. moorei have been collected from Andretta, Himachal Pradesh (India). Male germ cell chromosomes of the species have been described on the basis of conventional staining, C-banding, silver nitrate

staining and sequence specific staining. The species possesses 2n (♂) =25m, as the chromosome number and XO (♂)/XX (♀) type sex determination. Dark terminal C-bands are present on all the autosomal bivalents, while m bivalent shows small terminal C-bands and X chromosome is C-positive throughout the length. Terminal light/dark NOR'fs are present on all autosomal bivalents including m bivalent, while X chromosome also possesses terminal NOR. During sequence specific staining, all the autosomal bivalents show prominant terminal DAPI and CMA3 bright regions, while m bivalent possesses less bright DAPI and CMA3 signals and X chromosome possesses both DAPI and CMA3 regions. Linear characterization of chromosomes of M. moorei has been done for the first time." (Authors)] Address: Kaur Walia, Gurinder, Department of Zoology and Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

16836. Kay, R.T.; Gahala, A.M.; and Bailey, C. (2018): Assessment of water resources in areas that affect the habitat of the endangered Hine's emerald dragonfly in the Lower Des Plaines River Valley, Illinois. U.S. Geological Survey Scientific Investigations Report 2018–5074, https://doi.org/10.-3133/sir20185074.: 104 pp. (in English) ["Review of previous investigations indicates that potential decreases in groundwater recharge and increased groundwater extraction in the vicinity of the Lower Des Plaines River Valley in Will County, Illinois, may reduce the amount of groundwater flow in the Silurian aquifer in this area. Groundwater discharge from the Silurian aquifer to wetlands in the Lower Des Plaines River Valley plays an important role in sustaining the habitat of the endangered Somatochlora hineana. Groundwater modeling performed by previous investigators indicates that increasing the amount of water pumped from the aquifer in support of expanded quarry operations near the Lockport Prairie Nature Preserve has the potential to reduce groundwater discharge to the most productive S. hineana habitats in Illinois, potentially degrading the habitat. Model simulations indicate that mitigation procedures designed to artificially enhance groundwater recharge in the vicinity of dragonfly habitats near the Lockport Prairie Nature Preserve are likely to offset the effects of increased pumping. Several areas with smaller, often intermittent populations of S. hineana have been identified in other parts of the Lower Des Plaines River Valley and elsewhere in Illinois. Human activities have the potential to produce changes in hydrology and water quality that can threaten all of these habitats." (Authors)] Address: not stated

16837. Keilsohn, W.; Narango, D.L.; Tallamy, D.W. (2018): Roadside habitat impacts insect traffic mortality. Journal of Insect Conservation 22(2): 183-189. (in English) ["Paved roadways, spanning 6.6 million kilometres across the continental United States, are often bordered by natural or restored habitats and could provide opportunities for pollinator conservation. Because insects are frequently killed by auto traffic, roadside habitats may be ecological traps that kill more pollinators than they produce. Here we compare insect traffic mortality when roadsides are bordered by woodlots, meadows, or lawns. We also compare study sites with and without restored medians to examine the impact of creating habitat that can only be accessed by crossing traffic. We confined our study to high speed roads (70–90 km h-1) with heavy traffic volume. Both habitat type and the presence of a vegetated median affect vehicle strikes fatal to insects. Insect mortality in general, and its effect on bees and butterflies in particular, was consistently lower when roads were bordered by woodlots than when they were bordered by lawn or meadows. Which roadside habitats were associated with the highest insect mortality depended on the taxon in question and the presence or absence of a vegetated median. Butterfly and dragonfly mortality was highest on roads with meadow medians, while bee mortality was highest on roadsides with lawn medians. Across most site comparisons, vegetated medians significantly elevated fatal insect-vehicle strikes. Regardless of the habitat bordering roadsides, insect mortality was unacceptably high for areas being considered for conservation. We suggest four research directions that may lead to reduced insect mortality in roadside habitats." (Authors)] Address: Tallamy, D.W., Dept Entom. & Wildlife Ecology, Univ. of Delaware, 531 South College Ave., Newark, DE 19716, USA. E-mail: dtallamy@udel.edu

16838. Kelly, R.S.; Nel, A. (2018): Revision of the damsel-dragonfly family Campterophlebiidae (Odonata) from the Early Jurassic of England reveals a new genus and species. Alcheringa 42(1): 87-93. (in English) ["Historical fossil insect collections from England were re-examined and the taxa revised. Lateophlebia gen. nov. is erected for Liassophlebia anglicanopsis (Zeuner) in Campterophlebiidae. Petrophlebia anglicana Tillyard is confirmed in this family and Archithemis liassina (Strickland) is transferred to this family. Lastly, Archithemis brodiei (Geinitz), Archithemis Handlirsch, and Architemistidae Tillyard (reduced to this sole species) are transferred to the Heterophlebioidea." (Authors)] Address: Kelly, R., School of Earth Sciences, Univ. of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, UK. E-mail: richard.kelly@bristol.ac.uk

16839. Khan, M.K. (2018): Odonata of eastern Bangladesh with three new records for the country. Journal of Threatened Taxa 10(13): 12821-12827. (in English) ["A study was conducted in the eastern region of Bangladesh to contribute to the knowledge of the country's Odonata fauna. A total of 75 species belonging to nine families was recorded during the study period from April 2014 to July 2016. Calicnemia imitans, Prodasineura autumnalis, and Megalogomphus smithii, are new records for the country. The Megalogomphus genus is recorded for the first time from Bangladesh." (Author)] Address: Khan, M.K., Dept of Biochemistry & Molecular Biology, School of Life Sciences, Shahjalal Univ. of Science & Technology, Sylhet 3114, Bangladesh

16840. Khelifa, R.; Zebsa, R.; Amari, H.; Mellal, M.K.; Zouaimia, A.; Bensouilah, S.; Laouar, A.; Houhamdi, M. (2018): The hand of man first then Santa Rosalia's blessing: a critical examination of the supposed criticism by Samraoui (2017). Journal of Insect Conservation 22(2): 351-361. (in English) ["Samraoui (J Insect Conserv. https ://doi.org/10.1007/s1084 1-017-9966-2, 2017) claims that he shows evidence that our conservation plan of Urothemis edwardsii has failed and that natu-

ral dispersal was the only cause of the recent rapid range expansion of the species in Northeast Algeria. Here, we show that his analysis is biased, many of his arguments are erroneous and strongly contradictory, many key studies are dismissed, and the few data used as evidence to refute our conclusions rather confirm them. We also provide data to prove that our conservation plan did not cause any harm to the source population by comparing exuviae-based estimation of population size in 2012 and 2016. We discuss the need for future monitoring and management and highlight that the recommendations of Samraoui (J Insect Conserv, 2017) are misleading, and thus are unlikely to bring us closer to an effective long-term conservation of the species in the region. Beyond our criticism, we explain why we should not dismiss the direct and indirect implications of final instar larvae translocation in successful colonization of odonates in particular, which could also be applied to aquatic insects in general." (Authors)] Address: Khelifa, R., Dept of Evolutionary Biology & Environmental, Studies, Univ. of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

16841. Khomitskiy, E.E.; Zamotajlov, A.S.; Belyi, A.I. (2018): On vertical migrations in the ground beetles species Carbus (Megodontus) exaratus Quens. (Coleoptera, Carabidae). Scientific works of the Prisursky State Nature Reserve 33: 231-233. (in Russian, with English summary) ["Relocations of the adults carabid beetles genus Carabus on the different vertical surfaces may be caused by search for food and water, when unfavorable feeding conditions arise in characteristic beetles habitats.] Address: Khomitsky E.E., Russia, Krasnodar, FSBEI of HE "Kuban State Agrarian University named after I.T. Trubilina, Russia. E-mail: a_zamotajlov@mail.ru

16842. Kiauta, B. (2018): Some personal recollections of the late Professor Dr Eberhard G. Schmidt (1935-2018). Odonatologica 47(3/4): 181-191. (in English) ["Some recollections and anecdotes from 1963 to present are provided and some highlights in odonatological work of ES are emphasized. An outline of his professional career and his bibliography are omitted." (Authors)] Address: Kiauta, B., Callunastraat 6, NL-5853 GA Siebengewald/Lb„ The Netherlands. E-mail: mbkiauta@gmail.com

