Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

Editor:

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

Published in Zerf, Germany

ISSN 1438-0269

2018

16888. Martin, A.E.; Graham, S.L.; Henry, M.; Pervin, E.; Fahrig, L. (2018): Flying insect abundance declines with increasing road traffic. Insect Conservation and Diversity 11(6): 608-613. (in English) ["1. One potentially important but underappreciated threat to insects is road mortality. Road kill studies clearly show that insects are killed on roads, leading to the hypothesis that road mortality causes declines in local insect population sizes. 2. In this study we used custom-made sticky traps attached to a vehicle to target diurnal flying insects that interact with roads, sampling along 10 high-traffic and 10 low-traffic rural roads in southeastern Ontario, Canada. We used a paired sampling design to control for potentially confounding differences in the road characteristics (e.g. road width) and surrounding land covers (e.g. housing density) between high-traffic and low-traffic roads. We then used these data to test the prediction that fewer flying insects collide with vehicles, per vehicle (i.e. insect abundance is lower), on high-traffic than low-traffic roads. 3. We found significantly fewer insects at the high-traffic roads than at the low-traffic roads as predicted. There was a 23.5% decline in the number of insects/km/vehicle on high-traffic relative to low-traffic roads. 4. Given the high rates of insect mortality observed in previous studies, it is likely that road mortality contributes to these observed negative effects of traffic intensity. Thus the growing global road network is a concern for conservationists and land managers, not only because insect population declines contribute to the ongoing global losses of biodiversity but also because insects play a vital role in food webs and provide important ecosystem services." (Authors)] Address: Martin, Amanda, Rideau Valley Wildlife Sanctuary, P.O. Box 266, North Gower, ON, Canada. E-mail: amanda.martin@canada.ca

16889. McCauley, S.J.; Hammond, J.I.; Mabry, K.E. (2018): Simulated climate change increases larval mortality, alters phenology, and affects flight morphology of a dragonfly. Ecosphere 9(3): 14 pp. (in English) ["For organisms with complex life cycles, climate change can have both direct effects and indirect effects that are mediated through plastic responses to temperature and that carry over beyond the developmental environment. We examined multiple responses to environmental warming in a dragonfly, a species whose life history bridges aquatic and terrestrial environments. We tested larval survival under warming and whether warmer conditions can create carry-over effects between life history stages. Rearing dragonfly larvae in an experimental warming array to simulate increases in temperature, we contrasted the effects of the current thermal environment with temperatures +2.5° and +5°C above ambient, temperatures predicted for 50 and 100 yr in the future for the study region. Aquatic mesocosms were stocked with dragonfly larvae (Erythemis collocata), and we followed survival of larvae to adult emergence. We also measured the effects of warming on the timing of the life history transition to the adult stage, body size of adults, and the relative size of their wings, an aspect of morphology key to flight performance. There was a trend toward reduced larval survival with increasing temperature. Warming strongly affected the phenology of adult emergence, advancing emergence by up to a month compared with ambient conditions. Additionally, our warmest conditions increased variation in the timing of adult emergence compared with cooler conditions. The increased variation with warming arose from an extended emergence season with fewer individuals emerging at any one time. Altered emergence patterns such as we observed are likely to place individuals emerging outside the typical season at greater risk from early and late season storms and will reduce effective population sizes during the breeding season. Contrary to expectations for ectotherms, body size was unaffected by warming. However, morphology was affected: at +5°C, dragonflies emerging from mesocosms had relatively smaller wings. This provides some of the first evidence that the effects of climate change on animals during their growth can have carry-over effects in morphology that will affect performance of later life history stages. In dragonflies, relatively smaller wings are associated with reduced flight performance, creating a link between larval thermal conditions and adult dispersal capacity." (Authors)] Address: McCauley, Shannon, Department of Biology, University of Toronto Mississauga, 3359 Mississauga Road, Mississauga, Ontario L5L 1C6 Canada. E-mail: shannon.mccauley@utoronto.ca

16890. Mearns, B. (2018): First record of Orthetrum ransonnetii in the Canary Islands (Odonata: Libellulidae). Odonatologica 47(3/4): 213-218. (in English) ["An immature male O. ransonnetii was recorded in Barranco de Rio Cabras, on Fuerteventura, on 16-ii-2018. It is the first record of the species in the Canary Islands and in entire Macaronesia, making it also the first record for Spain and entire Europe." (Author)] Address: Mearns, Barbara, Connansknowe, Kirkton, Dumfries, DG1 1SX, UK. E-mail: barbaracmearns@gmail.com

16891. Medina, M.N.D.; Cabras, A.A. (2018): Assessment of Odonata and Lepidoptera fauna of the University of Mindanao Matina, Davao City, Philippines. Univ. of Min. Intl. Mult. Disc. Res. Jour. 3(1): 6 pp. (in English) ["Under the umbrella of the “Biodiversity assessment of the University of Mindanao (UM), Matina Campus” a rapid assessment of Odonata and Lepidoptera fauna was conducted between October 2016 and November, 2017. Opportunistic sampling and photo-documentation was conducted in three sampling areas: grassland, mini forest, and open landscapes near the college buildings. Nine species of Odonata were documented where the miniforest has the highest species richness and open landscapes near the buildings have the poorest. One Philippine endemic Odonata species Ceriagrion lieftincki was found inhabiting the fluvial systems near the grassland. At present, this endemic species is considered least concern with stable population in the wild. … The minimal number of Odonata and Lepidoptera within the campus can be attributed to its severely disturbed fluvial systems limiting the survival of endemic species paving the way to more tolerant oriental species. The low species richness of Lepidoptera can be attributed to the low diversity of angiosperms in the campus serving as their host and food plants. The present microhabitat within UM Matina campus is not suitable haven for endemics." (Authors)] Address: Medina, M.N.D., Research and Publication Center, Univ. of Mindanao, Davao City Philippines. E-mail: mnd_medina@umindanao.edu.ph

16892. Mendes, T.P.; Luiza-Andrade, A.; Cabette, H.S.R.; Juen, L. (2018): How does environmental variation affect the distribution of dragonfly larvae (Odonata) in the Amazon-Cerrado transition zone in Central Brazil? Neotropical Entomology 47(1): 37-45. (in English) ["This study investigated the effects of environmental variation on assemblages of dragonfly larvae (Odonata). We hypothesize that there is a significant correlation between species richness, species composition, and abundance of Odonata individuals, and habitat integrity and abiotic variables. To test this hypothesis, we sampled odonate larvae at 12 streams in the Suiá-Miçú River basin in Mato Grosso, Brazil, during three different periods of the year. Local physical and chemical variables (temperature, pH, turbidity, electrical conductivity (EC), dissolved oxygen (DO), total dissolved solids (TDS), and oxidation reduction potential (ORP)) were measured at each site using a multi-parameter probe, and integrity was assessed using the Habitat Integrity Index (HII). The variation in richness, abundance, and composition of Odonata species was related to the environmental variables analyzed, primarily by the abiotic factors pH, electrical conductivity, dissolved oxygen, total dissolved solids, and oxidation reduction potential. Our hypothesis was corroborated for the suborder Anisoptera, which showed a significant relationship with these variables, whereas Zygoptera was only related to pH. Our results show the importance of physical and chemical conditions in ecological studies using Odonata larvae as tools for the management and conservation of freshwater ecosystems." (Authors)] Address: Mendes, T.P., Graduate Program in Zoology – PPGZOO, Univ Federal do Pará – UFPA e Museu Paraense Emílio Goeldi – MPEG, Belém, Brasil

16893. Menon, V. (2018): Dynamical modelling for a dragonfly Micro Aerial Vehicle. M.Sc. thesis, University of Toronto Institute for Aerospace Studies: XI, 117 pp. (in English) ["Researchers are developing ever smaller aircraft called Micro Aerial Vehicles (MAVs). The Space Robotics Group has joined the eld by developing a dragon y-inspired MAV. This thesis presents two contributions to this project. The rst is the development of a dynamical model of the internal MAV components to be used for tuning design parameters and as a future plant model. This model is derived using the Lagrangian method and di ers from others because it accounts for the internal dynamics of the system. The second contribution of this thesis is an estimation algorithm that can be used to determine prototype performance and verify the dynamical model from the rst part. Based on the Gauss-Newton Batch Estimator, this algorithm uses a single camera and known points of interest on the wing to estimate the wing kinematic angles. Unlike other single-camera methods, this method is probabilistically based rather than being geometric." (Authors)] Address: not stated

16894. Mezquita-Aranburu, I. (2018): Catálogo provisional de los odonatos (Insecta, Odonata) de la ZEC Txingudi-Bidasoa (Gipuzkoa, País Vasco, España). Provisional Catalogue of Odonates in the Txingudi-Bidasoa Special Area of Conservation (Gipuzkoa, Basque Country, Spain). Munibe 66: 203-217. (in Spanish, with English and Basque summary) ["The present article sets out to compile a provisional catalogue of the odonates present in the Txingudi-Bidasoa SAC, which belongs to the Natura 2000 network, based on data collected between 2007 and 2017, as well as a bibliographical review of the previous references. The catalogue includes the 27 species of odonates observed up to 2017 (12 Zygoptera and 15 Anisoptera). We should like to point out that the aforementioned catalogue is provisional, given that it is likely that a number of new species have yet to be discovered." (Author)] Address: Mezquita-Aranburu, I., Sociedad de Ciencias Aranzadi, Depto de Entomología, Paseo de Zorroaga 11, 20004 Donostia-San Sebastián, Spain. E-mail: mezquitaaranburu@gmail.com

16895. Mill, P.J. (2018): The role of the abdomen of anisopteran larvae in respiration, locomotion and prey capture: A review — 2: Mechanics and neural control. J. Br. Dragonfly Society 34(1): 31-60. (in English) ["The dorso-ventral movements of the floor of the larval abdomen produce pressure changes in the body cavity that are used for ventilation of the gills in the branchial chamber, for jet-propulsive swimming

and for labial mask extension (prey capture). The various mechanisms and their neural control are reviewed. The techniques employed for the mechanical and physiological studies are outlined. The review is preceded by a description of the types of nerve cell (neuron) and how they convey information. Details of the mechanics and physiology have been obtained mostly from aeshnid larvae except in the case of labial mask extension." (Author)] Address: Mill, P.J., School of Biology, Univ. Leeds, Leeds, LS2 9JT, UK

16896. Miralles-Núñez, A.; Díaz-Martínez, C.; Díaz, A. (2018): Primeros registros de Sympetrum sanguineum (Müller, 1764) (Odonata: Libellulidae) en Granada y revisión de su distribución en Andalucía (España). Boletín Rola 12: 5-12. (in Spanish, With English summary) ["S. sanguineum is reported for the first time from the province of Granada after 34 years without any confirmed record in Andalusia. A critical review of all published records in this area is therein presented." (Authors)] Address: Díaz, Adrià, (Oxygastra-GEOC) Institució Catalana d'Història Natural, Carrer del Carme 47 - 08001 Barcelona, Spain. E-mail: amiralles10@gmail.com

16897. Miralles-Núñez, A.; Cabana Otero, M.; Arriadam M.T. (2018): Primera cita y confirmación de la reproducción de Cordulegaster bidentata Selys, 1843 (Odonata: Cordulegastridae) en la Comunidad Foral de Navarra (España). Boletín de la S.E. A. 62: 287-289. (in Spanish, with English summary) [C. bidentata is recorded for the first time in the Chartered Community of Navarra and the reproduction is confirmed. This record is the western limit of the species worldwide." (Authors)] Address: Miralles-Núñez, A., Grup d'Estudi dels Odonats de Catalunya (Oxygastra-GEOC), Institució Catalana d'Història Natural, Carrer del Carme 47, 08001. Barcelona, Spain. amiralles10@gmail.com

16898. Miroglu, A. (2018): Intraspecific variations in the ivory featherleg Platycnemis dealbata (Insecta: Odonata) from Turkey. Applied ecology and environmental research 16(3): 2213-2218. (in English) ["Intraspecific variations can be observed in many types of animal species in Turkey due to the geographical and ecological characteristics of the region. The aim of this research is to study the P. dealbata populations in Turkey and to survey how the Anatolian Diagonal affects them. The P. dealbata specimens were collected from Kahramanmaraþ and Igdir Provinces of Turkey in 2010, 2012, 2015, and 2017. Variations were found between these two populations. The variations seen in the P. dealbata populations were examined and demonstrated with illustrations." (Authors)] Address: Miroglu, A., Fatsa Fac. of Marine Sci., Ordu Univ., Fatsa-Ordu, Turkey. E-mail: alimiroglu@gmail.com

16899. Miroglu, A.; Demiratas, S. (2018): Ecological niche modeling of Calopteryx splendens (Harris, 1782) (Insecta: Odonata) subspecies in Turkey. Süleyman Demirel University, Journal of Natural and Applied Sciences 21(3): 935-941. (in Turkish, with English summary) ["Turkey is an important region in terms of biodiversity because of its geographical location, topographical structure and the presence of various climate types. The emergence of new species and subpopulations can be seen. In this study, we evaluated subspecies of C. splendens distributed in Turkey. 19 ecological parameters of the current known localities of these subspecies were analyzed. The potential habitats and new locations for the subspecies populations were investigated. Current distribution maps of C. splendens subspecies have been made using MaxEnt ecological niche modeling methods. According to these results, it was found that the distribution areas of C. splendens subspecies, whose distributions according to faunistic data are known, almost overlapped with the distribution areas of ecological data." (Authors)] Address: Miroglu, A., Fatsa Fac. of Marine Sci., Ordu Univ., Fatsa-Ordu, Turkey. E-mail: alimiroglu@gmail.com

16900. Mitchell, W. (2018): Seasonality of odonate-mediated methylmercury flux. Honors thesis, Dept of Biology, Texas Christian Univ., Fort Worth, Texas: 13 pp. (in English) ["Methylmercury (MeHg) is an aquatic contaminant that can be transferred to terrestrial predators by emergent aquatic insects such as odonates. We observed the effects of season on odonate-mediated MeHg flux (calculated as emergent odonate biomass × MeHg concentration) in 20 experimental ponds and the potential risk to nestling Red-winged Blackbirds (Agelaius phoeniceus) posed by consuming MeHg-contaminated odonates. Emergent odonates were collected weekly from ponds using emergence platforms from February to October 2017. The MeHg flux from damselflies, aeshnids, and libellulids began in March and peaked in May, June, and July, respectively, and then declined throughout the rest of the summer. Nesting of Red-winged Blackbirds overlapped with peak odonate emergence and odonate-mediated MeHg flux, suggesting that MeHg-contaminated odonates may pose a health risk to nestling Red-winged Blackbirds." (Author)] Address: not stated

16901. Mitra, B.; Shah, S.K.; Mishra, P. (2018): Insect Fauna associated with the Tea Ecosystem of North Bengal, India. Records of the Zoological Survey of India 118(2): 178-193. (in English) ["Present communication reports 167 species belonging to 139 genera of 42 families under 6 orders of insects from the tea gardens of North Bengal. Of them, Lepidoptera shares maximum number of species (77), followed by Hemiptera (29), Diptera (24), Coleoptera (19), Odonata (12) and Orthoptera (6). … 1 species of Diptera and Odonata are found as predators of tea pest. … (Authors)] Address: Zoological Survey of India, H.Q. Office, M- Block, New Alipore, Kolkata – 700053, West Bengal, India

16902. Mochon, A.; Savard, M. (2018): Sur les traces de l'épithèque de Provancher au mont Yamaska (Odonata: Corduliidae: Neurocordulia yamaskanensis). Le Naturaliste canadien 142(3): 10-21. (in French, with English summary) ["N. yamaskanensis was the subject of an investigation in 2017 at the foot of Mount Yamaska, in the slow and winding course of the Black River, located in Saint-Pie, Montérégie. This is the type locality of the species, discovered more than 140 years ago by Reverend Léon Provancher, and which had not been explored since at the odonatological level. The collect of exuviae and crepuscular observations of adults have shown that a population of the species is still present in the Mount Yamaska area.