16843. Kietzka, G.J.; Pryke, J.S.; Samways, M.J. (2018): Comparative effects of urban and agricultural land transformation on Odonata assemblages in a biodiversity hotspot. Basic and Applied Ecology 33: 89-98. (in English) ["Rivers of the Cape Floristic Region (CFR) biodiversity hotspot are threatened by land transformation. This region is a centre of endemism for many taxa, including Odonata. These insects are highly sensitive to changes in physical habitat structure, which makes them good bioindicators, and this led to the development of the Dragonfly Biotic Index (DBI). We investigated the effects of local agricultural and urban land transformations on Odonata species richness, assemblage composition and DBI scores in three CFR rivers. A total of 48 sites were selected and categorized as natural, agricultural or urban land use. Adult male Odonata and four environmental variables were recorded over two seasons. Land transformation significantly influenced Odonata assemblage composition but did not always significantly reduce species richness. Average vegetation height also affected Odonata assemblage composition and decreased species richness. Agricultural and urban sites had Odonata assemblages differing from those in the natural areas. Agricultural and urban local land use types reduced opportunities for some endemic species but provided for the persistence and establishment of widespread, generalist species, as indicated by great changes in DBI scores. Mitigating the adverse influences of land transformation through establishment of protected areas is essential for the conservation of rare taxa, particularly in an area with a high number of endemic species." (Authors)] Address: Kietzka, Gabriella, Dept of Conservation Ecology & Entomology, Stellenbosch University, Matieland 7602, South Africa. E-mail: gabikietzka@gmail.com

16844. Kim, M.J.; Jeong, S.Y.; Wang, A.R.; An. J.; Kim, I. (2018): Complete mitochondrial genome sequence of Macromia daimoji Okumura, 1949 (Odonata: Macromiidae). Mitochondrial DNA Part B 3(1): 365-367. (in English) ["M. daimoji has been listed as an Endangered insect in South Korea. We sequenced the complete 15,198 bp mitochondrial genome (mitogenome) of this organism, which is the first mitogenome sequence reported from the family Macromiidae. The genome includes a typical set of genes [13 protein-coding genes (PCGs), 2 rRNA genes, and 22 tRNA genes) and one non-coding region with an arrangement identical to that observed in most insect genomes. Phylogenetic analyses using concatenated sequences of the 13 PCGs and 2 rRNA genes using the Bayesian inference (BI) method placed Macromiidae, represented by M. daimoji, as a sister group to Libellulidae with the highest nodal support [Bayesian posterior probabilities (BPP)?=?1]. Unlike conventional phylogenetic analysis, the suborders Anisozygoptera and Zygoptera formed a strong sister group (BPP =1), justifying the use of different molecular markers for phylogenetic analysis." (Authors)] Address: Kim, I., Department of Applied Biology, College of Agriculture and Life Sciences, Chonnam National University, Gwangju, Republic of Korea;

16845. Kiyama, K.; Suda, D.; Handa, H. (2018): New record of Ophiocordyceps odonatae in Saitama Prefecture. Bull. Saitama Mus. Nat. Hist. [N. S.] 12: 29-32. (in Japanese, with English title). Address: Kiyama, K., Saitama Museum of Natural History, Nagatoro 1417-1, Nagatoro, Saitama, 369-1305 Japan

16846. Kiyoshi, T.; Katatani, N.; Hong, T.P. (2018): Sundaeschna gen. nov. with descriptions of two new species from Vietnam and Myanmar (Odonata, Anisoptera, Aeshnidae). Bull. Natl. Mus. Nat. Sci., Ser. A, 44(1): 1-9. (in English) ["Sundaeschna gen. nov. is proposed to accommodate two new species in the family Aeshnidae. One species, S. cattienensis sp. nov., is described from Dong Nai Province, Vietnam. Another species, S. tanintharyiensis sp. nov., is described from Tanintharyi Township, Myeik District, Tanintharyi Region, Myanmar. This new genus resembles the genus Sarasaeschna in the tribe Gomphaeschnini, but is easily distinguished by the structure of the fourth penile segment and by the pigmental

spots on the posterior margins of all wings. Both these new species are recorded from lowlands, in contrast with Sarasaeschna, whose members generally occur in mountainous regions. These two new species are easily distinguished from each other by the shape of the male epiproct." (Authors)] Address: Kiyoshi, T., Dept of Zoology, National Museum of Nature and Science, 4–1–1 Amakubo, Tsukuba, Ibaraki, 305–0005, Japan. E-mail: kiyoshi@kahaku.go.jp

16847. Klein, C.E.; Pinto, N.S.; Spigoloni, Z.V.A.; Bergamini, F.M.; de Melo, F.R.; De Marco, P.; Juen, L. (2018): The influence of small hydroelectric power plants on the richness and composition of Odonata species in the Brazilian Savanna. International Journal of Odonatology 21(1): 33-44. (in English) ["Regardless of the economic and social development that damming processes related to hydroelectric power plants bring to a region, they represent a wide range of disturbances to the physical, chemical, and biological characteristics of rivers. We evaluated the effects of dams on Odonata communities from the southeastern region of Goias, Brazil. 13 streams connected to three dams were studied: seven were used as reference samples (located upstream from the damming site, therefore not directly affected by damming) and six were used as affected area samples (located downstream from the dam). A total of 1128 odonates from six families, 22 genera, and 39 species were captured and identified. The results showed that Odonata richness was affected by the presence of dams, with different effects on Anisoptera and Zygoptera suborders. We discuss that these effects are related mostly to the physical and chemical variables in waterbodies directly affected by small hydroelectric power plants (SHPs). It is possible that negative effects on the Odonata community in SHP areas are related to changes in waterflow, pH and turbidity." (Authors)] Address: Pinto, N., PPG Ecologia e Biomonitoramento, UFBA, Bahia, Brazil. E-mail: nelsonsilvapinto@gmail.com

16848. Klop-Toker, K.; Valdez, J.; Stockwell, M. (2018): Community level impacts of invasive mosquitofish may exacerbate the impact to a threatened amphibian. Austral Ecology 43(2): 213-224. (in English) ["Invasive fish threaten many native freshwater fauna. However, it can be difficult to determine how invasive fish impact animals with complex life cycles as interaction may be driven by either predation of aquatic larvae or avoidance of fish-occupied waterbodies by the terrestrial adult stage. Mosquitofish (Gambusia spp.) are highly successful and aggressive invaders that negatively impact numerous aquatic fauna. One species potentially threatened by Gambusia holbrooki is the green and golden bell frog (Litoria aurea). However, G. holbrooki's role in this frog's decline was unclear due to declines driven by the chytrid fungal disease and the continued co-existence of these fish and frogs in multiple locations. To clarify the extent to which Gambusia is impacting L. aurea, we conducted 3 years of field surveys across a deltaic wetland system in south-east Australia. We measured the presence and abundance of aquatic taxa including G. holbrooki, and L. aurea frogs and tadpoles, along with habitat parameters at the landscape and microhabitat scale. Generalized linear models were used to explore patterns in the abundance and distributions of L. aurea and G. holbrooki. We found strong negative associations between G. holbrooki and tadpoles of most species, including L. aurea, but no apparent avoidance of G. holbrooki by adult frogs. Native invertebrate predators (Odonata and Coleoptera) were also absent from G. holbrooki-occupied ponds. Due to the apparent naivety of adult frogs toward G. holbrooki, the separation of G. holbrooki and tadpoles, plus the abundance of alternative predators in G. holbrooki-free ponds, we conclude that the impact of G. holbrooki on L. aurea recruitment is likely substantial and warrants management action." (Authors)] Address: Klop-Toker, K., Conservation Biology Research Group, University of Newcastle, C/O Michael Mahony, School of Environmental and Life Science, University of Newcastle, Callaghan, NSW, 2308 Australia. E-mail: kaya.klop-toker@uon.edu.au

16849. Knight, K. (2018): Dragonfly haemolymph looks more like ancestors'. Journal of Experimental Biology 2018 221: jeb187112 doi: 10.1242/jeb.187112 Published 3 August 2018: 1. (in English) ["Observing metamorphosing tadpoles pull themselves from the water is a rite of passage shared by budding naturalists the world over. Yet, frogs are not the only animals to pass their early life stages immersed in water. Dragonflies spend the majority of their lives submerged before emerging as aerobatic adults, trading in their water-breathing gills for trachea that deliver oxygen to every tissue in the body. However, Philip Matthews from the University of British Columbia (UBC), Canada, explains that the dragonflies and frogs have converged on the same aquatic lifestyle choice from different origins. Dragonfly larvae re-evolved the ability to breathe water from terrestrial ancestors, in contrast to amphibian tadpoles, which spent the whole of their evolutionary history immersed. And Matthews was puzzled; air-breathing animals carry high CO_2 concentrations in their body fluids, while water-breathing species have lower internal concentrations of CO2 thanks to the high solubility of the gas in water. Would the body fluids of water-breathing dragonfly nymphs resemble those of their aerial ancestors or the species that they re-joined in water? Describing trapping dragonfly nymphs and adults on the UBC campus, Matthews says, 'For the adult dragonflies, you need to be fast', recalling how he, Master's student Dan Lee and undergraduate Raman Ubhi captured the adults with insect nets while the nymphs were easier to collect with dip nets from ponds. Back in the lab, Lee skilfully collected samples of haemolymph (the insect equivalent of blood) from the adults and nymphs at various stages of development, to measure the total amount of CO2 – which can occur in several different forms – in the insects' bodies. 'We had to develop our own equipment to measure the CO_2 that was released from our tiny 5 µl haemolymph sample', says Matthews, remembering how Lee worked closely with a glass blower to build the bespoke system. In addition, Lee worked with Martin Gutbrod and Fernando Ferreras from PreSens, Germany, who had built a prototype CO_2 probe, to measure the partial pressure of the gas (the pressure exerted by the CO_2 molecules in a liquid) in the haemolymph of early dragonfly nymphs. However, Matthews needed convincing that the partial pressure readings were accurate, so Lee also measured the CO2 partial pressure of crayfish haemolymph. 'This gave us confidence in the values we recorded in dragonfly nymphs', says Matthews,

as he could compare the new crayfish measurements with values in the literature. Despite their aquatic lifestyle, which should have resulted in low CO_2 levels, the total CO_2 concentration in the haemolymph of the dragonfly nymphs was three times higher than that of crayfish and rainbow trout. 'When we saw this, we were very excited', says Matthews, adding, 'This suggests that they aren't expelling CO_2 as easily as one would expect while breathing water'. And when Lee compared how the dragonflies' total CO_2 levels changed as the insects prepared to depart the water, the total CO_2 levels increased to approach those experienced by the air-breathing adults: '[which] suggests that they might be preparing to become air breathers (or becoming poorer water breathers) during their final instar', says Matthews. So, water-breathing dragonfly nymphs have relatively high levels of CO_2 in their bodies compared with those of other water-breathing creatures, with the consequence that the transition that they undergo – to high total CO_2 levels – as they shift to an aerial lifestyle is less dramatic than it is for emerging tadpoles. And Matthews is eager to find out why aquatic dragonfly nymphs differ so much from other aquatic residents. 'There's so much more to do', he says." (Author)] Address: E-mail: kathryn.knight@biologists.com

16850. Kohli, M.K.; Sahlén, G.; Kuhn, W.R.; Ware, J.L. (2018): Extremely low genetic diversity in a circumpolar dragonfly species, Somatochlora sahlbergi (Insecta: Odonata: Anisoptera). Scientific Reports 8:15114 | DOI:10.1038/s41598-018-32365-7: 10 pp. (in English) ["We present the first empirical treatment of the northernmost breeding dragonfly, S. sahlbergi. We sequenced populations from United States, Canada, Finland, Sweden and Norway for cytochrome oxidase I (COI) and D2 region of 28s. We found that, despite geographic barriers across its vast arctic range, S. sahlbergi is a single species. Not only does it appear to interbreed across its entire range, there also seems to be almost no variation among European and North American populations in their COI gene fragment (the barcode gene), which is usually extremely variable. We further found that characters thought to be diagnostic for the larvae of S. sahlbergi were absent in our European samples. We review and re-describe the habitat of this species based on new findings from recent field observations. Finally, we report for the first time the likely presence of this species in Japan. We hope our findings will encourage further study of this species and other under-studied insect taxa that inhabit the remote Arctic." (Authors)] Address: Kohli, M.K., Dept of Biological Sciences, Rutgers University-Newark, Newark, USA. E-mail: mkk24@njit.edu

16851. Kompier, T. (2018): The genus Asiagomphus in Vietnam, with descriptions of three new species, and first descriptions of the male of Asiagomphus auricolor (Fraser, 1926) and of the female of Asiagomphus reinhardti Kosterin & Yokoi, 2016 (Odonata: Gomphidae). Zootaxa 4462(3): 301-330. (in English) ["The occurrence in Vietnam of eight species of Asiagomphus Asahina, 1985 is discussed. Three new species are described (Asiagomphus kosterini [holotype: Da Lat, Lam Dong Prov., (appr. 11.880 N, 108.442 E), 17-IV-2016], Asiagomphus monticola [holotype: Xuan Son NP, Phu Tho Prov., (appr. 21.163 N, 104.896 E), 31-V-2014], and Asiagomphus superciliaris [holotype: Huu Lien NR, Lang Son Prov., (appr. 21.686 N, 106.376 E), 01-V-2014], and the male of Asiagomphus auricolor (Fraser, 1926) and the female of Asiagomphus reinhardti Kosterin & Yokoi, 2016 are described for the first time. The female of Asiagomphus auricolor is redescribed. Distribution and ecology of all species and a key to the males occurring in Vietnam are provided." (Author)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompierintokyo@yahoo.com

16852. Kompier, T.; Karube, H. (2018): Chlorogomphus canhvang sp. nov. from Central Vietnam (Odonata: Chlorogomphidae). Zootaxa 4394(3): 437-442. (in English) ["Chlorogomphus canhvang sp. nov. [holotype ♂: Along QL15, Quang Binh Province (appr. 17.488 N, 106.302 E), 6.V.2016] is described from the Truong Son Mountains (Quang Binh and Thua Thien—Hue Provinces) in central Vietnam. Detailed differences are given to distinguish the new species from the very similar C. auratus Martin, 1910 for both males and females, and information on its ecology is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com

16853. Kopij, G. (2018): Diet of sympatrically breeding Southern Carmine Bee-eater Merops nubicoides and White-fronted Bee-eater Merops bullockoides. Ostrich 89(2): 191-194. (in English, with French summary) ["M. nubicoides and M. bullockoides are insectivore, cavity-nesting bird species, both of which occur in the Zambezi Region, north-eastern Namibia. I examined there the diet composition of these species by an analysis of prey remnants. The Southern Carmine Bee-eater chick's diet consisted of exclusively insects, represented by seven orders. The most numerous were orthopterans and beetles (40.9% and 26.1%, respectively; n = 582 prey items). Hymenopterans (18.7%) and bugs (12.9%) supplemented the diet, whereas dragonflies (Odonata) and moths (Lepidoptera) were preyed only occasionally. In the diet of the White-fronted Bee-eater, nesting at the same site, beetles were the most important prey (81.2% of all 101 prey items identified), with scarabaeids comprising more than half of the beetle diet. In comparison with the White-fronted Bee-eater, a lower proportion of beetles, but much larger proportion of orthopterans were recorded in the diet of the Southern Carmine Bee-eater. In both bee-eater species, hymenopterans appear to be less important than was expected. The essential difference in the proportion of main prey groups recorded in Southern Carmine and White-fronted Bee-eaters breeding at the same site may represent a shift in food niche due to both temporal segregation in breeding, and differences in food preferences (feeding sites)." (Authors)] Address: Kopij, G., Dept of Integrated Environmental Sciences, Ogongo Campus, University of Namibia, Oshakati, Namibia. E-mail: gkopij@unam.na