This discreet dragonfly, rarely seen in Québec, usually goes unnoticed because of its crepuscular behavior. This return to the origins of Provancher's discovery in 1875 is a nod to his lasting work, which continues through his magazine Le Naturaliste canadien, which in 2018 marks its 150th anniversary." (Authors)] Address: Alain Mochon: mochon.alain@sepaq.com

16903. Mokaria, K.; Jethva, B. (2018): Diversity, local distribution and occurrence of dragonflies and damselflies (Odonata: Insecta) In Nalsarovar Bird Sanctuary (Ramsar Site), Gujarat. International Journal of Scientific and Research Publications 8(1): 61-73. (in English) ["Nalsarovar is an important wetland in terms of its multiple categories designated such as a Birds Sanctuary, Important Bird and Biodiversity Area, a Ramsar Site of Gujarat State. Total area of Nalsarovar Bird Sanctuary (NBS) area is 120 km². A study was carried out from February 2015 to February 2017 at Nalsarovar Bird Sanctuary. A species inventory was carried out by Visual Encounter Survey (VES). 14 sites were fixed using GPS for the survey. Survey was carried out including all seasons and covering all major habitats. Adult Odonata encountered were recorded. During the entire survey total 30 species of odonates were encountered that belonged to Libellulidae, Gomphidae, Aeshnidae, Coenagrionidae and Lestidae. Total 37 odonate species were encountered depended especially Nalsarovar Bird Sanctuary area combining the past recorded species and species encountered in current research study. Among species encountered during study almost all species belong to Least Concern (LC) category whereas Indothemis carnatica (Fabricius, 1798) is listed under Near Threatened (NT) category under IUCN category. During entire study 14 species of odonates were encountered at all sites whereas variations in distribution of 16 Odonate species were encountered at specific sites." (Authors)] Address: Mokaria, K., Dept of Science, The Mahatma Jyotirao Phoole University, Jaipur, Rajasthan, India. Email: kala303@gmail.com

16904. Monasterio León, Y.; Escobés Jiménez, R. (2018): Sympetrum fonscolombii (Selys, 1840) y Anax imperator Leach, 1815 en la isla de El Hierro, Islas Canarias (Odonata). Boln. S.E.A. 63: 336. (in Spanish, with English summary) ["The first record of S. fonscolombii is reported from El Hierro, and the presence of A. imperator on the island is confirmed, raising to four the odonate species known from this island." (Authors)] Address: Monasterio León, Y., Asociación Española Para la Protección de las Mariposas y su Medio (ZERYNTHIA). www.asociacion-zerynthia.org

16905. Montoya Jiménez, M.; Sanz Sanz, T.; Montoya Amador, R.; Pomeda Maestre, M.Á.; Arriola González, J.Á. (2018): Primera cita de Trithemis kirbyi Selys, 1891 (Odonata: Libellulidae) en la provincia de León (Castilla y León, norte de España). Boletín de la Sociedad Entomológica Aragonesa 63: 349-350. (in Spanish, with English summary) [The first record in the province of Leon of T. kirbyi is provided, being the fourth province in Castilla y León with records of this species.] Address: Montoya Jiménez, M., C/ Alto de la calle, 5 24885 Prioro, León, Spain. E-mail: marioprioro@yahoo.es

16906. Moore, M.P.; Lis, C.; Martin, R.A. (2018): Immune deployment increases larval vulnerability to predators and inhibits adult life-history traits in a dragonfly. Evolutionary Biology 31(9): 1365-1376. (in English) ["While deploying immune defenses early in ontogeny can trade-off with the production and maintenance of other important traits across the entire life cycle, it remains largely unexplored how features of the environment shape the magnitude or presence of these lifetime costs. Greater predation risk during the juvenile stage may particularly influence such costs by 1) magnifying the survival costs that arise from any handicap of juvenile avoidance traits and/or 2) intensifying allocation trade-offs with important adult traits. Here, we tested for predator-dependent costs of immune deployment within and across life stages using the dragonfly, Pachydiplax longipennis. We first examined how larval immune deployment affected two traits associated with larval vulnerability to predators: escape distance and foraging under predation risk. Larvae that were induced to mount an immune response had shorter escape distances but lower foraging activity in the presence of predator cues. We also induced immune responses in larvae and reared them through emergence in mesocosms that differed in the presence of large predatory dragonfly larvae (Aeshnidae spp.). Immune-challenged larvae had later emergence overall and lower survival in pools with predators. Immune-challenged males were also smaller at emergence and developed less sexually selected melanin wing coloration, but these effects were independent of predator treatment. Overall, these results highlight how mounting an immune defense early in ontogeny can have substantial ecological and physiological costs that manifest both within and across life stages." (Authors)] Address: Moore, P.M., Dept of Biology, Case Western Reserve Univ., Cleveland, Ohio, USA. E-mail: mpm116@case.edu

16907. Moore, P.M.; Lis, C., Martin, R.A. (2018): Larval body condition regulates predator-induced life-history variation in a dragonfly. Ecology 99(1): 224-230. (in English) ["Organisms with complex life cycles commonly exhibit adaptive plasticity in the timing of transitions between life stages. While the threat of predation is predicted to induce earlier transitions, empirical support has been equivocal. When predation risk affects both the propensity to transition to the next life stage and the ability to reach the energetic thresholds necessary to complete the transition, only those individuals in the best physiological condition may be able to accelerate development and emerge earlier. To test this hypothesis, we followed uniquely marked dragonfly larvae (Pachydiplax longipennis) through emergence in pools where we factorially manipulated the presence of a large heterospecific predator (Anax junius) and cannibalism risk via conspecific size variation. Consistent with our hypothesis, high-condition larvae were more likely to emerge in the presence of the heterospecific predator than in its absence, and low-condition larvae were more likely to emerge in its absence than in its presence. Moreover, high-condition larvae emerged earlier when cannibalism risk was high than when it was low. Predation risk therefore has condition-dependent effects on emergence. As predation risk frequently affects resource accumulation, similar mechanisms across

taxa could commonly underlie the incongruence between empirical results and theoretical expectations for predator-induced life-history variation." (Authors)] Address: Moore, P.M., Dept of Biology, Case Western Reserve University, Cleveland, Ohio, USA. E-mail: mpm116@case.edu

16908. Moro Niño, J.-L.; Álvarez Fidalgo, M. (2018): Primera cita de Onychogomphus costae Selys, 1885, en la provincia de Valladolid y en Castilla y León (centro-norte de España) (Odonata: Gomphidae) - First record of Onychogomphus costae Selys, 1885 in the province of Valladolid and in Castile and León (Central-northern Spain) (Odonata: Gomphidae). BVnPC 7(94): 80-86.["In this note the first record of Onychogomphus costae Selys, 1885 in the province of Valladolid, community of Castile and León, is presented. In addition, the knowledge about the flight period of the species in Spain is updated." (Authors) 11-VII-2016, Valbuena de Duero (longitud: 41.643, latitud: -4.304, altitud: 735 msnm; cuadrícula 10 km × 10 km: 30TUM91)] Address: Moro Niño, J.L., Usuario de BiodiversidadVirtual.org – Valladolid, Castilla y León, Spain. E-mail: jluismoro1@gmail.com

16909. Moroz, M.D. (2018): The aquatic insects of the Zapadnaya Dvina river tributaries, Belarus. Eurasian Journal of Entomology 17(3): 201-211. (in Russian, with English summary) ["151 species from 9 orders of the aquatic insect fauna in the main tributaries of Zapadnaya Dvina river, Belarus, are registered, namely: … Odonata — 18; … High abundance of rheophil species indicates a fairly good quality of water in the studied watercourses. …" (Author)] Address: Moroz, M.D., State scientific & production amalgamation «The scientific and practical center of the National Academy of Science of Belarus for bioresources», Academicheskaya 27, Minsk 220072 Belarus. E-mail: mdmoroz@bk.ru

16910. Müller, R.; Eggers, T.O. (2018): Weiterer Fundort von Boyeria irene in Niedersachsen (Odonata: Aeshnidae). Libellula 37(3/4): 187-191. (in German, with English summary) ["Further record of B. irene in Lower Saxony, Germany - In the river Wietze, a Southern tributary of the river Aller, a larva of Boyeria irene was found on the 1st of May 2018. The record based on a macroinvertebrate sample within the regular Water Framework Directive Monitoring. Our record proves the expected further dispersion of the species." (Authors)] Address: Müller, R., Planungsbüro Hydrobiologie, Augustastr. 2, 12203 Berlin, Germany. E-mail: info@hydrobiologie.com

16911. Mujumdar, N.; Thakuria, D.; Halali, D.; Koparde, P. (2018): Observations on underwater oviposition in Pseudagrion indicum Fraser (Odonata: Coenagrionidae): an endemic species from the Western Ghats. Halteres 9: 39-44. (in English) ["Opportunistic records from two localities in Northern and Southern Western Ghats highlight the lack of data on breeding biology of these odonates. Observations presented here throw light on the need for documentation of breeding season of these species, which appears to be the post-monsoon season for P. indicum. Our work concludes that more emphasis should be given on ecological studies of these insects, especially endemic species that can provide valuable inputs in designing conservation strategies for potential areas." (Authors)] Address: Mujumdar, Neha, Bombay Natural History Society, Shaheed Bhagat Singh Road, Colaba, Mumbai - 400001, Maharashtra, India. Eail: nehadm02@gmail.com

16912. Nakanishi, K.; Yokomizo, H.; Hayashi, T.I. (2018): Were the sharp declines of dragonfly populations in the 1990s in Japan caused by fipronil and imidacloprid? An analysis of Hill's causality for the case of Sympetrum frequens. Environmental Science and Pollution Research 25(35): 35352-35364. (in English) ["Neonicotinoids and fipronil are the most widely used insecticides in the world. Previous studies showed that these compounds have high toxicity to a wide taxonomic range of non-target invertebrates. In rice cultivation, they are frequently used for nursery-box treatment of rice seedlings. The use of fipronil and neonicotinoid imidacloprid is suspected to be the main cause of population declines of red dragonflies, in particular S. frequens, because they have high lethal toxicity to dragonfly nymphs and the timing of the insecticides' introduction in Japan (i.e., the late 1990s) overlapped with the sharp population declines. However, a causal link between application of these insecticides and population declines of the dragonflies remains unclear. Therefore, we estimated the amount of the insecticides applied for nursery-box treatment of rice seedlings and analyzed currently available information to evaluate the causality between fipronil and imidacloprid usage and population decline of S. frequens using Hill's causality criteria. Based on our scoring of Hill's nine criteria, the strongest lines of evidence were strength, plausibility, and coherence, whereas the weakest were temporality and biological gradient. We conclude that the use of these insecticides, particularly fipronil, was a major cause of the declines of S. frequens in Japan in the 1990s, with a high degree of certainty. The existing information and our analyses, however, do not allow us to exclude the possibility that some agronomic practices (e.g., midsummer drainage or crop rotation) that can severely limit the survival of aquatic nymphs also played a role in the dragonfly's decline." (Authors) imidacloprid = Neonikotinoid] Address: Hayashi, T.I., 1. National Institute for Environmental Studies, Ibaraki, Japan

16913. Nautiyal, P. (2018): Diet components, dietary habits, resource and its use in the coexisting catfish species. J. Inland Fish. Soc. India, 50(1): 9-20. (in English) ["In over last six decades fisheries of the Ganga river System in general and the Ganga R. in particular have witnessed a radical change in dominance from the carp to catfish and now to invasive exotic species. Has this happened due modified river environment (natural flows, pollution) or have the species modified the food-web of the river is an issue that should be addressed in deep earnest intent. Among many facets that need to be answered, we should know the food resources base available in the river environment, preferences of fish species, if it is selective and the extent of overlap among the sympatric and co-existing species. The present investigation precisely examines this for the co-existing catfish species, Rita rita and Bagarius bagarius. R. rita feeds with greater intensity than B. bagarius. In R. rita intensity was high in pre-

monsoon (January to May) compared to B. bagarius where intensity was higher in post monsoon (October to December). R. rita showed +ve preference for chironomid-Diptera and variety of Trichoptera among insects.Others include crustaceans and gastropod molluscs. In contrast B. bagarius shows preferences for a consortium of Diptera (Simuliidae), Trichoptera (Glossosomatidae), Ephemeroptera (Heptageniidae), Coleoptera and Odonata among insect food. It has high preference for fish elements. Both species select these items. There is a biologically significant diet overlap but these species avoid competition not only by selecting different items from the common food resource base but also by seasonal variation in feeding intensity. Such studies need to be extended to fish within and among feeding guilds." (Author)] Address: Nautiyal, P., Dept of Zoology & Biotechnology, H.N.B. Garhwal Univ., Srinagar 246174, Uttarakhand, India. E-mail: pn.mahseer@gmail.com

16914. Nel, A.; Prokop, J.; Pecharová, M.; Engel, M.S.; Garrouste, R. (2018): Palaeozoic giant dragonflies were hawker predators. Scientific Reports 8:12141 | DOI:10.1038/s415-98-018-30629-w: 5 pp. (in English) ["The largest insects to have ever lived were the giant meganeurids of the Late Palaeozoic, ancient stem relatives of our modern dragonflies. With wingspans up to 71 cm, these iconic insects have been the subject of varied documentaries on Palaeozoic life, depicting them as patrolling for prey through coal swamp forests amid giant lycopsids, and cordaites. Such reconstructions are speculative as few definitive details of giant dragonfly biology are known. Most specimens of giant dragonflies are known from wings or isolated elements, but Meganeurites gracilipes preserves critical body structures, most notably those of the head. Here we show that it is unlikely it thrived in densely forested environments where its elongate wings would have become easily damaged. Instead, the species lived in more open habitats and possessed greatly enlarged compound eyes. These were dorsally hypertrophied, a specialization for long-distance vision above the animal in flight, a trait convergent with modern hawker dragonflies. Sturdy mandibles with acute teeth, strong spines on tibiae and tarsi, and a pronounced thoracic skewness are identical to those specializations used by dragonflies in capturing prey while in flight. The Palaeozoic Odonatoptera thus exhibited considerable morphological specializations associated with behaviours attributable to 'hawkers' or 'perchers' among extant Odonata." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

16915. Nichols, J. (2018): An assessment of Odonata abundance and impacts from urbanization in La Crosse County, WI. Undergraduate Thesis, Environmental Science: Conservation and Ecology, Carthage College, Kenosha, Wisconsin: 28 pp. (in English) ["Knowledge of the relationships between urbanization and the ecology and distribution of odonates enhances our ability to effectively assess conditions of aquatic ecosystems and nearby terrestrial habitats. With this project, the terrestrial adult Odonata populations and species dynamics between urban and nonurban river habitats of La Crosse County, WI were assessed using data received by the Wisconsin Odonata Survey. Using the counts of odonates by species from 2009 to 2015, calculations for general odonate abundance as well as species abundance were generated. It was expected that nonurban habitats would yield both more overall numbers of odonates as well as a more species, though the results showed little difference between the two types of locations. There were on average about 1 more individual odonates counted in urban locations. However, a t-test of these means yielded the data to not be considered statistically different (p-value 0.06). There was also little change in species counts for urban habitats, but there was a spike in counts of nonurban locations from 2009 – 2012, where there were 16 counted in 2009 up to 38 in 2012. Though the r-squared values of the corresponding trendlines suggest a low goodness of fit (< 0.001 and 0.27 for nonurban and urban locations), the low values were to be expected, given the variability of the data in terms of how uneven the counts were performed. The data itself was not gathered with regard to a study, as it has been the culmination of citizen scientists recording their own findings as they visited locations. The low values could reflect the bias toward sampling done for the survey, where the surveyor frequented more urban locations. Despite this, research done with regard to adult odonate ecology and 3 distribution is helping to broaden the lacking knowledge we currently have with regard to odonate population ecology, as well as increase our knowledge of the effects on urbanization on populations and habitats." (Authors)] Address: not stated