16854. Korbaa, M.; Ferreras-Romero, M.; Ruiz-García, A.; Boumaiza, M. (2018): TSOI - a new index based on Odonata populations to assess the conservation relevance of watercourses in Tunisia. Odonatologica 47(1/2): 43-72. (in English) ["Global ecological conditions existing in the streams of north-

ern Tunisia are very unequal. In consideration of their appropriate management and restoration requirements, breeding populations of 28 Odonata species were studied over an annual cycle in twentyeight watercourses (22 permanent, 6 intermittent). In total, 7 363 larvae and 337 exuviae were collected. We developed a new indicator, the Tunisian Stream Odonatological Index (TSOI), to assess conservation aspects of Odonata biodiversity in African Mediterranean streams by analysing dragonfly communities. The TSOI operates at the species level. Taxonomic richness, voltinism, endemism, relative taxonomic distinctiveness, and regional conservation status (IUCN) are elements taken into account to design this index. Accordingly, presence of both Maghreb endemic and semivoltine species (Calopteryx exul, Platycnemis subdilatata, Aeshna cyanea, Boyeria irene, Gomphus lucasii, Onychogomphus costae, O. forcipatus, and O. uncatus) may provide useful information about the refuge quality of each habitat type for species with different biological features, and their interest level from a conservation point of view. The results of a first application of this approach are presented in the paper as well. As far as we know, a biodiversity conservation index based on benthic invertebrates in the African Mediterranean area has never before been proposed nor used." (Authors)] Address: Korbaa, M., Unit of Hydrobiology, Laboratory of Environment Biomonitoring, Faculty of Sciences of Bizerte, 7021, Jarzouna, Tunisia. E-mail: manelkorbaa@yahoo.fr

16855. Kosterin, O.E. (2018): Rediscovery of Lestes nigriceps Fraser, 1924 (Odonata: Lestidae) in eastern Cambodia. Zootaxa 4526(4): 561-575. (in English) ["L. nigriceps was described from a male (later the lectotype) and two non-conspecific females collected in 1922 at Pusa, Bihar State, India, and has never been reported since. In June 2018 a population of L. nigriceps was unexpectedly found in eastern Cambodia, Mondulkiri Province. The Cambodian males, their variation and, for the first time, the true female of L. nigriceps is described." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev Ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

16856. Kosterin, O.E.; Ahmadi, A. (2018): Odonata observed in Central Zagros, Iran, in late May 2017. IDF-Report 117: 1-65. (in English) ["In the period 18th – 31st May 2017, 33 localities were examined for Odonata in the Central Zagros area of Iran: 16 in Markazi Province, 14 in Lorestan Province and 3 in Esfahan Province; in 27 of those localities Odonata were found, 25 species in total. For Markazi Province, only one species, Calopteryx splendens, was previously reported (and also found by us), so of 17 species found there 16 are formally new provincial records (Epallage fatime, Lestes barbarus, Coenagrion ornatum, C. persicum, Enallagma cyathigerum, Ischnura elegans, I. intermedia, I. pumilio, Platycnemis kervillei, Anax imperator, Anaciaeschna isoceles, Caliaeschna microstigma, Libellula depressa, Onychogomphus lefebvrii, Orthetrum brunneum, Sympetrum fonscolombii). Of 17 species found in Lorestan, 5 are new for this province (L. barbarus, Aeshna mixta, Orthetrum taeniolatum, Sympetrum arenicolor, S. striolatum). Only two species were seen in Esfahan Province, in which little time was spent. Notes on variation and taxonomy are provided for Sympecma paedisca, C. ornatum (considered to be a senior synonym of C. vanbrinkae because of variation in the presumed main diagnostic character), E. cyathigerum, I. elegans, Gomphus schneideri (including discussion of G. amseli), as well as notes on habitats of most species and the general characteristics of the area." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

16857. Kosterin, O.E. (2018): Spring aspect of Odonata of the Abrau Peninsula, the Black Sea coast of the West Caucasus, as observed in May 2018. International Dragonfly Fund Report 120: 1-13. (in English) ["Results of a brief examination of the spring aspect of Odonata at the Abrau Peninsula and some nearby localities on 21-27th May 2018 are presented. Lestes dryas and Caliaeschna microstigma are reported for the Peninsula for the first time, revealing the world northernmost record of the latter. Some old data of Odonata at Novorossiysk and some recent erroneous data on the Krasnodarskiy Kray are referenced and discussed. The known Odonata fauna of the Abrau Peninsula reaches 38 species." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

16858. Kosterin, O.E. (2018): Macromidia genialis buusraaensis subspecies nova (Odonata, Synthemistidae s.l.) from eastern Cambodia. IDF-Report 121: 1-26. (in English) ["M. genialis buusraaensis subspecies nova is described from 10 males and 2 females from three localities of Mondulkiri Province, the eastern Cambodia (the type locality: a brook downstream Buu Sraa Waterfall 12°34' N 107°25' E). The new subspecies is close to M. g. shanensis Fraser, 1927 and differs from it by an additional, and the broadest, yellow spot on S7. It is partly syntopic with Macromidia rapida Martin, 1907. A brief overview of the current knowledge of the genus Macromidia Martin, 1907 is provided." (Author)] Address: Kosterin, O.E., Inst. Cytol. & Genet. SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

16859. Kosterin, O.E.; Kompier, T. (2018): Amphicnemis valentini sp. nov. from the Cardamom ecoregion in Cambodia and Vietnam (Odonata: Coenagrionidae). Zootaxa 4429(2): 281-294. (in English) ["A. valentini sp. nov. is described from the Ream Peninsula of Cambodia (holotype: Cambodia, Preah Sihanouk Province, Ream Peninsula, 10.52258 N 103.69556 E, RMNH) and Phú Qu.c Island, Kien Giang Province of Vietnam, both in the Cardamom ecoregion. It is similar to A. gracilis Krüger, 1898, which occurs in Peninsular Malaysia and Sumatra, but differs from it by a long process on the male prothorax." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

16860. Kosterin, O.E.; Borisov, S. (2018): New records and migration strategy of Anax ephippiger (Burmeister, 1839) (Odonata, Aeshnidae) in the territory of the Russian Federation. Eurasian Entomological Journal 17(1): 73-79. (in English, with Russian summary) ["New records and observations of a migratory dragonfly A. ephippiger in Russia and the first record in Abkhazia are provided. Due to a peculiar migratory life strategy these dragonflies inhabit the Caucasus only in the warm season." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

16861. Kosterin, O.E.; Zaika, V.V. (2018): Update to the knowledge of Odonata of Tuva and southern Krasnoyarskiy Kray, Siberia, Russia. International Dragonfly Fund - Report 113: 1-28. (in English) ["Sympetrum fonscolombii is for the first time reported for Tuva (Tyva Republic, Russia), as found in the Ubsu-Nur Depression. New data are provided on Odonata of the Turan or Turan-Uyuk Depression of Tuva, including the first record of Somatochlora exuberata in Tuva beyond the Todzha Depression and Coenagrion armatum, C. ecornutum, Aeshna juncea, A. grandis, Somatochlora graeseri and Libellula quadrimaculata for the first time reported for the Turan Depression. New distributional data and comments on Ophiogomphus spinicornis Selys, 1878 are added. Somatochlora alpestris found at Lake Oyskoe is for the first time reported for the southern Krasnoyarskiy Kray." (Authors)] Address: Kosterin, O.E., Inst. Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

16862. Kosterin, O.E. (2018): Too pervert: an attempt at an interfamiliar homosexual copulation wheel in damselflies. Agrion 22(1): 52-53. (in English) [tandem of males of Copera vittata and Mortonagrion falcatum, Ream Peninsula, Cambodia, 3 March 2017.] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

16863. Kowalska, J.; Rychla, A, (2018): Dragonflies (Odonata) observed at Lake Wojnowskie Zachodnie and Lake Woj-nowskie Wschodnie (district Lubuskie) in the years 2009-2017. Odonatrix 142: 5 pp. (in Polish, with English summary) ["Irregular observations of adult dragonflies were carried out at Lake Wojnowskie Zachodnie and Lake Wojnowskie Wschodnie (district Lubuskie) in the years 2009–2017. In total, 20 and 17 species were recorded at Lake Wojnowskie Zachodnie and Lake Wojnowskie Wschod-nie, respectively. Consequently, the number of species shown in the UTM square WT57 has in-creased from 8 in the year 2007 (Bernard et al. 2009) up to 24 in the year 2017." (Authors)] Address: Kowalska, Jolanta, ul. Armii Krajowej 3/3, 66-100 Sulechów, Poland. E-mail: j.kowalska.wojciechowska@-gmail.com