16916. Nourbakhsh, H.Z.; Obeidi, R. (2018): Analysis of the diet of the Liza abu (Heckel, 1843) in Mond River in Bushehr seaport. Advances in Bioresearch 9(3): 140-144. (in English) ["During the fishing season, 765 Liza abu were collected from Mond River and the contents of their digestive system were examined. The minimum and maximum length of the collected fish was 45 and 350 mm, respectively. In addition, the gut length to body length ratio (RLG) of the one-year and five-year fish was 4 and 2.2, respectively. The highest frequency of nutrients in the river belonged to the Ephemeroptera, but the feeding preference of this fish was Plecoptera and Odonata in both rivers. The research results revealed that this fish is an omnivorous species given its feeding habits." (Authors)] Address: Nourbakhsh, Haniyeh Ziaeian, Dept of Fisheries Sciences, Bushehr Branch, Islamic Azad Univ., Bushehr, Iran

16917. Novelo-Gutiérrez, R. (2018): Cordulegaster virginiae sp. nov. from Mexico, including a comparison with C. diadema Selys, 1868, and a redescription of its larva (Odonata: Cordulegastridae). Zootaxa 4394(3): 371-382. (in English, with Spanish summary) ["C.r virginiae sp. nov. is described based on eight adults (7 ♂♂, 1 ♀) collected in cloud forest in municipalities of Banderilla and Xalapa, Veracruz, Mexico. The new species is compared with adults of C. diadema Selys, 1868. All the structural differences between both species are located on the abdomen. Cordulegaster godmani McLachlan, 1876 is considered a junior synonym of C. diadema. The larva of C. diadema is redescribed and illustrated in detail based on reared material." (Author)] Address:

Novelo-Gutiérrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

16918. Nugraha, F.A.D.; Andri Maulidi, A.; Winasis, S.; Kurniawan, N. (2018): Morphometric analysis of Ischnura aurora (Brauer, 1865) in two lakes at Semeru Mountain East Java. Plant and Animal Research Journal 1(1): 7-12. (in English) ["Lake Ranu Pani has been experiencing environmental damage due to human activities, while Lake Ranu Regulo is still in good condition. This difference in environmental conditions allows for differences in the genetic diversity of animals in the area. The aim of this research is to know the genetic diversity of I. aurora based on morphometric analysis in both locations. A total of 8 morphometric characters (in mm) were measured using a digital caliper. Data were analyzed using T test, biplot and cluster. T test results showed that male I. aurora in both sites was not significantly different, nor did females, but there were differences between male and female aurora at each location ie body color, wing span (WS) and length of hindwing (LH). Biplot analysis showed the uniformity of sample distribution for each character. The dendogram results described most of the samples were clustered into a single group. The result data showed that genetic diversity of I.aurora in Ranu Pani and Ranu Regulo lakes is still low." (Authors)] Address: Winasis, S., Baluran National Park, Bantangan, Situbondo, East Java, Indonesia

16919. Ortega-Salas, H. (2018): Erpetogomphus oxybelis sp. nov. from Veracruz, Mexico (Odonata: Gomphidae). Zootaxa 4378(4): 589-594. (in English, with Spanish summary) ["E. oxybelis sp. nov. is described and figured from Río Hondo, Veracruz State, Mexico (18.387 N, -96.174 W, 20 m a.s.l.), the holotype is deposited in the Frost Entomological Museum at Pennsylvania State University, USA [PSUC]. Relationship with members of the ophibolus group sensu Garrison are discussed." (Author)] Address: Ortega-Salas, H., Depto de Zoología, Inst. de Biología, UNAM, Apartado Postal 70–153, México. E-mail: hector_os@ciencias.unam.mx

16920. Ott, J. (2018): Invasive Krebse und ihre Wirkungen auf Libellen. Wie gewonnen, so zerronnen – erfolgreiche Ansiedlungen geschützter und gefährdeter Arten im Südwesten Deutschlands bedroht. Naturschutz und Landschaftsplanung 50(2): 37-43. (in German, with English summary) ["Invasive crayfish and their impact on dragonflies – Successful colonisation of protected and endangered species at risk in the southwest of Germany For many years invasive crayfish have already been regarded as nature conservation problem, but mainly due to their influence on native river crayfish: they transmit the crayfish plague (Aphanomyces astaci) leading to their death. Additionally, over the last years proof has been furnished in numerous studies that invasive crayfish also have negative effects on other taxa. The paper illustrates these effects using five examples, mainly related to the group of the dragonflies. The problems caused by invasive crayfish should not be ignored from a nature conservation point of view. In the near future it might lead to significantly larger losses of dragonflies. Owing to numerous nature conservation measures the dragonfly fauna has recovered in many areas, but these successes are put at risk by the spreading of invasive crayfish species.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16921. Ottonello, D.; Oneto, F.; Vignone, M.; Rizzo, A.; Salvidio, S. (2018): Diet of a restocked population of the European pond turtle Emys orbicularis in NW Italy. Acta Herpetologica 13(1): 89-93. (in English) ["Recently several projects have been implemented for the conservation of E. orbicularis, but few aspects of the captive-bred animals released into the wild have been described. In this note we report about the trophic habits of a small restocked population of the endemic subspecies E. o. ingauna that is now reproducing in NW Italy. Faecal contents from 25 individuals (10 females, 11 males and 4 juveniles) were obtained in June 2016. Overall, 11 taxonomic categories of invertebrates were identified, together with seeds and plant remains. Plant material was present in 24 out of 25 turtle faecal contents, suggesting that ingestion was deliberate. There were no differences between the dietary habits of females and males, and the trophic strategy of adult individuals was characterised by a relatively high specialization on dragonfly nymphae. These findings suggest that captive bred turtles are adapting well to the wild and that restocked individuals assumed an omnivorous diet, a trophic behaviour typical of other wild turtle populations living in similar habitats." (Authors)] Address: Salvidio, S., DISTAV, Univ. degli Sudi di Genova, Corso Europa 26, 16132 Genova, Italy. E-mail: salvidio@dipteris.unige.it

16922. Panorel, P.A.; Maglasang, J.C. (2018): Experimental and computational investigation of corrugated dragonfly airfoil performance in small wind turbine applications. Asia-Pacific Journal of Science, Mathematics and Engineering 4(2): 4-8. (in English) ["Small wind turbines suffer performance degradation due to its inherent low Reynolds number flow. The flow is initially laminar and is prone to separate even under a mild adverse pressure gradient. Recent studies revealed the capability of corrugated Dragonfly airfoil in delaying flow separation against streamlined airfoils in the low Reynolds number regime. Hence, this paper aims to improve the performance of small wind turbines by leveraging the capabilities of Corrugated Dragonfly airfoil. Experimental results have shown that small wind turbines made from corrugated dragonfly, NACA 4412, and flat plate airfoil had a coefficient of performance of 0.191, 0.284 and 0.099, respectively."] Address: Panorel, P.A., Dept of Mechanical Engineering, MSUIligan, Institute of Tech., Iligan City, Philippines. E-mail: ppanorel@gmail.com

16923. Park, C.-D.; Lee, C.-W.; Lim, J.-C.; Yang, B.-G.; Lee, J.-H. (2018): A study on the diet items of American Bullfrog (Lithobates catesbeianus) in Ga-hang wetland, Korea. Korean J. Environ. Ecol. 32(1): 55-65. (in Korean, with English summary) ["This study was conducted to clarify diet items and predatory behavior of L. catesbeianus according to the sex, maturity and season from April to September 2014 at

Gahang wetland of Changnyeong-gun, Gyeongsangnamdo province, Korea. We examined the stomach contents of L. catesbeianus using a gastrectomy technique and identified the contents to a genus or species. The examination showed that large and heavy individual of L. catesbeianus fed on larger amounts of food. However, there were no statistically significant differences in predation amount according to the sex and maturity of L. catesbeianus. The main diet item of during the study period was mostly Insecta (average population rate of 65.5%), followed by Crustacea (13.5%) and Gastropoda (7.9%). The most preferred diet item of L. catesbeianus was Muljarus japonicus. Surprisingly, L. catesbeianus also foraged Parus major, Apodemus agrarius, and Crocidura lasiura. These findings showed that L. catesbeianus directly disturbed the wetland ecosystem. We expect the results will be the important reference data for checking the impact of L. catesbeianus, which is designated as invasive species by the Ministry of Environment, on wetland ecosystem." Cercion melanotum, Anax parthenope julius and Orthetrum albistylum speciosum are listed as odonate prey items. (Authors)] Address: Lee, J.-H., National Institute of Biological Resources, Seo-gu Incheon 22689, Korea. E-mail: lee98511@korea.kr

16924. Parker, K.; Fuller, C. (2018): Effects of Roundup on feeding behavior of larval Blue Dashers, Pachydiplax longipennis. 2018 - Spring Scholars Week (April 16-20): (in English) [Verbatim: "Herbicides are widely used, and prior research has shown that many herbicides are harmful to organisms and the environment. Herbicides enter aquatic environments through runoff or aerial dispersion from fields. The objective of this study was to determine if Roundup (active ingredient Glyphosate) causes negative effects on feeding behavior of larval Pachydiplax longipennis. Larvae were captured from rainwater-filled mesocosms at Hancock Biological Station in Murray, KY. Larvae were exposed to one of four concentrations of Roundup (0mg/L, 2.5mg/L, 5mg/L, or 10mg/L). Daphnia consumption trials were conducted at 7 and 14 days post-exposure. There were no significant differences among treatments for whether or not larvae ate offered Daphnia for Day 7 (c^2 =1.195, df =3) or Day 14 (c^2 =1.283, df =3). For the trials on Day 7, Roundup concentration did not have a significant effect on the time it took the larvae to consume 1, 2, or 4 Daphnia; however, exposure significantly increased the time it took the larvae to consume three Daphnia (P=0.036). For the trials on Day 14, concentration did not have a significant effect on the time it took to consume 1 or 2 Daphnia; however, Roundup significantly increased the time it took to consume 3 (P=0.050) or 4 Daphnia (P=0.029). Thus, Roundup slowed prey consumption, suggesting that it could have a negative impact on larval dragonfly predation and, consequently, their overall quality of life. More time to capture and consume food suggests higher energy usage during predation." (Authors)] Address: Parker, Kayleen, Biology Dept, Murray State University, Murray, KY 42071

16925. Parr, A.J. (2018): Migrant and dispersive dragonflies in Britain during 2017. J. Br. Dragonfly Society 34(2): 79-88. (in English) ["In Britain, the year 2017 proved to be a highly eventful one for migrant and dispersive dragonflies; indeed it was to be one of the best years on record. Several dispersive species showed notable range expansions (e.g. the first record of Libellula fulva for Wales was made at Porthkerry Country Park, Glamorgan, on 7 June), and many of our recent colonist species faired well. The major highlights, however, referred to longer distance migrants, with immigration being noted throughout much of the year. Significant arrivals of Anax ephippiger were noted both in early spring 2017 and again in autumn. Anaxparthenope had a good year, with records from over 30 sites during the summer, and presumed immigrant Aeshna affinis were seen at a few localities in southern England well away from the species' breeding stronghold around the greater Thames Estuary. Perhaps the most significant events of the year involved various members of the Libellulidae. Sympetrum fonscolombii appeared in very good numbers, with records from almost 100 sites around the UK. Many individuals stayed around to breed, and a locally-bred second generation was noted during late summer/ autumn at sites as far north as Yorkshire, though productivity was in general low. The other highlights relate to Crocothemis erythraea, where a male was present at Longham Lakes in Dorset over 8-9 July; this followed late news, only recently received, of a male seen at Hickling Broad in Norfolk on 5 July 2016. These are the first confirmed British records for over a decade." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

16926. Patel, R.K.; Ghetiya, L.V.; Patel, S.R.; Patel, P.S. (2018): Study of odonates in South Gujarat in relation to their diversity and morphological characteristics. Journal of Entomology and Zoology Studies 6(2): 2796-2807. (in English) ["The present experiment was conducted to study the odonates in South Gujarat in relation to their diversity and morphological characteristics (Morphometrics of forewing, hind wing and abdomen), at Dept of Agricultural Entomology, during 2014-15. Total 37 species of odonates belongs to 28 genera, from eight families were recorded from different localities of South Gujarat. Among them, Epophthalmia vittata was the largest in relation to size of forewing (53.24±0.13mm), hind wing (51.32±0.12mm) and abdomen (58.32±0.14mm), while Acisoma panorpoides was the smallest in size with measurement of forewing (19.81±0.18mm), hind wing (18.11±0.11 mm) and abdomen (15.75±0.20mm). On the other hand Lestes umbrinus was the largest considering the size of forewing (28.08±0.04mm), hind wing (29.68±0.56mm) and abdomen (32.19±0.09mm) in Zygoptera." (Authors)] Address: Patel, R.K., Department of Agricultural Entomology, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India. E-mail: patelrk1692@gmail.com

16927. Payra, A.; Deepak, C.K.; Saini, J.; Tripathy, B. (2018): First record of Pseudagrion pruinosum (Odonata: Coenagrionidae) from mainland India. Notulae odonatologicae 9(1): 26-30. (in English) ["P. pruinosum is recorded for the first time from mainland India as well as from Indian Eastern Himalaya. Five males and one female were collected from Miao village of Changlang District, Arunachal Pradesh, India. Information on the species' distribution and morphological characters are given." (Authors)] Address: Payra, A., Zoological

Survey of India, M- Block, New Alipore, Kolkata - 700053, West Bengal, India; arajushpayra@gmail.com

16928. Paz Leiza, L.; Conesa García, M.A.; Torralba Burrial, M. (2018): Contribución de la red de control de la calidad biológica de las aguas superficiales de Navarra (España) al conocimiento de la distribución de los odonatos fluviales (Insecta: Odonata). Boletín de la Sociedad Entomológica Aragonesa 63: 337-342. (in Spanish, with English summary) ["Contribution of the surface water biological quality monitoring network from Navarre (Spain) to the knowledge on distribution of riverine odonates (Insecta: Odonata): Data on distribution of the Odonata species of running waters are presented, obtained from the analysis of the larvae contained in the samples of benthic macroinvertebrates collected in river quality monitoring campaigns in Navarre (Spain) over the last years (2011-2017). Records of special interest for conservation are those of: Coenagrion mercuriale, Gomphus simillimus, Gomphus vulgatissimus and Oxygastra curtisii." (Authors)] Address: Paz Leiza, Leire, EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. 20180 Oiartzun, Spain. E-mail: leire@ekolur.com

16929. Pérez Fernández, P.J.; Cano-Villegas, F.J.; Rodriquez Loranzo, B. (2018): Primeras citas de Lestes virens (Charpentier, 1825) (Odonata, Lestidae) para la provincia de Almería (SE península ibérica). Boletín de la SAE Nº 28: 170-174. (in Spanish) [T.M. Paterna del Rio, Balsa Grande, 30SWF09, 07-IX-2018: 2 males, 06-X-2018: 12 males, 7 ♀♀ and 9 ♂♀; Spain] Address: Cano-Villegas, F.J., Asociación Odonatológica de Andalucía. Isla de Mallorca, 2 P6 4ºA, 14011 Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