16864. Kumar, D.; Kamath, G.M.; Mohite, P.M.; Kamle, S. (2018): Realization and dynamic studies of CNTs-PDMS membranes for biomimetic flapping wing applications. Mechanics of Biological Systems & Micro-and Nanomechanics 4: 35-37. (in English) ["Aerial and aquatic animals including bats, insects and fish use their wings/fins to generate propulsive forces. Natural fliers deform their wings, actively and/or passively, in bending and twisting modes to generate lift and thrust. Within a flapping cycle, wing skin interacts with surrounding fluid and transfers dynamic loads to the internal stiffening structure. Biomimicking of such complex natural flapping wings is possible if the development involves both materials and structural aspects. In the present study, thin PDMS films are chosen for developing the skin of the biomimetic flapping wings. The films are first characterized for dynamic mechanical properties (storage modulus, loss modulus and loss factor) using a dynamic mechanical analyzer. The tests are done in frequency and strain sweep modes to analyze the effect of strain-rates and strain-amplitudes on the dynamic mechanical properties and generate experimental data for constitutive modeling. The dragonfly and cicada wings are taken as the bioinspiration for developing the biomimetic wings. The fabrication of wing skeletons and their integration with the PDMS membranes are achieved through advanced manufacturing techniques including laser micromachining, photolithography and casting. Two types of composite materials are used for making the wing skeletons, i.e., carbon nanotubes (CNTs)/polypropylene (PP) nanocomposite sheet for cicada inspired wing and carbon fiber/epoxy composite strands for dragonfly inspired wing. Structural dynamic analysis of such light, flexible and small size biomimetic structures are interesting and useful for evaluation of biomimicking performance of used materials and manufacturing methods, but difficult to perform. A real-time high-speed non-contact dynamic testing method based on DIC-FPGA coupling (3D digital image correlation technique coupled with real-time data acquisition system, developed at our lab) is used for determining the natural frequencies and corresponding mode shapes of fabricated wings. Structural dynamic analysis of such light, flexible and hyperviscoelastic structures are interesting and useful but difficult to perform. A high-speed non-contact dynamic testing method based on DIC-FPGA coupling (3D-DIC technique coupled with real-time data acquisition system, developed at our lab) will be used for determining natural frequencies, mode shapes and loss factors of the membranes. Similar studies will also be carried out computationally using Abaqus and validated with the experimental results. The experimental measurements will be performed inside a vacuum chamber to observe the effect of air and compare with computational results. Quasi-static and dynamic mechanical testing of PDMS films will be performed to do hyperelastic and viscoelastic constitutive modelling for FE simulations. The computational study will also be used to design the biomimetic wing structures with internal stiffening structure. The membranes will be reinforced with carbon nanotubes (CNTs) based nanocomposites skeletons and tested for structural dynamic characteristics. This will be done to achieve coupled bending and twisting fundamental mode shape for a wing tested in cantilever form, which is useful to maximize efficiency and generate both lift and thrust. PDMS wings will be developed with different wing skeletons and tested for performing optimization exercise towards the

biomimicking goal. Integration of membrane and nanocomposite skeletons will be achieved through advanced manufacturing techniques including laser micromachining and photolithography. The piezoelectric properties of CNTs could potentially be exploited for sensing and control for morphing and flapping wing applications." (Authors)] Address: Kumar, D., Dept of Aerospace Engineering, Indian Institute of Technology, Kanpur, India

16865. Kumar, P.; Sharma, S.; Barman, J. (2018): Habitat preference of odonates (dragonfly and damselfly) along with its diversity, abundance, and richness in Madan Kamdev Temple area (Dewangiri Hill of Kamrup (R) district, Assam, India. International Journal of Plant, Animal and Environmental Sciences 8(3): 8-18. (in English) ["The present study was piloted at Madan Kamdev Temple area of the Kamrup (R) district, Assam during December 2017 to May 2018. A total of 32 species of Odonata including 19 species of Anisoptera and 13 species of Zygoptera under 2 families were recorded. 12 species were documented from zone1 (forest area), 31 species were documented from zone 2 (river bank) and 20 species were from zone 3 (crop fields). 11 species were common in all the zones. The most abundant Anisopteran species was Pantala flavescens and most abundant Zygopteran species was Ceriagrion coromandelianum. Shannon Weiner Index (H') was estimated to be 2.644, in forest it was 2.126, near river 2.649 and in crop field it was 2.366. Margalef's Richness Index (DMg) was found to be 4.705, in forest it was 2.456; in near river 4.898 and in crop field it was 3.654.In the present study 4 species i.e. Crocothemis servilia, Neurothemis fulvia, Orthetrum sabina and Ceriagrion coromandelianum used all types of habitat. Maximum number of species and individuals of Odonates were recorded during the mid-day time when temperature is high." (Authors)] Address: Sharma, S., Dept of Ecology and Environmental Science, Assam University, Silchar, India. Email: dudckecr@gmail.com

16866. Kunce, W. (2018): Sub-lethal effects of anthropogenic contaminants on aquatic invertebrates. Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology 1692. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-513-0382-6.: 70 pp. (in English) ["Anthropogenic contaminants are considered to play a substantial role in the decline of freshwater invertebrate diversity. Sub-lethal effects of many of these contaminants on behaviour and life history traits of aquatic invertebrates may contribute to their decline. As contaminants are rarely present in the environment alone, the effects of mixture exposures are highly relevant in assessing the risk these substances pose to the biota. This thesis focuses on sub-lethal effects of exposure to aquatic pollutants, separately and in combination, on fresh-water invertebrates. To investigate the single and combined effects of pesticides, larvae of the midge, Chironomus riparius were exposed to a 1 hour pulse of two neonicotinoids and two pyrethroids. This short exposure to environmentally relevant concentrations of pesticides decreased the survival and delayed development in C. riparius. The combination of neonicotinoids and pyrethroids did not produce synergistic effects; however, there was some indication of antagonism. Additionally, larvae of the damselfly, Coenagrion puella, were exposed for 14 hours to two environmentally relevant concentrations of pyrethroid pesticides, alone and in combination. Exposure to the pyrethroid, deltamethrin, reduced the larvae's predatory ability. Combined exposure to both deltamethrin and esfenvalerate inhibited the Glutathione S-transferase detoxification pathway and may have additive toxic effects on the larvae's predatory ability. Microplastics are increasingly gaining attention as an aquatic pollutant of major concern with respect to the toxicity of the microplastics themselves as well as their capacity to adsorb persistent organic pollutants like pesticides. To investigate the effects of microplastics and a pyrethroid, alone and in combination, C. riparius larvae were raised in sediment spiked with two sizes of polystyrenebased latex microbeads and an environmentally relevant concentration of esfenvalerate under normal and food-restricted conditions. Exposure to both sizes of microplastics and esfenvalerate lead to equally decreased emergence under food-restricted conditions. Additionally, exposure to esfenvalerate led to decreases in survival when food was scarce that did not occur when microplastics were co-present. Antishistamines are also an emerging aquatic contaminant of concern with very little known about their biological effects on aquatic wildlife. Antihistamines could potentially interfere with the histaminergic pathways and thus affect thermal tolerance and temperature preference in aquatic invertebrates. The freshwater snail, Planorbarius corneus, was exposed for 24 hours to the antihistamine, diphenhydramine. This exposure increased thermal tolerance and righting time, but did not affect temperature preference. The results of the investigation suggest that anthropogenic contaminates alone and/or in combination have sub-lethal effects on life history, behavior and physiology of aquatic invertebrates. Such sublethal effects have the potential to affect populations and community structure in the aquatic and terrestrial environment." (Authors)] Address: Kunce, W., Dept of Ecology and Genetics, Animal ecology, Norbyvägen 18 D, Uppsala University, SE-752 36 Uppsala, Sweden