16930. Petrulevieius, J.F. (2018): A new Malachite Damselfly (Synlestidae: Odonata) from the Eocene of Patagonia, Argentina. Life: The Excitement of Biology 6(2): 36-43. (in English) ["A new synlestid zygopteran, Madres delpueblo n. gen. n. sp., is described from the middle Eocene of Río Pichileufú, Patagonia, Argentina. The new genus is characterised by wing characters such as the discoidal cell narrow and long; Ax2 aligned with the arculus; MP distinctly curved after its origin; CuP+AA fused to the hind margin half of the length of the discoidal cell; CuP closer to Ax2 than to Ax1. Needle damselflies or Malachites are represented in other two Patagonian Eocene localities, by nymphs and adults. The new genus enlarges the fossil record of Lestomorpha in Argentina to four extinct genera: Promegalestes, Austroperilestes, Inacayalestes and Madres n. gen. versus two Recent ones: Lestes and Archilestes." (Author)] Address: Petrulevieius, J.F., CONICET - División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Paseo del Bosque s/n, La Plata (1900), Argentina. Email: levicius@fcnym.unlp.edu.ar

16931. Phan, Q.T.; Karube, H.; Sasamoto, A. (2018): Drepanosticta draco sp. nov., a new damselfly from northern Sumatra, Indonesia (Odonata: Platystictidae). Tombo 60: 66-70. (in English) ["Drepanosticta draco sp. nov. is described from northern Sumatra based on a single male specimen. The new species is closely related to D. pytho Lieftinck, 1937 but can be distinguished by morphology of paraproct and its robust size, reached to the level of cerci and sharply pointed apex." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

16932. Phan, Q.T.; Tran, T.T. (2018): Description of Coeliccia phamiha sp. n. from central Vietnam (Odonata: Platycnemididae). International Journal of Odonatology 21(1): 45-53. (in English) ["Coeliccia phamiha sp. n. (holotype ♂ and paratype ♀ from Dak Et bridge, Deo Lo Xo, Phuoc Son district, Quang Nam Province, Central Vietnam, deposited in zoological collection of Duy Tan University) is described based on both sexes. Judging by the structure of genital ligula and appendages of the ♂ and prothorax of the ♀ it seems close to C. mientrung Kompier & Phan, 2017, but it is easily separated by its markings and structural details. Differential diagnosis between the new species and its allied species is provided." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Institute of Research & Development, Duy Tan University, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16933. Phan, Q.T.; To, V.Q. (2018): Odonata checklist from Son Tra Nature Reserve, Da Nang city, central Vietnam. IDF-Report 111: 7-19. (in English) ["A checklist of 44 odonate species (21 Zygoptera and 23 Anisoptera) from Son Tra Nature Reserve, central Vietnam is provided. Idionyx thailandica Hämäläinen, 1985 is recorded for the Vietnamese fauna for the first time, a new Coeliccia sp. is awaiting description in the near future, and the taxonomic status of specimens of the genus Leptogomphus remains unsettled and will have to be solved in the future." (Authors) Macromidia genialis shanensis] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Center for Molecular Biology, Institute of Research & Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16934. Phan, Q.T. (2018): Notes on the genus Indocnemis Laidlaw, 1917 in Vietnam with description of Indocnemis marijanmatoki sp. n. (Odonata, Zygoptera, Platycnemididae). ZooKeys 809: 15-29. (in English) ["Indocnemis marijanmatoki sp. n. (holotype ♂, 12°07'10.0"N, 108°5'51.0"E, 1503 m a.s.l., Hon Ba Nature Reserve, Nha Trang city, Khanh Hoa Province, central Vietnam) is described based on both sexes. The morphological variation of Indocnemis orang (Förster in Laidlaw, 1907) is discussed and its distribution in Vietnam updated." (Author)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research and Training of Medicine, Biology and Pharmacy, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16935. Phan, Q.T.; To, V.Q. (2018): The genus Megalestes Selys, 1862 in Vietnam, with first description of female of Megalestes australis Karube, 2014 (Odonata: Zygoptera: Synlestidae). IDF-Report 111: 1-6. (in English) ["The male secondary genitalia and the caudal appendages of males and females of the three confirmed Vietnamese Megalestes

species (M. australis, M. haui and M. micans) are figured. The female sex of M. australis is described for the first time." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Center for Molecular Biology, Institute of Research and Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

16936. Piersanti, S.; Rebora, M. (2018): The antennae of damselfly larvae. Arthropod Structure & Development 47(1): 36-44. (in English) ["The larval antennal sensilla of two Zygoptera species, Calopteryx haemorroidalis and Ischnura elegans are investigated with SEM and TEM. These two species have different antennae (geniculate, setaceous) and live in different environments (lotic, lentic waters). Notwithstanding this, similarities in the kind and distribution of sensilla are outlined: in both species the majority of sensilla types is located on the apical portion of the antenna, namely a composed coeloconic sensillum (possible chemoreceptor), two other coeloconic sensilla (possible thermo-hygroreceptors) and an apical seta (direct contact mechanoreceptor). Other mechanoreceptors such as filiform hairs sensitive to movements of the surrounding medium or bristles positioned to sense the movements of the flagellar segments are present on the antenna. Similarities in the antenna sensilla types and distribution are observed also with other dragonfly species, such as Onychogomphus forcipatus and Libellula depressa. A peculiar structure with an internal organization similar to that of a gland is observed in the apical antenna of C. haemorroidalis and I. elegans and it is present also in O. forcipatus and L. depressa. The possible function of this structure is at the moment unknown but it deserves further investigations owing to its widespread presence in Odonata larvae." (Authors)] Address: Piersanti, Silvana, Dipto di Chimica, Biologia e Biotecnologie, Univ. Perugia, Via Elce di Sotto, 1, 06121 Perugia, Italy. E-mail address: silvana.piersanti@unipg.it

16937. Pinto, A.P.; Kompier, T. (2018): In honor of conservation of the Brazilian Atlantic Forest: description of two new damselflies of the genus Forcepsioneura discovered in private protected areas (Odonata: Coenagrionidae). Zoologia 35: e21351: 19 pp. (in English) ["Two new Brazilian Protoneurinae damselflies, Forcepsioneura regua sp. nov. (holotype ♂ deposited in DZRJ: Brazil, Rio de Janeiro State, Cachoeiras de Macacu municipality, RPPN Reserva Ecológica de Guapiaçu) and Forcepsioneura serrabonita sp. nov. (holotype ♂ deposited in DZRJ: Brazil, Bahia State, Camacan municipality, RPPNs Serra Bonita), are described, illustrated and diagnosed based on males and females. The bluish and smaller F. regua sp. nov. has been confused with at least three previously described species, being very similar to the type species of Forcepsioneura, F. garrisoni Lencioni, 1999, but lacking a defined tubercle-like process on the posterolateral margin of the median lobe of the prothorax in both sexes, which allows it to be distinguished from all other known species. The shape of the cercus of the male of F. serrabonita sp. nov. is similar to that of F. grossiorum Machado, 2001 and F. lucia Machado, 2000, two species with very short ventrobasal process. However, it differs from them mainly by the mediobasal process of the cercus, which is rounded in dorsal view and almost not visible in lateral view. The taxonomic status of Forcepsioneura is discussed and a comparison with the other species of the genus is provided. Based on size, habitat and coloration, Forcepsioneura can be informally divided into two groups: (1) large, orange-black and montane species, including F. grossiorum, F. itatiaiae (Santos, 1970), F. lucia and F. serrabonita sp. nov.; (2) small, bluish and lowland species, including F. garrisoni, F. haerteli Machado, 2001, F. regua sp. nov. and F. sancta (Hagen in Selys, 1860). Our findings highlight the urgency in directing collecting efforts to unexplored areas, as well as the importance of private preserves that harbor the type localities as guardians of the threatened and diverse Atlantic Forest diversity. Together these two localities surveyed account for more than 210 species of odonates, representing almost 24% of the number of Brazilian species. Brazil has the greatest number of known species of odonates in the world. This study shows that further research is required in order to fully understand the diversity of Forcepsioneura." (Authors)] Address: Pinto, A.P., Laboratório de Sistemática de Insetos Aquáticos, Depto de Zoologia, Univ. Federal do Paraná. Caixa Postal 19020, 81531-980 Curitiba, PR, Brazil. E-mail: appinto@ufpr.br

16938. Popova, O.N.; Haritonov, A.Yu. (2018): On the distribution of Sympetrum croceolum in the Russian part of its range (Odonata: Libellulidae). Odonatologica 47(3/4): 29-49. (in English) ["We used literature data, museum collections, and fieldwork to compile a list of records and produce a distribution map of S. croceolum in the Russian part of its range from where the species was little known to odonatologists outside of Russia for a long time. A detailed description of the fourth record of the species in Western Siberia (Chernyy Mys village, Kolyvanskiy District, Novosibirsk Province), which is globally the northernmost record of the species, is given. We suppose that the West Siberian S. croceolum populations originate from westward migrations from the eastern core part of the species' range. Morphometric analysis of specimens from different populations showed that variation of the hind wing size is within the individual variability of S. croceolum. By breeding S. croceolum in an aquarium from an egg clutch, information on the period of embryonic development and morphometric characteristics of eggs and larvae of younger instars was obtained. The subspecies Sympetrum croceolum fuscoatrum Belyshev, 1964, is synonymised with the nominotypical subspecies." (Authors)] Address: Popova, Olga, Institute of Systematics & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091, Russia. E-mail: popova-2012@yandex.ru

16939. Prasad Uppu, S.; Manisha, D.; Devi, G.D.; Chengalwa, P.; Devi, B.V. (2018): Aerodynamic analysis of a dragonfly. Journal of Advanced Research in Fluid Mechanics and Thermal Sciences 51(1): 31-41. (in English) ["The aim of this work is to determine the Aerodynamic properties of the corrugated dragonfly airfoil in comparison to the traditional smooth NACA 2.5411 airfoil. A simplified dragonfly airfoil is analysed in the current work, at low speeds. A 3D printed model is tested using Six Component strain gauge and the results are compared with NACA 25411 airfoil. Aerodynamic

performance is evaluated at low Reynolds number to associate the results with the regular section. In order to streamline the results both experimental and numerical work is carried over the model at different wind speeds and wind angles. Data obtained provides a valuable insight to the physics of the model which showed a completely nonlinear behaviour resulting in positive aerodynamic forces." (Authors)] Address: Prasad Uppu, S., Dept of Aeronautical Engineering, Institute of Aeronautical Engineering, JNT Univ. Hyderabad, 500043, India. E-mail: shivaprasad047@gmail.com

16940. Rajabi, H.; Stamm, K.; Appel, E.; Gorb, S.N. (2018): Micro-morphological adaptations of the wing nodus to flight behaviour in four dragonfly species from the family Libellulidae (Odonata: Anisoptera). Arthropod Structure & Development 47(4): 442-448. (in English) ["Highlights: •The shape and material composition of the nodus in percher and flier dragonflies are adapted to their flight behaviour. •The area proportion of the soft, resilin-dominated cuticle is found to decrease from typical perchers to typical fliers. •The presence of a knot-shaped protrusion in the nodus of percher dragonflies is likely to avoid large wing displacements. •We suggest a framework for future research on the relationship between wing morphology and flight behaviour in dragonflies. Abstract: Adult dragonflies can be divided into two major groups, perchers and fliers, exhibiting notably different flight behaviour. Previous studies have yielded conflicting results regarding the link between the wing macro-morphology and flight style in these two groups. In this study, we present the first systematic investigation of the micro-morphological differences of wings of percher and flier dragonflies in four closely related species from the family Libellulidae. Our results suggest that the shape and material composition of wing microstructural components and, in particular, the nodus are adapted to facilitate the specific wing functioning in fliers and perchers. The findings further indicate a decreasing trend in the area proportion of the soft resilin-dominated cuticle in the nodus in the series of species from typical perchers to typical fliers. Such a reduction in the resilin proportion in the nodus of fliers is associated with an increase in the wing aspect ratio. The knot-shaped protrusion at the nodus of perchers, which becomes notably smaller in that of strong fliers, is likely to act as a mechanical stopper, avoiding large wing displacements. This study aims to develop a novel framework for future research on the relationship between wing morphology and flight behaviour in dragonflies." (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

16941. Rajeshkumar, S.; Raghunathan, C. (2018): Description of a new species of Nosoticta Hagen (Odonata: Platycnemididae: Disparoneurinae) from Central Nicobar Islands, India. Zootaxa 4422(3): 431-441. (in Andaman, Nosoticta nancowra sp. nov., Nosoticta nicobarica, Central Nicobar Islands) ["Nosoticta nancowra Rajeshkumar sp. nov. is described based on eight males and three females from Central Nicobar Islands, India. The diagnostic characteristics of the new species separating it from congeners are discussed. Morphological variations observed in the anal appendages of males and the pronotum of females are documented. A description of the new species using photographs and drawings is given. An identification key to species of the genus Nosoticta occurring in Nicobar Islands is given for both sexes." (Authors)] Address: Rajeshkumar, S., Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair-744 102, Andaman & Nicobar Islands, India. E-mail: rajeshkumar0802@gmail.com; Raghunathan, C., Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053, India

16942. Rampola, R.B.; Nuñeza, O.M.; Villanueva, R.J.T. (2018): Species diversity and distribution of Odonata in selected river systems of North Cotabato, Philippines. Proceedings of the 23rd International Forestry and Environment Symposium 2018 of the Department of Forestry and Environmental Science, University of Sri Jayewardenepura: 1 p. (in English) [Verbatim: Odonata has long been studied as an insect order that plays an important role in the balance of aquatic environment. The order represents one set of insects that is potential in indicating environmental quality. In this study, the species diversity and distribution of Odonata in selected river systems of North Cotabato, Mindanao, Philippines was assessed. Four rivers were sampled in the study: Mirasol River in Alamada and Nicaan River in Libungan which are relatively disturbed and Raradangan River in Alamada and Kimarayag River in Pigcawayan which are relatively undisturbed. Opportunistic sampling was employed through sweep netting in visual encounter surveys. The association of environmental factors to species distribution was evaluated using Canonical Correspondence Analysis (CCA). Geographic Information System (GIS) was used to create a distribution map of Odonata species in the sampling sites. Fifteen species belonging to five families were recorded of which four (26.67%) species are Philippine endemic. High species diversity (H'=2.13) was recorded in Raradangan River (Site 1). Kimarayag River (Site 4) is considered high in diversity (H'=2.02) next to site 1. Moreover, Sites 2, Mirasol River (H'=1.62) and site 3, Nicaan River exhibited moderate diversity (H'=1.53) inspite of the human disturbances. The Oriental species, Pseudagrion p. pilidorsum (Brauer) is the most abundant distributed in all sampling sites. The values for all the parameters (water temperature, pH, dissolved oxygen and relative humidity) in all sampling sites are within the Philippine standard of water quality. Eight species were identified to be affected by high dissolved oxygen, three species were positively affected by relative humidity, and four species were found to have tolerance to change in water temperature. GIS mapping clearly showed spatial aggregation of species within the surrounding habitat. Results indicate that Odonata appears to be associated with habitat variables.] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

16943. Ranjeeta, D-M.; Singh K.I.; Ray D.C. (2018): Predators and parasitoids of rice insect pests under rice ecosystems of Manipur valley. Indian Journal of Entomology 80(3): 789-793. (in English) ["Field surveys on predators and parasitoids of rice ecosystem during kharif season (2012–