16867. Laily, Z.; Rifqiyati, N.; Kurniawan, A.P. (2018): Keanekaragaman Odonata pada Habitat Perairan dan Padang Rumput di Telaga Madirda. Jurnal MIPA 41(2): 105-110. (in Indonesian, with English summary) ["The study aimed to find out the dragonfly diversity in Madirda Lake in aquatic and grassland habitats. The research method uses sampling points and counts individual counts directly. Data were analyzed by the Shannon-Wienner (H ') diversity index and Evennes (E) evenness index. The results of the study showed 19 species of dragonflies from 5 families. 12 species are included in the Anisoptera suborder and 7 species are included in the Zygoptera suborder. One endemic Java dragonfly species was found, Rhinocypha fenestrata. The Shanoon-Wienner (H ') diversity index in 2.11 aquatic habitats and on grassland habitats 0.93, which shows that diversity in aquatic habitats is in the medium category and grassland habitat is in the low category." (Authors)] Address: Laily, Z., Program Studi Biologi, Fakultas Sains dan Teknologi, UIN Sunan Kalijaga, Yogyakarta, Indonesia. E-mail: zainullaily@gmail.com

16868. Lambret, P.; Rutter, I.; Grillas, P.; Stoks, R. (2018): Oviposition plant choice maximizes offspring fitness in an aquatic predatory insect. Hydrobiologia 823: 1-12. (in English) ["Evidence for the adaptive value of oviposition site selection in terms of increased offspring fitness is rare in predatory insects. We tested this in Lestes macrostigma that prefers the plant Bolboschoenus maritimus. We carried out two experiments with shoots containing eggs: we flooded (1) some shoots of the same type (i.e. combination of species and desiccation state) at different dates and (2) different shoot types at the same date. Earlier flooding increased hatching success. Because B. maritimus grows in deeper parts of temporary ponds, it is flooded before other plants after the drought season, suggesting that adult oviposition site selection is driven by lower egg desiccation risk. Independently of flooding date, hatching success was higher and larvae hatched earlier when eggs were laid in B. maritimus. Faster embryonic development enhances chances to complete larval development before pond desiccation and reduces costs associated with time stress. Offspring higher fitness was more constant between shoots of B. maritimus compared to the other types of shoot, suggesting that laying eggs in one shoot of this plant leads offspring to high fitness more surely. Our results indicate that adults choose oviposition plants maximizing offspring fitness (higher hatching success and faster embryonic development)." (Authors)] Address: Lambret, P., Tour du Valat, Res. Inst. Conservation of Mediterranean Wetlands, Le Sambuc, Arles, France

16869. Langourov, M.; Simov, N.; Bekchiev, R.; Chobanov, D.; Antonova, V.; Dedov, I. (2018): Inventory of selected groups of invertebrates in sedge and reedbeds not associated with open waters in Bulgaria. Acta zool. bulg. 70(4): 487-500. (in English) ["Inventory of selected groups of the invertebrate fauna in the EUNIS wetland habitat type D5 “Sedge and reedbeds normally without free-standing water” in Bulgaria was carried out. It included 47 localities throughout the country. The surveyed invertebrate groups included Gastropoda, Odonata, Orthoptera, Heteroptera, ants (Formicidae), Lepidoptera and some coleopterans (Staphylinidae: Pselaphinae). Data on the visited localities, identified species and their conservation status are presented. In total, 316 species of 209 genera and 68 families were recorded. Fifty species were identified as potential indicator species for this wetland habitat type. The highest species richness (with more than 50 species) was observed in wetlands near Marino pole (Plovdiv District) and Karaisen (Veliko Tarnovo District)." (Authors)] Address: Langourov, M., National Museum of Natural History – Sofia, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria. E-mail: langourov@gmail.com

16870. Laughlin, M.M.; Martin, J.G.; Liesch, P.J.; Olson, E.R. (2018): Dragonfly (Odonata: Corduliidae, Macromiidae, Gomphidae, Aeshnidae) and damselfly (Odonata: Calopterygidae) exuviae observed at record heights in Pinus strobus and Picea abies canopies. The Great Lakes Entomologist 51(1): 26-29. (in English) ["Most odonate species do not typically climb higher than 50 cm when choosing an emergence support. We observed multiple species of odonate nymphs using trees as emergence supports at heights greater than 50 cm and up to 4, 6.9, and 14.6 m for Calopteryx maculata, Somatochlora, and Didymops transversa, respectively. These heights represent the greatest heights ever documented for odonate nymph emergence supports. Our research suggests that some species (S. minor; D. transversa) appear to have a greater affinity for climbing to great heights during emergence than others (Dromogomphus spinosus; Basiaeschna janata; Macromia illinoiensis. Odonate nymphs appeared to have a strong preference for emergence sites at the underside or base of branches. Researchers have hypothesized that competition for emergence sites drives climbing to such great heights. We propose three alternative hypotheses that could potentially explain these unique behaviors." (Authors)] Address: Laughlin, M.M., Northland College, USA: E-mail: laughm986@myemail.northland.edu

16871. Lee, D.J.; Gutbrod, M.; Ferreras, F.M.; Matthews, P.G. D. (2018): Changes in hemolymph total CO_2 content during the water-to-air respiratory transition of amphibiotic dragonflies. Journal of Experimental Biology 2018: jeb.181438 doi: 10.1242/jeb.181438: 9 pp. (in English) ["Anisoptera are amphibiotic; the nymph is aquatic and breathes water using a rectal gill before transitioning to the winged adult that breathes air through spiracles. While the evolutionary and developmental transition from water- to air-breathing is known to be associated with a dramatic rise in internal CO2 levels, the changes in blood-gas composition experienced by amphibiotic insects, which represent an ancestral air-to-water transition, are unknown. This study measured total CO_2 (TCO_2) in hemolymph collected from aquatic nymphs and air-breathing adults of Anax junius, Aeshna multicolor (Aeshnidae), Libellula quadrimaculata, and L. forensis (Libellulidae). Hemolymph PCO_2 was also measured in vivo in both Aeshnid nymphs and marbled crayfish (Procambarus fallax. f. virginalis) using a novel fiber-optic CO_2 sensor. The hemolymph TCO_2 of the pre- and early-final instar nymphs was found to be significantly lower than that of the air-breathing adults. However, the TCO_2 of the late-final instar Aeshnid nymphs was not significantly different from the air-breathing adult, despite the late-final nymph still breathing water. TCO_2 and PCO_2 were also significantly higher in the hemolymph of early-final Aeshnid nymphs compared to the water-breathing crayfish. Thus, while dragonfly nymphs show an increase in internal CO_2 as they transition from water to air, from an evolutionary standpoint, the nymph's ability to breathe water is associated with a comparatively minor decrease in hemolymph TCO_2 relative to the air-breathing adult.] Address: Lee, D.J., Dept of Zoology, Univ. of British Columbia, Vancouver, BC, V6T 1Z4, Canada. E-mail: pmatthews@zoology.ubc.ca

16872. Lee, D.-Y.; Lee, D.-S.; Bae, M.-J.; Hwang, S.-J.; Noh, S.-Y.; Moon, J.-S.; Park, Y.-S. (2018): Distribution patterns of odonate assemblages in relation to environmental variables in streams of South Korea. Insects 2018, 9(4), 152; https://doi.org/10.3390/insects9040152: 14 pp. (in English) ["Odonata species are sensitive to environmental changes, particularly those caused by humans, and provide valuable ecosystem services as intermediate predators in

food webs. We aimed: (i) to investigate the distribution patterns of Odonata in streams on a nationwide scale across South Korea; (ii) to evaluate the relationships between the distribution patterns of odonates and their environmental conditions; and (iii) to identify indicator species and the most significant environmental factors affecting their distributions. Samples were collected from 965 sampling sites in streams across South Korea. We also measured 34 environmental variables grouped into six categories: geography, meteorology, land use, substrate composition, hydrology, and physicochemistry. A total of 83 taxa belonging to 10 families of Odonata were recorded in the dataset. Among them, eight species displayed high abundances and incidences. Self-organizing map (SOM) classified sampling sites into seven clusters (A–G) which could be divided into two distinct groups (A–C and D–G) according to the similarities of their odonate assemblages. Clusters A–C were characterized by members of the suborder Anisoptera, whereas clusters D–G were characterized by the suborder Zygoptera. Non-metric multidimensional scaling (NMDS) identified forest (%), altitude, and cobble (%) in substrata as the most influential environmental factors determining odonate assemblage compositions. Our results emphasize the importance of habitat heterogeneity by demonstrating its effect on odonate assemblages." (Authors)] Address: Lee, D.-Y., Department of Biology, Kyung Hee University, Seoul 02447, Korea