2014) in the four valley districts (Imphal East, Imphal West, Thoubal and Bishnupur) of Manipur were conducted. Altogether 33 species of predators belonging to 26 genera under 15 families of 5 orders and 15 species of parasitoids belonging to 5 families of Hymenoptera were listed. Among the predators … damselflies (Agriocnemis femina, A. pygmeae and Ischnura aurora), and dragonflies (Orthetrum sabina and Sympetrum sp.) were found as dominant species. … One way ANOVA was done to evaluate the variation in the distribution of predators and parasitoids among the four study sites: among the predators, spider was found to be dominating (73.0) over other groups in Site 4 (Bishnupur District) whereas among the parasitoids, Cotesia rufricus (11.0) was dominating in Site 1 (Imphal East). The data revealed the significant variation in the distribution of predators and parasitoids ($p < 0.01$). It was also observed that spiders existed with maximum density in all the four sites (57.4–73.0) while among the parasitoids, Cotesia rufricus was observed with maximum density (5.4–11.0)." (Authors)] Address: Ranjeeta, D-M., Ecology & Environmental Science, Assam Univ., Silchar, 788011, India. E-mail: ranjeetamoirangthem1@gmail.com

16944. Ribi, W.; Zeil, J. (2018): Diversity and common themes in the organization of ocelli in Hymenoptera, Odonata and Diptera. Journal of Comparative Physiology A 204(5): 505-517. (in English) ["We show in a comparative analysis that distinct retinal specializations in insect ocelli are much more common than previously realized and that the rhabdom organization of ocellar photoreceptors is extremely diverse. Hymenoptera, Odonata and Diptera show prominent equatorial fovea-like indentations of the ocellar retinae, where distal receptor endings are furthest removed from the lens surface and receptor densities are highest. In contrast, rhabdomere arrangements are very diverse across insect groups: in Hymenoptera, with some exceptions, pairs of ocellar retinular cells form sheet-like rhabdoms that form elongated rectangular shapes in cross-section, with highly aligned microvilli directions perpendicular to the long axis of cross-sections. This arrangement makes most ocellar retinular cells in Hymenoptera sensitive to the direction of polarized light. In dragonflies, triplets of retinular cells form a y-shaped fused rhabdom with microvilli directions oriented at 60° to each other. In Dipteran ocellar retinular cells microvilli directions are randomised, which destroys polarization sensitivity. We suggest that the differences in ocellar organization between insect groups may reflect the different head attitude control systems that have evolved in these insect groups, but possibly also differences in the mode of locomotion and in the need for celestial compass information." (Authors)] Address: Ribi, W., Research School of Biology, The Australian National University, Canberra, Australia

16945. Richards, S.J; Polhemus, D.A. (2018): A note on the correct repository for the holotype of Pseudagrion fumipennis Polhemus, Michalski & Richards (Odonata: Coenagrionidae). Australian Entomologist 45(1): 46. (in English) ["The published repository for the holotype of P. fumipennis, is corrected to the South Australian Museum, Adelaide, Australia, not the 'Australian Museum of Natural History, Sydney' as stated in the original description." (Authors)] Address: Richards, S.J., Vertebrates Dept, South Australian Museum, North Terrace, Adelaide, S.A. 5000, Australia. E-mail: richards.steve@saugov.sa.gov.au

16946. Richmond, E.K.; Rosi, E.J.; Walters, D.M.; Fick, J.; Hamilton, S.K.; Brodin, T. Sundelin, A.; Grace, M.R. (2018): A diverse suite of pharmaceuticals contaminates stream and riparian food webs. Nature Communicationsvolume 9, Article number: 4491 (2018): 9 pp. (in English) ["A multitude of biologically active pharmaceuticals contaminate surface waters globally, yet their presence in aquatic food webs remain largely unknown. Here, we show that over 60 pharmaceutical compounds can be detected in aquatic invertebrates and riparian spiders in six streams near Melbourne, Australia. Similar concentrations in aquatic invertebrate larvae and riparian predators suggest direct trophic transfer via emerging adult insects to riparian predators that consume them. As representative vertebrate predators feeding on aquatic invertebrates, platypus and brown trout could consume some drug classes such as antidepressants at as much as one-half of a recommended therapeutic dose for humans based on their estimated prey consumption rates, yet the consequences for fish and wildlife of this chronic exposure are unknown. Overall, this work highlights the potential exposure of aquatic and riparian biota to a diverse array of pharmaceuticals, resulting in exposures to some drugs that are comparable to human dosages." (Authors)] Address: Richmond, Erinn K., Water Studies Centre, School of Chemistry, Monash University, Clayton 3800 Victoria, Australia. E-mail: erinn.richmond@monash.edu

16947. Rodrigues, M.E.; Moura, E.B.; Koroiva, R.; Piovezan Borges, A.C.; Roque, F. (2018): Survey of dragonflies (Odonata) in palm swamps of Cerrado hotspot. Entomological News 128(1): 24-38. (in English) ["The palm swamps (i.e. Veredas) in the Cerrado, Brazilian Savanna, are priority areas for conservation. The Veredas' hydrological characteristics are fundamental for the maintenance of biodiversity and economic activities in this region. However, despite this importance, only a few studies have been carried out in these areas, primarily surveys for dragonflies. Here, we sampled 25 palm swamps in a Cerrado region. We found 56 species of Odonata, ten of which were new records for the Mato Grosso do Sul State: Coenagrionidae (6), Libellulidae (3) and Aeshnidae (1). The Veredas harbor both lentic and lotic systems which contribute to the great regional diversity of Odonata. Our results increase our knowledge about Odonata diversity in Veredas areas of the Cerrado, show the importance of these environments for Odonata species, and emphasize the importance of maintaining the Veredas as Permanent Preservation Areas." (Authors)] Address: Moura, E.B., Bioscience Inst., Federal Univ. Mato Grosso do Sul – Cidade Universitária, s/n, 79070-9, Brasil. E-mail: roque.eco@gmail.com

16948. Rodrigues, M.E.; De Oliveira Roque, F.; Guillermo-Ferreira, R.; Saito, V.S.; Samways, M.J. (2018): Egg-laying traits reflect shifts in dragonfly assemblages in response to different amount of tropical forest cover. Insect Conservation

and Diversity 12(3): 231-240. (in English) ["1. Oviposition site selection by aquatic insects is usually influenced by both aquatic and terrestrial cues. Landscape changes (e.g. native vegetation loss) can affect the level of the reproductive success in aquatic insects, changing local species composition and richness. 2. We investigate whether forest cover loss around streams influences the number of species with exophytic (species which lay eggs directly on the water surface), endophytic (species which lay their eggs directly into plant tissue), or epiphytic (species which lay eggs on the exposed surface of rocks, leaves, trunks or other substrates protruding from the stream surface) oviposition behaviour in dragonfly assemblages. 3. We sampled adult dragonflies in 116 streams in a Neotropical savanna region in Brazil. The relationship between species richness for each behavioural category, and the proportion of forest cover around the streams, was tested using regression analysis. 4. We collected 2413 Anisoptera and Zygoptera individuals, belonging to 8 families, 30 genera, and 63 species. Of these, 25 species were classified as exophytic, 28 as epiphytic, and 10 as endophytic. Our results show that the number of species with exophytic or epiphytic behaviour was strongly related to riparian forest loss. 5. Forest loss changes the habitat, and here, specifically changes site suitability for oviposition. We highlight the importance of using behavioural traits as a bioindicator tool for the assessment of anthropogenic impacts on tropical forest." (Authors)] Address: Rodrigues, M.E., Depto Ciencias Biologicas, CCBS, Rodovia Jorge Amado, Km 16, Salobrinho, Ilh eus, Bahia, CEP: 45 662-900, Brazil. E-mail: rodrigues.mbio@gmail.com

16949. Rodríguez, J.S.; Gómez, D.; Molineri, C. (2018): New records of Odonata from Argentina. Odonatologica 47(3/4): 193-212. (in English) ["The present paper provides new records for Odonata collected in the central and northern regions of western Argentina (23° to 30°S latitude), including the biogeographical provinces of Puna, Monte, Chaco and Yungas. 19 sampling sites were visited at least once. New geographical records for 20 species are reported, including three new national records for Argentina - Gynacantha mexicana, Rhionaeschna cornígera and Triacanthagyna caribbea - and 19 new provincial records from 17 species. Two of them involve large range expansions since they were previously known only from the east of the country, viz. Brachymesia herbida and Macrothemis hemichlora. Other records involve moderate to small range extensions for 15 species. Photographs of diagnostic characters are given for all the species." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical, CONICET-Univ. Nacional de Tucumán, Fac. Ciencias Naturales, Ciudad Universitaria, Horco Molle (4107), Tucumán, Argentina. E-mail: carlosmolineri@gmail.com

16950. Rojas, D.; Rojas, M.A. (2018): Observación de cópulas de Sympetrum sinaiticum Dumont, 1977 (Odonata, Libellulidae) en Cádiz y nuevo registro para Almería (Andalucía, España). Revista gaditana de Entomología 9(1): 321-323. (in Spanish, with English summary) ["Copulations of S. sinaiticum are observed in the province of Cadiz and a new location for the species is added in the province of Almeria." (Authors) 11-XI-2018, El Gastor (30STF98).] Address: Rojas, D., 11380, Tarifa, Cádiz, Spain. E-mail: danrp93@gmail.com

16951. Rossi, R., Savoldelli, P.; Sindaco, R. (2018): Climate change and species distribution: the case of Calopteryx haemorrhoidalis (Odonata Calopterygidae) in Piedmont (Italy). Boll. Soc. Ital. Entomol. Ital. 150(3): 107-110. (in English, with Italian summary) ["Climate change affects species and biological systems in several ways and is documented to be responsible of species distribution shifts. Odonata are reported to respond quickly to climate change, and in last years several Mediterranean species have expanded their range northwards in Europe. In this note, we report the first records of reproductive populations of C. haemorrhoidalis in Piedmont (NW Italy), suggesting a northwards latitudinal shift of the range of the species in Italy. The reports of Mediterranean dragonflies and damselflies that in the last years have been recorded for the first time in Piedmont are also outlined." (Authors)] Address: Rossi, Roberta, via Fatebenefratelli 4, 10137 Torino, Italy. E-mail: robertarossipg@gmail.com

16952. Saha, P.D.; Rahane, S.; Gaikwad, S.M. (2018): Alpha diversity and species assemblage of Odonata from different habitats in Pune-Chindchwad Municipal Corporation (PCMC) area, Pune, Maharashtra. International Conference on Frontiers in Life and Earth Science 5(1): 184-191. (in English) ["The present work is aimed to study diversity and abundance of Odonata of Pimpri-Chinchwad Municipality in Pune city of Maharashtra in Northern western Ghats. This study has been carried out for one year from June 2016 to March 2017. A total number of 32 species under 6 families was observed. The most abundant family was Libellulidae comprising 20 species followed by Coenagrionidae comprising 6 species, Chlorocyphidae comprising 2 species, Lestidae with 2 species, Aeshnidae and Platycnemidae comprising of 1 species. Assemblage of different species in relation to their habitat diversity and diversity indices were also reported." (Authors)] Address: Saha, P.D., Dept of Zoology, Modern College of ACS, Shivajinagar, Pune, Maharashtra, India

16953. Saha, S.K.; Mondal, A. (2018): Abundance and diversity of Odonata in and around Uttarpara, Hoogly, West Bengal. Heritage 5: 120-124. (in English) ["A study on the abundance, species richness and diversity of Odonate fauna in and around Uttarpara, West Bengal was conducted during October 2015 to March 2016. A total of 209 specimens of odonates belonging to 2 families and 21 species under two suborders were recorded during the entire study period. Highest species richness and diversity were observed in habitat A (21, 1.25) followed by habitat C (19, 1.18) and habitat B (12, 1.04) respectively. We observed that the habitat A is most diverse in odonate fauna." (Authors)] Address: Saha, S.K., PG Dep Zoology, Bethune College, Kolkata-6, India

16954. Salvador-Vilariño, V.S.; Osorio, C.; Rodríguez Esteban, M. (2018): Nuevos datos sobre la distribución de Calopteryx haemorrhoidalis (Vander Linden, 1825) (Odonata: Calopterygidae) en el noroeste ibérico (Castilla y León-Galicia, España). Arquivos Entomolóxicos 19: 169-173. (in Spanish, with English summary) [" C. haemorrhoidalis is recorded for the first time in the provinces of León and Zamora (Castilla y León), being described the presence of an isolated population of

the species in the sub-basin of the Sil River (León) and the existence of small populations in the Spanish side of the Duero River basin (Zamora-Salamanca). In addition, the occurrence of a population in inland waters of the Ulla River subbasin in the provinces of Pontevedra and A Coruña (Galicia) is also presented." (Authors)] Address: Salvador-Vilariño, V., Plaza Juan Pablo II, 7, 4ºB. 47015 Valadolid, Spain. E-mail: victor.salvador@jcyl.es

16955. Sánchez-Guillén, R.A.; Ott, J. (2018): Genetic consequences of range expansions along several fronts in Crocothemis erythraea. International Journal of Odonatology 21(2): 81 -91. (in English) ["Global warming has altered the ranges of many species, especially those of insects and other ectotherms that are particularly susceptible to rising temperatures. Four decades ago, C. erythraea began to demonstrate northern range expansion in Germany, as well as in Belgium, the Netherlands, Poland and the UK. The rapid range expansion of C. erythraea has highlighted the capacity of this dragonfly for dispersal, making this species a good model to investigate the genetic consequences of expansions from several fronts. We predict that the recently established populations of C. erythraea in central Europe (Germany & Switzerland) will show only a minimal reduction in genetic diversity (because founders may derive from a broader set of core populations) with respect to populations from core regions of this species, and an increase in the genetic differentiation (given the multiple independent expansion axes along the broad front). To test our hypothesis, we compared genetic variation, in terms of genetic diversity and genetic differentiation using two mitochondrial genes (cytochrome b and NADH dehydrogenase), between central Europe and three core regions (south-west Europe, Italy and Africa). Results were in concordance with our hypothesis: populations from central Europe did not show a significant reduction in the overall genetic diversity but were highly differentiated from Africa, Italy and south-west Europe populations." (Authors)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

16956. Sanchez Herrera, M.; Beatty, C.; Nunes, R.; Realpe, E.; Salazar, C.; Ware, J.L. (2018): A molecular systematic analysis of the Neotropical banner winged damselflies (Polythoridae: Odonata). Systematic Entomology 43(1): 56-67. (in English) ["The Neotropics are a hotspot of global diversity for many groups of organisms, including the dragonflies and damselflies (Insecta: Odonata). While the number of biodiversity surveys and new species descriptions for Neotropical odonates is increasing, diversity in this region is still under-explored, and very few studies have looked at the genetic and morphological diversity among (and within) species. Here, we present an overview of the evolutionary history of the Neotropical damselfly family Polythoridae. The family comprises 57 species across seven genera: Chalcopteryx, Chalcothore, Cora, Euthore, Miocora, Polythore and Stenocora. Using a multi-locus approach, mitochondrial (COI, ND1, 16S) and nuclear (18S, 28S, EF1-alpha) genes were concatenated to estimate phylogenetic relationships. Our results support five monophyletic clades, which were not always congruent with the genera previously considered to be monophyletic. Only Polythore was recovered as monophyletic, and within it there was geographical structure. We propose the following new genus-level classification: Chalcothore, Chalcopteryx, Cora s.s., Cora s.l., Miocora, Euthore s.l and Polythore. In addition, we proposed the following new combinations: Miocora aurea comb.n., Miocora chirripa comb.n., Euthore confusa comb.n., Euthore klenei comb.n., and Euthore terminalis comb.n., based on our phylogenetic analyses, our evaluation of morphological characters and their geographical distribution: these data each support the monophyletic entities we recover here." (Authors)] Address: Sanchez Herrera, Melissa, Biology Program, Faculty of Natural Sciences and Mathematics, Universidad del Rosario, KR 24 63C–69, Bogota 111221, Colombia. E-mail: melsanc@gmail.com

16957. Sansault, E.; Le Naour, A.; baeta, R.; Pincebourde, S. (2018): Génétique et télémétrie, deux outils au service de la connaissance de Leucorrhinia caudalis (Charpentier, 1840) (Odonata, Libellulidae). Revue scientifique Bourgogne-Franche-Comté Nature 27: 313-316. (in French, with English summary) ["Genetic analyses and telemetry are new tools for a better understanding of how L. caudalis populations are connected to each other and what habitats are used during the maturation stage. In Indre-et-Loire we showed a relatively low genetic differentiation between two groups of populations 70 km away to each other. This result may highlight a recent and widespread dispersal phenomenon. On a more local scale, the use harmonic radar and 20 mg passive tags during the maturation stage showed the importance of the canopy in deciduous forests." (Authors)] Address: Le Naour, Aurélia, Institut de Recherche sur la Biologie de l'Insecte (IRBI) - UMR 7261 CNRS/Université de Tours - 37200 Tours, France

16958. Sasamoto, A.; Vu, V.L. (2018): Description of a new species of Cephalaeschna (Odonata: Anisoptera: Aeshnidae) from northern Vietnam. Zootaxa 4471(2): 334-340. (in English) ["C. yanagisawai sp. nov. from northern Vietnam (Hoang Lien National Park, Lai Chau Province, 103°45'E, 22°20'N, 1900~2000 m a.s.l.), is described and illustrated. This species can be differentiated from the other species of the genus by body maculation, the morphology of the male anal appendages, and female postero-ventral S10 tergite projecting posteriorly, which is a rare feature in the genus." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shiki-gun, Nara Pref., Japan. E-mail: akssmt@sea.plala.or.jp

16959. Schmidt Dalzochio, M.; Renner, S.; Sganzerla, C.; Prass, G.; Ely, G.J.; Salvi, L.C.; Dametto, N.; Périco, E. (2018): Checklist of Odonata (Insecta) in the state of Rio Grande do Sul, Brazil with seven new records. Biota Neotropica 18(4): e20180551: 14 pp. (in English, with Portuguese summary) ["The regional knowledge of species diversity and distribution is important to support conservation strategies for species and their habitats. The main goal of this work is to present a checklist of Odonata species in the state of Rio Grande do Sul, as well as their known locations in the municipalities. The preparation of the list was based in data gathered from collections of Museu de Ciências da Universidade do Vale do

Taquari (UNIVATES), Laboratório de Ecologia e Evolução da Universidade do Vale do Taquari (UNIVATES), Museu de Ciências Naturais da Fundação Zoootânica, Museu de Zoologia da Universidade do Vale do Rio dos Sinos (UNISINOS) plus data extracted from 65 publications and the sites SpeciesLink, All Odonata and Puget Sound University. A total of 182 Odonata species were recorded, spanning nine families and 57 genera. The most representative family was Libellulidae (80 species) followed by Coenagrionidae (41 species) and seven species are new records for Rio Grande do Sul. The list of species presented here is a significant advance compared to previous counts for Rio Grande do Sul, however, our list is by no means a final one. Some regions of the state remain poorly explored, such as the border to Uruguay also in the northernmost part of the state. Several families remain poorly sampled, especially those that inhabit small forested streams and probably there are many specimens which are not cataloged and identified yet in scientific collections, both in the state and in the country." (Authors)] Address: Schmidt Dalzochio, Marina, Universidade do Vale do Taquari, Laboratório de Ecologia e Evolução, Lajeado, RS, Brasil. E-mail: mahsdalzochio@gmail.com

16960. Schmitz, M. (2018): Veränderungen der Odonatenfauna im FFH-Gebiet Heisinger Ruhraue von Mitte der 1980er Jahre bis 2015. Libellula 37(3/4): 55-78. (in German, with English summary) ["Changes in the Odonata fauna of the Heisinger Ruhraue from the mid 1980s to 2015 - In the Heisinger Ruhraue Odonata surveys were carried out in the mid 1980s. The results are compared to those of field studies in 1999-2007 and 2009-2015, covering a period of more than 30 years in all. The Heisinger Ruhraue is a Special Area of Conservation under the European Union's Habitats Directive. It consists of the river Ruhr and its floodplain with different types of standing water bodies. From 2003 to 2005 new habitats were created through the implementation of compensation measures. 36 Odonata species have been recorded so far, for 29 breeding was proven or is strongly suspected. The total number of species rose over the years and comprises species of all dragonfly associations described for riverine habitats. The Heisinger Ruhraue is an especially valuable habitat for dragonflies close to the metropolitan Ruhr area and of importance beyond that and neighbouring regions. The highest number of (breeding) species was recorded in 1999-2007. Dragonflies increased due to recolonisation by species inhabiting rivers and streams (following improvement of water quality), the occurrence of Mediterranean species expanding their ranges (climatic changes) and as a consequence of the newly created habitats, supporting thermophile species of shallow open water bodies. The new habitats were subject to vegetative succession and after a few years partly overgrown by higher plants and trees. As a result of vegetative growth and eutrophication at the newly created and other water bodies several species decreased or have not been recorded in the last years. The natural dynamic is restricted in the Stretch of the river Ruhr where the Heisinger Ruhraue is situated. Thus more measures for river development and renaturation are needed to maintain suitable habitats for the different species of dragonfly." (Author)] Address: Schmitz, M., Birkenhang 37, D-42555 Velbert-Langenberg, Germany. E-mail: mich.schmitz@gmx.de

16961. Schneider, T.; Ikemeyer, D.; Dumont, H.J. (2018): Crocothemis sanguinolenta new for Iran – an example of influx of African Odonata across the Strait of Hormuz (Odonata: Libellulidae). Odonatologica 47(3/4): 219-228. (in English) ["On 14-vii-2018, C. sanguinolenta (Burmeister, 1839) was found in a ditch with clear, cold, fast flowing water near Khabr in Kermãn, southern Iran (28.7241°N, 56.3298°E; 1 979 m a.s.l.). A male was observed perching on a stone in the water and a pair in the wheel was collected. To our knowledge C. sanguinolenta is new for Iran and new for Asia outside of the Arabian Peninsula and the Levant. As winters are cold in the Hazaran Mountain region, reproduction may fail. We speculate that both C. sanguinolenta and Zygonyx torridus regularly establish bridgeheads across the Strait of Hormuz between Oman and southern Iran, supported by favourable weather during summer." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

16962. Schorr, M.; Kosterin, O.E.; Borisov, S.N.; Marinov, M. (2018): Anormogomphus kiritshenkoi Bartenev, 1913 (Odonata: Gomphidae): a literature review of the variable spelling of the species epithet, choice of the correct spelling and notes on the type locality of the species. Zootaxa 4370(4): 439-445. (in English) ["The spelling of the specific name of an Anormogomphus species in its original description by Bartenev (1913) was variable, kiritshenkoi (5 times) vs kiritschenkoi (1 time). Bartenev himself did not mention this species in his further publications. Later authors proceeded to use different spelling versions of this name, including those not in the original paper. According to the International Code of Zoological Nomenclature (ICZN), the valid spelling should be chosen by the First Reviser. Acting as such, we choose as valid the name spelling Anormogomphus kiritshenkoi Bartenev, 1913, since it predominates in the original description, appears in the species subtitle, and is a proper transliteration from Cyrillic to Latin. It also corresponds to the spelling of his name used by A.N. Kiritshenko himself. Information of the type locality of the species is provided." (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

16963. Sconfietti, R.; Pesci, I.; Paganelli, D. (2018): Terrace springs: habitat haven for macrobenthic fauna in the lower plain of the River Ticino (Lombardy, Northern Italy). Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano, 5 (2): 19-26. (in English, with Italian summary) ["Springs are important environments between hypogean and epigean habitats; the interaction between aquatic and terrestrial ecosystems is an important factor for their biotic communities. We investigated the ecology of the macrobenthic community of two lowland springs in the River Ticino valley, focusing on the autoecology of some relevant species and on the role of springs as hotspots of biodiversity in an area threatened by anthropogenic pressure. We collected 26 taxa in total: Diptera (8),

Trichoptera (6), gastropods (5), Coleoptera (2), Crustacea (2), Lumbricidae (1), Odonata (1) [Cordulegaster boltonii], Plathelminthes (1). Some of them are stenothermal and oligotrophic species thus quite unusual for a flood plain area characterized by intensive agricultural activities. In conclusion, our study highlights the importance of lowland springs in conserving some habitat-selective macrobenthic species." (Authors)] Address: Paganelli, D., Dept of Earth and Environmental Sciences, University of Pavia, Via S. Epifanio 14, 27100 Pavia, Italia. E-mail: daniele.paganelli@unipv.it

16964. Seehausen, M. (2018): Orthetrum chrysostigma, the first predominantly African dragonfly species, introduced to a European country via aquarium trade (Odonata: Libellulidae). Notulae odonatologicae 9(1): 6-10. (in English) ["In October 2017 a dragonfly larva has been found in a private aquarium in the city of Leimen, Baden-Württemberg, Germany. It emerged on 30-xi-2017 and the imago has been identified as a female O. chrysostigma. This is the first record of a predominantly African species introduced via the aquarium trade to Europe and Germany." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16965. Seehausen, M. (2018): „H. Sauter s Formosa-Ausbeute" und weitere Libellen aus Asien und Papua-Neuguinea im Übersee-Museum Bremen (Insecta: Odonata). TenDenZen 2014 (2018), Jahrbuch XXII, Übersee-Museum Bremen: 103-118. (in German, with English summary) ["The Odonata from Asia and Papua-New Guinea in the collection of the Übersee-Museum Bremen/Germany were determined and catalogued. The biggest part from one source is a collection of Taiwanese dragon- and damselflies from Hans Sauter which were not published before. Furthermore there are Asian specimens from Borneo, China, India, Malaysia, Sri Lanka, Thailand, Japan and Java. Most remarkable is the re-discovery of an excollection of M. E. de Selys Longchamps which was given to Bremen in 1875. Additionally some specimens of Neurothemis stigmatizans collected in Papua New-Guinea are listed. Lestes cf. concinnus, Orthetrum luzonicum, Pseudothemis zonata and Sympetrum baccha arenot mentioned by F. Ris in his publications ab out the taiwanese specimens of Hans Sauter. The female of Prodasineura croconota was labeled by Erich Schmidt as "AIlotype" in 1931. Because there was no publication about a description of this female and Ris described two male specimens from different places this status is wrong. Very raretobe found in collections is Aristocypha fulgipennis. Unfortunately there isawrang labei at this specimen with ("Java") as supposed finding locality. This species is only known from Vietnam, Laos and Cambodia. Two specimens of original syntype series were found in the duplicate collection of Selys: Dysphaea dimidiata ("race limbata") and Rhinocypha trifasciata. These have been published more detailed before with a catalogue ofthe complete ex-collection. Also published before was the first record of Matrona basilaris from Hongkong. They were, tagether with specimens of Euphaea opaca, collected by J. T. Lauts between 1878 and 1907. Of E. opaca there was only one historical record before. Also not often tobe found in collections is Epophthalmia vittata. This species was collected, tagether with some others, by Tiefermann who was inmate atthe British detention center Ahmednagar in India between 1914 and 1918. One specimen of Macromia mooreiwhich was mentioned by M.A. Lieftinck could not be found and must be declared as lost. Also there are records of four dragonfly species collected offshore on board of a ship in the Andaman Sea between Andaman-Islands and Mergui Archipelago in the collection." (Author)] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum fur Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16966. Seehausen, M. (2018): Anax guttatus erstmals über den Aquaristikhandel nach Deutschland importiert (Odonata: Aeshnidae). Libellula 37(1/2): 91-96. (in German, with English summary) ["In April 2018 five aeshnid larvae were found in a home aquarium in Maintal-Bischofsheim (Hesse). They were transferred to the author and three female Anax guttatus emerged. Two larvae died, having been eaten by conspecifics. This is the first record of an introduction of A. guttatus in Germany." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich–Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

16967. Seifert, M. (2018): Neufunde von Sympetrum meridionale (Selys, 1841) (Odonata: Libellulidae) in Ostthüringen und Westthüringen, mit Gesamtdarstellung bisheriger Funde in Thüringen. Thüringer Faunistische Abhandlungen 23: 105-115. (in German, with English summary) ["In July and August 2018 new discoveries of S. meridionale were made and evidence of reproduction was found at three different sites in Thuringia. The circumstances of the new records are described and discussed with reference to habitat structures amongst other factors. All new and previous observations are summarized graphically and as tables, with the aid of the technical information System for nature Conservation, which serves as data storage for the „Arbeitskreis Libellen Thüringen“ (Dragonfly work group Thuringia)." (Author)] Address: Seifert, M., Strenzfelder Allee 10, 06406 Bernburg, Germany. E-mail: Micha-Seifert-web@web.de

16968. Sellam-Bouattoura, N.; Attou, F.; Arab, A.; Samraoui, B. (2018): Odonata of the Mazafran hydrosystem: distribution and community structure. Revue d'Ecologie 73(4): 537-549. (in English, with French summary) ["One of the objectives of our study is to increase our knowledge of the Odonata in the Mazafran hydrosystem, located in the centre of northern Algeria. This unexplored region in terms of Odonatology, is characterized by its sub-humid Mediterranean climate, and a dry period spread over six months, from May to the end of October. The prospection of 19 sites distributed along the Mazafran hydrographic system during 24 months, from April 2013 to March 2015, allowed us to identify 948 adults involving 15 species. Calopteryx haemorrhoidalis (33.1 %) and Platycnemis subdilatata (20.5 %) were the most abundant and frequent species.