16873. Leeb, E.; Hoffmann, F.; Holzinger, W.E. (2018): Ein neues Vorkommen der Zierlichen Moosjungfer (Leucorrhinia caudalis) in Österreich (Insecta: Odonata). Linzer biol. Beitr. 50/2: 1259-1265. (in German, with English summary) ["Saissersee and Kleiner See are two bog lakes near Velden/Wörthersee (Carinthia) in 600 m a.s.l. Their Odonata fauna was surveyed since the 1990-ies. 23 species could be found at the Saissersee, the Kleiner See hosts 8 species. From a nature conservation point of view, the most important species is Leucorrhinia caudalis, present in a small, but stable population. It is one of only two populations in Austria and the only one in the alpine biogeographic region. Furthermore, it is the highest-located reproduction site in Europe. The population of Epitheca bimaculata is also noteworthy, as it is the second record from Carinthia. The continuation of the (very sensitive) utilisation of the two lakes and their environs is essential to preserve the suitability as habitat for L. caudalis and E. bimaculata." (Authors)] Address: Leeb, Eva, Obermüllnerstraße 5 /33, 1020 Wien, Austria. E-Mail: eva.leeb@aon.at

16874. Lei, J.; Xiong, W.; Sui, X.-Y. (2018): Feeding habits of the Chinese minnow Rhynchocypris oxycephalus (Sauvage & Dabry de Thiersant, 1874) from the upper Yangtze River, China. Journal of Applied Ichthyology 34(3): 550-555. (in English) ["The feeding habits of the Chinese minnow, Rhynchocypris oxycephalus (Sauvage & Dabry de Thiersant, 1874), were investigated in the Laohegou River, a tributary of the upper Yangtze River, China. A total of 412 specimens were collected by electrofishing in four seasons of 2012, 7 days per season. Diet composition was analyzed according to season, size classes and sex. The Chinese minnow is a generalist omnivorous species, whose diet consists of aquatic insects and plants. Besides algae, Hemiptera, Ephemerida, Trichoptera, Odonata, Diptera were the most dominat food items. The Shannon-Wiener index on diet items showed no significant differences between major food items ($p > .05$) or between seasons, size classes and sexes. In contrast, fullness index and dietary breadth analysis both indicated significant diet changes between seasons. Consequently, this study provides information on feeding habits of R. oxycephalus, which may be useful in cultivation trials." (Authors)] Address: Sui, X.-Y., Laboratory of Biological Invasion and Adaptive Evolution, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, China. E-mail: xiaoyunsui@ihb.ac.cn

16875. Lesch, V.; Bouwman, H. (2018): Adult dragonflies are indicators of environmental metallic elements. Chemosphere 209: 654-665. (in English) ["Highlights: • 115 Adult dragonflies from 21 sites in South Africa analysed for metallic elements. • Species and sizes had no influence on concentrations, but habitat type did. • Mining was associated with higher concentrations of As and Pb at some sites. • Geographic distributions of concentrations indicated possible pollution sources. • Dragonflies would be good indicators of metallic elements. Abstract: Adult dragonflies (Insecta; Odonata) are aerial predatory arthropods that occur globally except in the polar regions. However, we know of no research on adult dragonflies as potential indicators of metallic elements in the environment or metallic element concentrations and relative contribution patterns between sites, species, size classes, habitat types, and relation to possible pollution sources. There is also no information available about adult dragonflies and their responses to toxic metals. However, metallic elements are toxic in elevated concentrations to all organisms. We predict that adult dragonflies would be suitable indicators of elemental concentrations. We analysed 105 adult male dragonflies from 21 sites in South Africa for 33 metallic elements including Hg, As, Pb, Cr, Cu, Cd, Ni, Se, Al, and Au. The results indicated that all species of dragonflies, regardless of body size, are suitable indicators. Furthermore, different aquatic habitat types did not affect the metallic element concentrations at the scale of this study. Dragonflies collected near wastewater treatment plants showed concentrations of certain elements such as Au higher than from elsewhere. Elements such as As and Pb were found at elevated concentrations (relative to the other sites) in dragonflies collected near mines. Dragonflies from sampling sites near potential pollution sources, but had seemingly isolated water sources, showed lower metallic element concentrations when compared with other sites. We conclude that adult dragonflies would be good indicators of environmental metallic elements." (Authors) Orthetrum caffrum; Brachythemis lacustris; Trithemís kirbyi; Trithemis arteriosa; Trithemis dorsalis; Palpopleura jucunda; Zosteraeschna minúscula; Nesciothemis farinosa; Brachythemis leucostica; Orthetrum chrysostigma; Sympetrum fonscolombíi; Crocothemis erythraea; Tramea limbata; Trithemis furva; Trithemís annulata] Address: Lesch,

Velesia, Research Unit: Environmental Sciences and Management, North-West University, Potchefstroom, South Africa. E-mail: velesialesch1@gmail.com

16876. Li, Q.; Zheng, M.; Pan, T.; Su, G. (2018): Experimental and numerical investigation on dragonfly wing and body motion during voluntary take-off. Scientific Reports 8, Article number: 1011 (2018): 16 pp. (in English) ["We present a detailed analysis of the voluntary take-off procedure of a dragonfly. The motions of the body and wings are recorded using two high-speed cameras at Beihang University. The experimental results show that the dragonfly becomes airborne after approximately one wingbeat and then leaves the ground. During this process, the maximum vertical acceleration could reach 20m/s². Evidence also shows that acceleration is generated only by the aerodynamic force induced by the flapping of wings. The dragonfly voluntary take-off procedure is divided into four phases with distinctive features. The variation in phase difference between the forewing and hindwing and angle of attack in the downstroke are calculated to explain the different features of the four phases. In terms of the key parameters of flapping, the phase difference increases from approximately 0 to 110 degrees; the angle of attack in down-stroke reaches the maximum at first and then decreases in the following take-off procedure. Due to experimental limitations, 2-D simulations are conducted using the immersed boundary method. The results indicate that the phase difference and the angle of attack are highly correlated with the unsteady fluid field around the dragonfly's wings and body, which determines the generation of aerodynamic forces." (Authors)] Address: Li, Q., National Key Laboratory of Science and Technology on Aero-Engine Aero-thermodynamics Collaborative Innovation Center of Advanced Aero-Engine, School of Energy and Power Engineering, Beihang University, Beijing, China

16877. Lösch, B.; Festi, A.; Nössing, T.; Winkler, F. (2018): Rote Liste der Libellen Südtirols (Insecta: Odonata). Gredleriana 18: 27-45. (in German, with English summary) ["A checklist and red list of the dragonflies and damselflies species of South Tyrol are presented. The red list categories were assigned on the basis of three separately specified indicators: frequency, population trend and habitat loss. Information about habitat preferences, vertical distribution and about a possible particular responsibility and the need for urgent intervention for each single species are provided. The odonatofauna of South Tyrol actually counts 60 species. Of the 58 evaluated species, 9 are extinct (RE) and 20 (34 %) endangered of which 12 are assigned to the categories VU, EN or CR and 8 to NT. 25 species (43 %) are considered of least concern (LC). The intensification of agriculture and urbanization turn out to be the main causes of threat. Other, somewhat less important factors are the abandonment of certain agricultural activities. Most endangered species are running water specialists or species of the ephemeral habitats of floodplains. Further important habitats for endangered dragonfly species include peat bogs." (Authors)] Address: Festi, A., Penegalstr. 7, 39100 Bozen, Italy. E-mail: alex.festi@rolmail.net