The results revealed the presence of Ischnura pumilio, which is currently relatively rare in the overall Maghreb. Both the physicochemical and climatic characteristics of the various wadi influenced the Mazafran hydrographic system. The seasonal change of flow rate led to a dramatic increase in water temperature and had a considerable impact on sites located at low elevation. Cumulative effects of urban and industrial effluents, river bed degradation, illegal pumping of water for agricultural purpose and reduction of riparian canopy influence the Odonata community and lead to a decrease of species richness and diversity. We urge decision-makers to take urgent steps for the restoration of the natural state and functioning of wadi systems throughout Algeria before their irreversible destruction."] Address: Sellam-Bouattoura, Nassima, Laboratory of Dynamics and Biodiversity, FSB, USTHB, LP 32 El Alia, Bab Ezzouar. Algiers, Algeria. E-mails: sellamnassima@gmail.com

16969. Senouci, H.; Bounaceur, F. (2018): Contribution to the study of diversity and abundance of odonates in some wet biotopes in Tiaret region, Algeria. Plant Archives 18(1): 555-560. (in English) ["This research was realised by systematic monitoring during three successive months from April to Jun 2014 in the hydrographic system of Tiaret-Algeria. Sampling was carried from 09 stations in order to explore the species richness and diversity of Tiaret's Odonata, which never has been explored before. A first list of 11 species has been established: 8 species of Zygoptera belonging to: Lestidae, Platycnimididae, Calopterigidae and Coanagronidaes and 3 species of Anisoptera) belonging to: Ashenidae, Libelliludea and Gomphidaes." (Authors)] Address: Senouci, H., Laboratory of Agro-biotechnology and Nutrition in Semi-arid Areas, Faculty of Natural and Life Sciences, Dept of Biology, Compuskarman University, Ibn Khaldoun of Tiaret, Algeria. E-mail: ha-senouci@outlook.fr

16970. Serdar, O.; Verep, B. (2018): The investigation of water quality of Iyidere and Çiftekavak streams using physicochemical and biotic indexes. Int. J. Pure Appl. Sci. 4(1): 61-71. (in English) ["An investigation was carried out on the streams of Çiftekavak and Iyidere in Rize between April 2010 and March 2011. Water samples were taken monthly from the station which chosen six sample points on Iyidere and two sample point on Çiftekavak Stream. Water quailty was evaluated with the standard physicochemical analysis (water temperature, pH, dissolved oxygen, oxygen saturation, electrical conductivity, suspended solid, total hardness, Ca hardness, Mg hardness, biological oxygen demand, nitrite nitrogen, total phosphate) like parameters were determined according to the Inland Water Resources Criteria, Water Pollution Control Regulation. With this study, it was aimed to determine the water quality of 8 stations at Iyidere and Çiftekavak Streams. It had been determined that the physicochemical data were not contaminated with Iyidere grade. However, Çiftekavak Stream had been determined that the pollution be under threat at the level. Benthic macroinvertebrates were analysed and compared with the measurement of parameter. In this study, as biomarker indexes, seven different biotic index such as SI (Saprobi Index), FBI (Family Biotik Index), BMWP (Biological Monitoring Index Scores), BBI (Belgium Biotic Index), ASPT (Medium Taxon Index) and EPT (Ephemeroptera Per Taxon) taxon number were used in evaluation. During the period of this study, 27 taxas which belong to Ephemeroptera, Amphipoda, Tricladida, Coleoptera, Decapoda, Rhynchobdellida, Odonata, Diptera, Trichoptera, Plecoptera, Tubificida and Arthropoda were identified. The Ephemeroptera taxa was the highest abundance values in benthic macroinvertebrates. With this study, it was aimed to determine the water quality at 8 stations at Çiftekavak and Iyidere. Both biologic and physicochemical yields were found to result in unpollution of the Iyidere Stream level. However, Çiftekavak stream was found to be under the threat of pollution." (Authors)] Address: Serdar, O., Munzur University, Fisheries Faculty, Tunceli, Turkey. E-mail: osmanserdar@munzur.edu.tr

16971. Shakur, M. (2018): An annotated checklist of Odonate fauna from southern marwar region of Rajasthan. (India). International Journal of Current Research 10(9): 73131-73135. (in English) ["Odonates were sampled from 3 sites i.e; 1. Jawai Dam, 2. Near Bijapur and 3. Jawai river near Aravalli. Southern Marwar region of Rajasthan reported 14 species belonging to Libellulidae and 5 species to Zygoptera. Orthetrum cancellatum, Trithemis annulata and Rhodischnura nursei are recorded for the first time." (Authors)] Address: Shakur, M., Biodiversity Research Lab., Zoology Dept, Maharshi Dayanand Saraswati University, Ajmer -305009, Rajasthan, India

16972. Sharma, M. (2018): A note on Brachydiplax chalybea Brauer, 1868: A first record from Nepal. International Journal of Entomology Research 3(6): 29-30. (in English) [Morang, Nepal, 9-VIII-2018 from running water of Gokarna resort, Sundarharaicha Municipality, Morang District, Nepal. (Author)] Address: Sharma, M., Central Department of Zoology, Tribhuvan University, Kalthmandu, Nepal

16973. Sharma, M.; Oli, B.R.; Awasthi, S.; Subedi, N.; Pokhrel, P.R. (2018): Dragonflies and damselflies (Insecta: Odonata) of western Nepal: A checklist. International Journal of Fauna and Biological Studies 5(6): 140-146. (in English) ["This paper deals with the first comprehensive checklist of odonate species recorded in western Nepal. The present checklist is based on field survey from May 2017 to October 2018 in six different locations of western Nepal which reveals that there are 61 Odonata species belonging 40 genera and 11 families. Family Libellulidae was dominant representing 28 species. Recorded species were common in all regions of Nepal except Epophthalmia frontalis which was reported from western and central regions. Local status of recorded species also identified. Accordingly, two species were very common, 26 common, 30 fairly common species and 3 rare species to this region." (Authors)] Address: Sharma, M., Central Dept of Zoology, Tribhuvan University, Kathmandu, Nepal

16974. Shi, G.C.; Wang, M.L.; Zhu, Y.Y.; Shen, L.; Ma, W.L.; Wang, Y.H.; Li, R.F. (2018): Dragonfly wing decorated by gold nanoislands as flexible and stable substrates for surface-enhanced Raman scattering (SERS). Scientific Reports 8, Article number: 6916: 11 pp. (in English) ["A flexible and

stable biomimetic SERS substrate was successfully fabricated by depositing gold (Au) nanoislands on the dragonfly wings (DW) via a simple DC magnetron sputtering system. Characterizations of the Au/DW nanostructure indicated that the optimum Au/DW-45 (sputtering time was 45 min) substrate owns high sensitivity, good stability and outstanding reproducibility. The limit of detection (LOD) for Rhodamine 6 G (R6G) was as low as 10-7 M and enhancement factor (EF) was calculated to be 2.8 × 106. 70-day-duration stability tests showed that Raman intensity of R6G reduced only by 12.9% after aging for 70 days. The maximum relative standard deviations (RSD) of SERS intensities from 100 positions of Au/DW-45 substrate were less than 8.3%, revealing outstanding uniformity and reproducibility. Moreover, the flexible Au/DW-45 bioscaffold arrays were employed to solve the vital problem of pesticide residues. By directly sampling from tomato peels via a “press and peel off” approach, cypermethrin has been rapidly and reliably determined with a LOD centered at 10-3 ng/cm2 and a correlation coefficient (R2) of 0.987. The positive results demonstrated that the Au-based DW biomimetic arrays may offer an efficient SERS platform for the identification of various pesticide residues on real samples." (Authors)] Address: Ma, W.L., Dep Mathematics, NC State Univ., Raleigh, 276968205, USA. E-mail: wml@ysu.edu.cn

16975. Sindaco, R.; Savoldelli, P.; Bombonata, D. (2018): Le libellule (Insecta: Odonata) di interesse comunitario in Piemonte: lo stato attuale delle conoscenze. Rivista piemontese di Storia naturale 39: 373-388. (in English) ["The state of knowledge on the Odonata of European concern in Piedmont is updated. With the exception of Coenagrion mercuriale, for the remaining four species included in the annexes II and IV of the Habitats Directive 92/43/EEC, current data show ranges of comparable or greater extension than those historically known. The increase of known localities for Sympecma paedisca, Gomphus flavipes and Ophiogomphus cecilia is most likely due to the intensification of research in the last decade. Instead, the increase of Oxygastra curtisii could be due to a genuine expansion of the range." (Authors)] Address: Sindaco, R., I.P.L.A. – Istit. per le Piante da Legno e l’Ambiente, corso Casale 476, 10132 Torino, Italy. E-mail: sindaco@ipla.org

16976. Smit, J.T.; Dijkstra, K.-D.B.; Beentjes, K.; Miller, J.; Madden, H.; van der Hoorn, B. (2018): First records of Odonata from Sint Eustatius, Dutch Lesser Antilles. Notulae odonatologicae 9(2): 78-82. (in English) ["Six species of dragonflies are recorded for the island of Sint Eustatius, Lesser Antilles. Breeding records are established for four out of the six species, despite the lack of natural fresh water sources. DNA barcoding was used to match the larvae with the adults." (Authors)] Address: Smit, J.T., European Invertebrate Survey – the Netherlands / 2 Naturalis Biodiversity Centre, PO Box 9517, 2300 RA Leiden, the Netherlands. E-mail: John.Smit@naturalis.nl

16977. Smith-Herron, A.J.; Cook, T.J. (2018): Gregarines infecting Ischnura spp. in Louisiana, U.S.A., including description of Geneiorhynchus gradalis n. sp. (Apicomplexa: Actinocephalidae: Actinocephalinae) from Ischnura ramburii (Odonata: Zygoptera) in St. John the Baptist Parish, Louisiana, U.S.A. Comparative Parasitology 85(1): 42-47. (in English) ["Geneiorhynchus gradalis n. sp. (Apicomplexa: Eugregarinida: Actinocephalidae: Actinocephalinae) is described from adults of I. ramburii. Geneiorhynchus gradalis is placed generically by way of its hesperidiform oocysts being released via simple rupture, by the fact that the epimerite is hemispherical and bears many semifalciform spines, and because association occurs late, just prior to syzygy. This species is distinguished from other members of the genus by its distinct oocyst morphometrics (narrowly hesperidiform with distinct bipolar truncations) and by the fact that its epimerite is shallowly toroid, bearing a single anterior row of semifalciform spines and becoming filamentous in mature forms with an absent tumidus. Its diamerite is meager. Herein we describe the new taxon while providing new host and locality records for known actinocephalid gregarines in Louisiana." (Authors)] Address: Smith-Herron, Autumn, Texas Invasive Species Inst., Sam Houston State Univ., Huntsville, Texas 77341, USA. E-mail: smith-herron@shsu.edu

16978. Soh, J.; Leng, G.; Fawzi, S.; Thomas, N.; Ngiam, R.W.J. (2018): New record of the dragonfly, Anax panybeus, in Singapore. Singapore Biodiversity Records 2018: 19-21. (in English) [Pulau Ubin, NParks office at Pulau Ubin Volunteer Hub; 10-X-2017] Address: Ngiam, R.W.J., National Parks Board, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569. E-mail: yanrobin@hotmail.com

16979. Solano, E.; Hardersen, S.; Audisio, P.; Amorosi, V.; Senczuk, G.; Antonini, G. (2018): Asymmetric hybridization in Cordulegaster (Odonata: Cordulegastridae): Secondary postglacial contact and the possible role of mechanical constraints. Ecology and Evolution. 2018 DOI: 10.1002/ece3.4368: 15 pp. (in English) ["Two Cordulegaster dragonflies present in Italy, the Palaearctic and northern distributed C. boltonii and the endemic to the south of the peninsula C. trinacriae, meet in central Italy and give rise to individuals of intermediate morphology. By means of mitochondrial and nuclear markers and of Geometric Morphometrics applied to sexual appendages, we defined i) the geographical boundaries between the two species in Italy and ii) we determined the presence, the extent, and the genetic characteristics of the hybridization. Genetic data evidenced asymmetric hybridization with the males of C. trinacriae able to mate both interspecifically and intraspecifically. The results contrast with expectations under neutral gene introgression and sexual selection. This data, along with the morphological evidence of significant differences in size and shape of sexual appendages between the males of the two species, seem indicative of the role of mechanical constraints in intraspecific matings. The origin of the two species is dated about to 1.32 Mya and the hybridization resulted related to range expansion of the two species after Last Glacial Maximum and this led to the secondary contact between the two taxa in central Italy. At last, our results indicate that the range of C. trinacriae, a threatened and protected species, has been moving northward probably driven by climate changes. As a result, the latter species is currently intruding into the range of C. boltonii. The hybrid area is quite extended and the hybrids seem well adapted to the environment. From a conservation

point of view, even if C. trinacriae has a strong genetic identity, the discovery of hybridization between the two species should be considered in a future species management." (Authors)] Address: Antonini, Gloria, Dep Biol. & Biotech. "Charles Darwin", Univ. Rome "La Sapienza", Via Alfonso Borelli 50, 00161 Rome, Italy. Email: gloria.antonini@uniroma1.it

16980. Solis, M.; Bonetto, C.; Marrochi, N.; Paracampo, A.; Mugni, H. (2018): Aquatic macroinvertebrate assemblages are affected by insecticide applications on the Argentine Pampas. Ecotoxicology and Environmental Safety 148: 11-16. (in English) ["Highlights: •Land use in the basin affects the macroinvertebrate assemblages in Pampas streams. •Nutrient concentrations are higher in streams adjacent to crops. •Endosulfan was measured in sediments from cropped streams; a stream with a buffer strip contained lower concentrations. •Macroinvertebrate assemblages in the agricultural streams were different from those in the livestock and reserve streams. Abstract: Agriculture intensification in Argentina has increased agrochemicals consumption in the last decades and might represent an environmental risk for adjacent water bodies. The objective of the present work was to assess the effect of land use on water quality and invertebrate assemblages in the Argentine Pampas streams. Eight streams were sampled on 4 occasions during the 2013/14 growing season. Three streams are located within a biosphere reserve, two drain basins with extensive livestock fields, and three run through intensively cultivated plots; one of them contained a 30 m wide uncultivated grass-covered strip between the crop and the stream. Macroinvertebrates were sampled from emergent vegetation by means of a D-net with a 500 μm pore size, and 30 cm diameter. Higher nutrient concentrations were measured in the agricultural streams. Endosulfan was measured in sediments of the agricultural streams, concentrations being significantly lower in the stream with the buffer strip. Invertebrate assemblages in the cropped streams were significantly different from those in the livestock and reserve streams, those in the latter not being different from each other. Ampullaridae (Pomacea canaliculata) and Planorbidae (Biomophalaria peregrina) were the taxa best represented in the agricultural streams. Hyalellidae (Hyalella curvispina), Zygoptera and Planorbidae (B. peregrina) were the taxa best represented in the reserve and livestock streams. Present evidence suggests that the observed differences in the invertebrate composition in the agricultural streams were related with the impact of agrochemicals and that buffer strips represent a useful attenuation practice. Cattle breeding on natural pastures represented a land use with low impact on the invertebrate assemblages." (Authors)] Address: Solis, Marina, ILPLA (Instituto de Limnología "Dr. Raúl A. Ringuelet"), UNLP, FCNyM, CONICET, Boulevard 120 y 62, La Plata, Buenos Aires, Argentina. E-mail: marinasolis@ilpla.edu.ar

16981. Somwanshi, N.R.; Sonawane, A.R.; Khandagle, A.J. (2018): New report of Zyxomma petiolatum (Rambur, 1842). Odonates from Daund Tehsil, MS: India. International Conference on Frontiers in Life and Earth Science 5(1): 143-146. (in English) ["Morphological similarity often complicates field identification in insects, leading to data analysis on the basis of geographic distribution over planet. Still working on morphometrical data analysis on some endemic or rare species it's really challenging job with conservation status, that's the reason for taxonomical analysis done in August to October 2017 on Z. petiolatum. The Indian dragonfly genus Zyxomma is a difficult group to identify on field due to their extreme occurrence during mild sunny evening time with higher flier conditions, and shortest information on identification keys, geographical distribution and natural history. Z. petiolatum is commonly known as brown dusk hawk. Primarily based upon the hypothesis that collected specimen may be dragonfly or damselfly as due to showing both characteristic such as, slender abdomen looks like damselfly and spreading of wings, compound eyes, bulgy thorax shown in case of dragonfly. After carefully observing the specimen it showed 8 abdominal segments which were characteristic features of dragonfly." (Authors)] Address: Somwanshi, N.R., Post Graduate Dept of Zoology, Ahmednagar College, Ahmednagar, Maharashtra, India

16982. Sonawane, A.R.; Shendge, A.N.; Doshi, S.S.; Kudale, R.G. (2018): A taxonomical shortnote on Microgomphus torquatus (Anisoptera: Odonata) from Pavana River (Pune District, Ms: India). International Journal of Scientific Research in Science and Technology 5(2): 8-13. (in English) ["M. torquatus (Anisoptera) species belonging to Family: Gomphidae, which is also called as Clubtails. This type of the species commonly identified by their unique eyes, which are well separated and black, brown to yellow colouration. This family derived its name gomphides due to its last abdominal segment which are bulbous, club or dilated downward in shape. As compared to other dragonflies it shows variability in body size. Usually this species shows abdomen about 22-25 mm in length in case of male and 26-27 mm in case of female, Hind wings about 20-22 mm in case of male while 23-24mm in case of the Female. Wings are tinted in colouration with brownish shade and abdomen generally 29- 30 mm in length. They show greenish brown coloration, legs are whitish and also possessing black spines on it. They occur in the habitat from River surroundings with shady vegetations." (Authors)] Address: Sonawane, A.R., Post Graduate Dept Zool., Tuljaram Chaturchand college, Baramati, Pune, Maharashtra, India