16878. Lonsdale, O.; Locke, M.M. (2018): Name-bearing type specimens in the Canadian National Collection of Insects, Arachnids & Nematodes (CNC): Blattodea, Dermaptera, Notoptera, Mecoptera, Megaloptera, Myriapoda, Neuroptera, Odonata, Orthoptera, Phthiraptera, Pseudoscorpiones, Psocoptera, Raphidioptera & Siphonaptera. Zootaxa 4526(2): 101-126. (in English) [Holotyps of Williamsonia fletcheri Williamson 1923 and Neurocordulia michaeli Brunelle, 2000 are documented.] Address: Lonsdale, O., Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario, K1A 0C6, Canada. E-mail: owen.lonsdale@canada.ca

16879. Lozano, F.; Rodrigues, M.E. (2018): Acanthagrion marinae sp. nov. (Zygoptera: Coenagrionidae): a new species of the apicale group. Anais da Academia Brasileira de Ciências 90(3): 2865-2872. (in English) ["Acanthagrion marinae sp. nov. (Holotype male: BRASIL, Mato Grosso do Sul, Campo Grande, UFMS, 20°29'56.26''S - 54°36'48.43''W, 547m, leg. M.E. Rodrigues, 03.ii.2015, collection code: VZYG437, MLP) is described and illustrated on the basis of 15 males. The new species belongs to the apicale species group by having horns on S10 and sclerotized hooks on tip of distal segment of the genital ligula. It can be easily distinguished from other species of the group by a combination of characters of the genital ligulae (presence of setae on segment two; absence of setae at flexure; distal lateral lobes of segment three absent). Notes on habitat and a modification of previous keys for the species of the apicale group are provided." (Authors)] Address: Lozano, F., Laboratorio de Biodiversidad y Genética Ambiental/BioGeA, Universidad Nacional de Avellaneda, Mario Bravo 1460 esq. Isleta, 1870 Piñeyro, Buenos Aires, Argentina

16880. Luck, J.C. (2018): Discovery of new populations of Libellula fulva Muller (Scarce Chaser) in East Sussex. J. Br. Dragonfly Society 34(2): 61-78. (in English) ["Although Libellula fulva, Scarce Chaser, is known to have established populations on the two main West Sussex rivers the Arun and the Adur, it was thought to be absent in East Sussex. With sightings on both the Cuckmere and Ouse rivers in 2006, it was decided to conduct surveys on both rivers to establish the extent of the populations. This was carried out by the author for the first three years and, for the following three years, with the assistance of a team of helpers. Libellula fulva was shown to be present on the Cuckmere River from the White Horse (TQ514007) upstream to Michelham Priory (TQ565099), and on the River Ouse from Hamsey Weir (TQ415127) upstream to Sutton Hall Weir (TQ440187), as well as on some of the tributaries of the River Ouse. Whereas, uniquely, the abdomen of a male L. fulva displays clear evidence of mating, it does not, of course, reveal the location. To resolve this, various methods were deployed using larval survey, exuviae search and field observations. It was determined that the species has a preference for breeding in slow moving or still areas of water. This held true even where the male may be holding territory

on faster, moving stretches of river. Copulation was observed on several occasions, supporting this theory, but rarely observed ovipositing was only seen on one occasion." (Author)] Address: Luck, J.C., 4 Mill View, Ringmer, Lewes, East Sussex, BN8 5EP, UK

16881. Makbun, N.; Fleck, G. (2018): Description of Microgomphus farrelli sp. nov. (Odonata: Anisoptera: Gomphidae) based on adults of both sexes and larvae from Northern Thailand. Zootaxa 4422(3): 442-450. (in English) ["The new gomphid species, Microgomphus farrelli sp. nov., is described and illustrated on the basis of male and female adult specimens and larvae collected from Chiang Mai and Mae Hong Son province, Northern Thailand. It is compared with other species of the genus. Based on the larvae this species is most closely related to Microgomphus svihleri (Asahina, 1970), comb. nov., which is the senior and valid synonym of Microgomphus thailandicus Asahina, 1981, syn. nov." (Authors)] Address: Makbun, N., 1211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

16882. Mallard, F. (2018): Présentation des indicateurs biologiques des effets du changement climatique sur la biodiversité en région Nouvelle-Aquitaine: les espèces sentinelles du climat. Bull. Soc. Linn. Bordeaux 153, nouv. série n° 46(2-4): 341-358. (in French, with English summary) ["Presentation of biological indicators of the effects of climate change on biodiversity in the New Aquitaine region (South West, France): the climate sentinel species: Understanding the local effects of climate change on biodiversity is essential to guide environmental and management policies for natural areas. The lack of knowledge at the regional level has led to the development of a research program "Climate sentinels". The main hypothesis of the program is that effects on biodiversity are particularly detectable in species that have low movement abilities. These "climate sentinel" species would be the first to respond to local climatic variations by adaptation or local extinction. From the territory of New Aquitaine (France), 20 biological indicators of climate change in different ecosystems (dune, dry, wet, mountain and forest) were chosen: plants communities of ecosystems, insects (butterflies, dragonflies, bumblebees), amphibians (Rana pyrenaica, Hyla molleri, H. arborea), reptiles (Iberolacerta bonnali, Timon lepidus, Zootoca vivipara, Emys orbicularis, Vipera berus) and mammals (Marmota marmota, micromammals). This paper presents the method of development of these indicators and the research hypotheses associated with climate sentinel species." (Author)] Address: Mallard, Fanny, Association Cistude Nature, Chemin du Moulinat, F - 33185 Le Haillan, France. E-mail: fanny.mallard@cistude.org

16883. Marinov, M. (2018): In memoriam Richard Seidenbusch (1944-2020). Odonatologica 47(3/4): 1-14. (in English) ["Personal recollections and anecdotes of a friendship that lasted almost 30 years are given. The full odonatological bibliography of Richard Seidenbusch is appended." (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigator Plant Health Team, Ministry for Primary Industries, 8053 Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

16884. Márquez-Rodríguez, J.; López-Márquez, M. (2018): New record of Calopteryx xanthostoma (Charpentier, 1825) in Ourense, northwest of Spain (Odonata: Calopterygidae). Arquivos Entomolóxicos 19: 163-165. (in English, with Spanish summary) ["A new record of the damselfly Calopteryx xanthostoma (Charpentier, 1825) (Odonata: Calopterygidae) in the province of Ourense (Spain) is provided. A photographic record of the species observed at the end of summer is attached: 1 male, Miño River, Ourense, Spain. 42°21'5"N 7°54'40"W. 20 August 2018, 16:30 h." (Authors)] Address: Márquez-Rodríguez, J., Zoología. Departamento de Sistemas Físicos, Químicos y Naturales - Facultad de Ciencias Experimentales. Universidad Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. E-mail: E-mail: jmarrod1@upo.es

16885. Marthelot, J.; Dupuis, T.; Brun, P.-T. (2018): K57.00011: Dragonfly-inspired deployable structures: how to inflate and stay flat? Bulletin of the American Physical Society, APS March Meeting 2019, Monday–Friday, March 4–8, 2019; Boston, Massachusetts, Session K57: The Extreme Mechanics of Balloons, 8:00 AM–11:00 AM, Wednesday, March 6, 2019: (in English) [Verbatim: Programming the final shape of a soft inflatable structure is a nontrivial challenge. Such a task is routinely accomplished in nature, for example when the wing of an emerging dragonfly deploys over just a couple of minutes. This expansion is guided by a network of veins where hemolymph is injected and subsequently solidifies to generate rigidity. Inspired by dragonflies, we build a model experiment to investigate inflatable deployable structures composed of a tubular network of the veins. We first mimic differential growth to fabricate wrinkled tubular structures. They comprise a soft annular core surmounted by a stiffer and thinner annulus prepared so as to yield a wrinkling instability. We then study the mechanical response of a single wrinkled tubular structure under pressure. We then characterize the in-plane expansion of the structure and study its correlation to the network geometry and the pressure applied to the system. A systematic variation of the geometric and elastic parameters allows us to search for optimal design and operational conditions for a maximal extension while minimizing the input pressure.] Address: not stated.