16983. St. Clair, C.R.; Fuller, C.A. (2018): Atrazine exposure influences immunity in the Blue Dasher Dragonfly, Pachydiplax longipennis (Odonata: Libellulidae). Journal of Insect Science 18(5): 1-7. (in English) ["Agricultural runoff containing herbicide is known to have adverse effects on freshwater organisms. Aquatic insects are particularly susceptible, and herbicide runoff has the potential to affect immunity in this group. Here we examined the effect of ecologically relevant levels of atrazine, an herbicide commonly used in the United States, on immune function in larvae of P. longipennis during a long-term exposure at ecologically relevant concentrations. Larvae were exposed to concentrations of 0, 1, 5, and 10 ppb atrazine for 3 or 6 wk. Hemocyte counts, hemolymph phenyloxidase (PO) activity, cuticular PO, and gut PO were measured at the end of each trial period as indicators of immune system strength. Atrazine concentration had

a significant effect on hemocyte counts after controlling for larval size. There was a significant interaction between time and concentration for hemolymph PO, cuticular PO, and a marginal interaction for gut PO. The effect of atrazine on the measured immune parameters was often nonmonotonic, with larger effects observed at intermediate concentrations. Therefore, atrazine affects both hemocyte numbers and PO activity over time in P. longipennis, and the changed immune function demonstrated in this study is likely to modify susceptibility to pathogens, alter wound healing, and may decrease available energy for growth and metamorphosis." (Authors)] Address: Fuller, Claire, Dept of Biological Sciences, Murray State University, 2112 Biology Building, Murray, KY 42071, USA. E-mail: cfuller@murraystate.edu

16984. Start, D. (2018): Animal behavior and algal camouflage jointly structure predation and selection. Journal of Evolutionary Biology 31(5): 773-778. (in English) ["Trait variation can structure interactions between individuals, thus shaping selection. While anti-predator strategies are an important component of many aquatic systems, how multiple anti-predator traits interact to influence consumption and selection remains contentious. Here, I use a common larval dragonfly (Epitheca canis) and its predator (Anax junius) to test for the joint effects of activity rate and algal camouflage on predation and survival selection. I found that active and poorly camouflaged Epitheca were more likely to be consumed, and thus survival selection favored inactive and well camouflaged individuals. Notably, camouflage dampened selection on activity rate, likely by reducing attack rates when Epitheca encountered a predator. Correlational selection is therefore conferred by the ecological interaction of traits, rather than by opposing selection acting on linked traits. I suggest that anti-predator traits with different adaptive functions can jointly structure patterns of consumption and selection." (Authors)] Address: Start, D., Toronto, ON, Canada. E-mail: denon.start@mail.utoronto.ca

16985. Stewart, S.S.; Vodopich, D.S. (2018): Seasonal and annual variations on wing shape and wing size of eight damselfly species (Odonata: Calopterygidae, Coenagrionidae). Odonatologica 47(3/4): 245-266. (in English) ["This study examined the effects of seasonal and annual variations on wing shape and wing size of eight damselfly species in central Texas. Comparisons included i) populations collected early in the flight season versus those collected late in the flight season, and ii) populations collected from the same locations during several annual flight seasons. We found widespread differences in both wing shape and body size in males and females among most species examined. Wing shape of male and female damselflies collected early varied significantly from those collected late in the flight season for all locations and years sampled. Damselflies emerging early in the flight season were significantly larger than those emerging late, except for Enallagma civile showing opposite results. Populations of six species sampled in different years at the same location were compared, and significant differences in wing shape and size occurred in no females and in males of only two species. Our results suggest that differences in seasonal and year-to-year environmental conditions frequently influence wing shape and body size in multiple damselfly species." (Authors)] Address: Stewart, Sherry, Dept Biol., Baylor Univ., Waco, Texas 76798-7388, USA. E-mail: Sherry_Stewart@baylor.edu

16986. Subramanian, K.A.; Babu, R. (2018): Insecta: Odonata. In: Faunal Diversity of Indian Himalaya. Published by the Director, Zool. Surv. India, Kolkata: 227-240. (in English) ["The Odonata fauna of Himalaya is documented based on field surveys by the authors and extensive literature study. A total of 257 species under 112 genera and 18 families are reported, of which 23 species are endemic to the region. The eastern Himalaya comprising of Sikkim, Darjeeling and Arunachal Pradesh have high diversity compared to the Western Himalaya. The cold deserts of Ladakh and Lahul and Spiti has very low diversity. There are no records of Odonata from Trans Himalaya of Sikkim. The Odonata of the region is threatened with anthropogenic activities." (Authors)] Address: Subramanian, K.A.; Babu, R., Zoological Survey of India, Southern Regional Centre, Chennai-600 028, India. E-mails: subbuka.-zsi@gmail.com, baburzsi@gmail.com

16987. Subrero, E.; Sforzini, S.; Viarengo, A.; Cucco, M. (2018): Exposure to anti-mosquito insecticides utilized in rice fields affects survival of two non-target species, Ischnura elegans and Daphnia magna. Paddy and Water Environment 17: 1-11. (in English) ["Insecticides are commonly utilized to control mosquito larvae in rice fields. They can, however, have negative effects on both vertebrates and non-target invertebrate species. In this study, we examined the effects of pulse exposition to different concentrations of cypermethrin (0.15, 0.015, 0.0015 mg/L) and diflubenzuron (0.15, 0.015, 0.0015 mg/L) on egg hatching rate, larval growth, and larval survival in Ischnura elegans, and on survival of a crustacean, Daphnia magna. Insecticide exposure had significant negative effects on hatching rate in damselfly eggs. Exposed damselfly larvae also grew less and showed a higher mortality than control larvae. In Daphnia, the acute toxicity test (ISO 6341 in Water quality—determination of the inhibition of the mobility of Daphnia magna Straus (Cladocera, Crustacea)—acute toxicity test, Int Organ Stand Geneve, Geneva, 2012) showed an increased inhibition of mobility in the presence of insecticides. We observed a proportional response in relation to insecticide concentration, such that the highest exposure levels showed the largest reduction of vital performances. Our highest tested values correspond to those currently employed in agriculture. This study suggests that exposure to two common insecticides strongly affects non-target invertebrates even at very low concentration levels (cypermethrin 0.0015 mg/L and diflubenzuron 0.0015 mg/L)." (Authors)] Address: Subrero, Erica, DISIT, University of Piemonte Orientale, Alessandria, Italy

16988. Suhling, F.; Suhling, I. (2018): Dämmerungsaktivität von Boyeria irene an der Örtze (Odonata: Aeshnidae). Libellula 37(3/4): 193-201. (in German, with English summary) ["Crepuscular activity of B. irene at the Oertze River - We report observations on activity and reproductive behaviour of B. irene

in a highly isolated population in northern Germany. We recorded that crepuscular activity Start approximately at sunset and correlated with shifting sunset over the flight season. We also observed mating behaviour during these phases of activity. By comparing our observations with the literature, we conclude that mate finding and mating may be mainly confined to dawn, while oviposition occurs during the day. In addition, we report a case of dispersal, which connects between an older and a more recently established reproduction site." (Authors)] Address: Suhling, F., Insti. Geoökol., TU Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

16989. Supekar, S.C.; Gramapurohit, N.P. (2018): Larval skipper frogs recognise kairomones of certain predators innately. Journal of Ethology 36(2): 143-149. (in English) ["Recognising potential predators is critical for the survival and reproduction of prey animals. However, prey animals may possess an innate ability to recognise the signature odours (kairomones) of only certain native, sympatric predators, while requiring learning to recognise others. Our observations have shown that larval skipper frogs (Euphlyctis cyanophlyctis) fail to recognise kairomones of dragonfly nymph, a common predator of amphibian tadpoles with a cosmopolitan distribution. Hence, we wanted to determine if larval skipper frogs totally lack an innate mechanism to recognise kairomones of all aquatic predators, or have an innate ability to recognise kairomones of only certain predators. In a series of experiments, we tested the antipredator response of larval skipper frogs to kairomones of dragonfly nymph (Bradinopyga geminata); walking catfish (Clarias batrachus); Mozambique tilapia (Oreochromis mossambicus); two species of predatory tadpoles, Indian bullfrog (Hoplobatrachus tigerinus) and Jerdon's bullfrog (Hoplobatrachus crassus); and the checkered keel back snake (Xenochrophis piscator). The results clearly indicate that larval skipper frogs have the innate ability to recognise kairomones of the walking catfish, both species of larval bullfrog and checkered keel back snake. However, they lack the innate ability to recognise kairomones of dragonfly nymph and Mozambique tilapia. Prey choice of the Mozambique tilapia and gape-limitation of dragonfly nymphs could be responsible for the lack of innate responses of larval skipper frogs to them. The study provides empirical evidence for the notion that prey can innately recognise certain predators." (Authors)] Address: Supekar, S.C., Dept Zool., Savitribai Phule Pune Univ., Pune, India

16990. Sybertz, J. & M. Reich (Hrsg.) (2018): Tierarten im Klimawandel in Harz und Lüneburger Heide. Natur und Raum 10, Schriftenreihe Institut für Umweltplanung, Leibniz Universität Hannover: 7-56. (in Gernan, with English summary) ["Within the KLIFF research project, the sensitivity of 227 Red List species (breeding birds, reptiles, amphibians, dragonflies and damselflies, grasshoppers and crickets, and butterflies) to climate change impacts within the "Harz" and "Lüneburger Heide und Wendland" ecoregions, in Lower Saxony, was evaluated. This assessment included the sensitivity of the species towards specific climatic changes as well as their general sensitivity towards environmental changes. Based on the climate projections for these regions up to the end of the 21st century, increasing mean temperatures, an increase of hot extremes, a decrease of cold periods and a shift in annual precipitation regimes (including a decrease of precipitation in summer and an increase of precipitation in winter) can be expected. About half of the examined species are probably not sensitive towards these climatic changes and most of the sensitive species are sensitive to a low to moderate degree. Overall, more species seem to be affected by a decrease of summer precipitation than by an increase of mean temperatures. On average, the examined species are more sensitive towards environmental changes in general than towards specific climatic changes. As assessments of climate change impacts on species are linked with uncertainties, it is important to take these uncertainties into account when developing nature conservation strategies adapted to climate change. Regarding management strategies, the conservation and restoration of wetlands, as well as the promotion of wildlife corridors and habitat connectivity, are of high importance." (Authors)] Address: Reich, M., Inst. für Umweltplanung, Leibniz Univ. Hannover, Herrenhäuser Str. 2, 30419 Hannover, Germany

16991. Szabo, T.; Müller, Z.; Gaspar, A.; Juhasz, P.; Ludanyi, M.; Malnas, K.; Mihaliczku, E.; Olajos, P.; Polyak, L.; Kiss, B. (2018): Contribution to the Hungarian damselfly (Odonata: Zygoptera) fauna, based on nationwide surveys. Folia Historico-Naturalia Musei Matraensis 42: 15-70. (in English) ["Between 1996 and 2017 larvae, exuviae and imagoes of damselflies were collected from 2072 sampling sites in Hungary. Altogether 21 damselfly species … have been recorded. The data for the following species are the most important faunistical results: Lestes macrostigma, Coenagrion ornatum, C. scitulum." (Authors)] Address: Szabó, T., BioAqua Pro Ltd., Soó R. u. 21, H-4032 Debrecen, Hungary. E-mail: szabot@bioaquapro.hu

16992. Tamm, J. (2018): Untersuchungen an Larven und Exuvien der Cordulegaster bidentata an einem Bach im Kaufunger Wald und ihre ökologischen und methodischen Konsequenzen (Odonata: Cordulegastridae). Libellula 37(3/4): 161-180. (in German, with English summary) ["Investigations on larvae and exuviae of C. bidentata at a forest stream in Kaufunger Wald, Germany, and the ecological and methodological consequences - Between 2016 and 2018, a population of C. bidentata was studied in a forest stream in Kaufunger Wald. Whereas 40 exuviae were found, using sieves only five larvae could be detected. The highest density of exuviae were found along a short very stony stream section adjoining a spring outflow. Fine-grained Sediments were almost absent there and larvae could not be found. It is obvious that the larvae of C. bidentata can also live in stream structures other than fine-grained Sediments. In the case given the only possible structures were fissures in the rocky stream bottom, where larvae could not be caught with sieves. The consequences for the larval ecology and sampling methods are discussed. Moreover, sampling of exuviae is recommended for evidence and estimation of population sizes of C. bidentata, because this method has proven to be effective." (Author)] Address:

Tamm, J., Elgershäuser Str. 12, 34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de

16993. Tavares, R.S.; Pestana, G.; Rocha, A.D., Schiavone, D.C.; Guillermo-Ferreira, R. (2018): Come to the dark side: habitat selection of larval odonates depends on background visual patterns. Ecological Entomology 43(5): 640-646. (in English) ["1. Determining which environmental traits enable animals to inhabit and choose preferred habitats is key to understanding ecological processes. Habitat complexity and background colour patterns can act as selective pressures on animal behaviour, and ultimately affect habitat choice. 2. To investigate the role of environmental features on habitat selection, this study looked at whether dragonfly and damselfly larvae show a preference between dark/light or complex environments. Last-instar larvae of Micrathyria didyma and Acanthagrion lancea) were collected in the Neotropical savanna, and five experiments in laboratory conditions were subsequently carried out. The first experiment tested the preference of larvae for leaves in contrast to a white background. The second experiment compared a preference for white and black backgrounds. As both experiments showed a significant preference for darker backgrounds, a predator was included in the black background in the third experiment, and a macrophyte was included in the white background in the fourth experiment. In this way, favourable and unfavourable conditions were included in the habitat of choice. The fifth experiment tested the influence of environmental complexity on habitat choice. 3. The results of these experiments showed that larvae choose darker backgrounds independently of predation risk, and that macrophytes are as attractive as a dark background. They also suggest that the coenagrionid, but not the libellulid, prefer more complex environments. 4. Overall, these findings suggest that larvae exhibit behavioural preferences for background colour and complexity, which may ultimately drive habitat occupation." (Authors)] Address: Guillermo-Ferreira, R., Laboratory of Ecological Studies on Ethology and Evolution (LESTES), Dept of Hydrobiology, Federal University of São Carlos, UFSCar, Rod. Washington Luís km 235 - São Carlos, São Paulo, SP-310 – 13565-905 Brazil. E-mail: rhainerguillermo@gmail.com

16994. Terzani, F. (2018): Ricerche odonatologiche in Toscana. XIV. Il genere Onychogomphus Selys, 1854 (Insecta: Odonata: Gomphidae). Quaderno di Studi e Notizie di Storia Naturale della Romagna 48: 67-74. (in Italian, with English summary) ["New records and notes on the distribution of O. forcipatus unguiculatus (Vander Linden, 1820) and O. uncatus (Charpentier, 1840) in Tuscany are given." (Author)] Address: Terzani, F., Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola" via Romana 17, I-50125 Firenze, Italy. E-mail: libellula.ter@gmail.com

16995. Thaokar, N.R.; Verma, P.R.; Andrew, R.J. (2018): Breeding behaviour of the Coromandel Marsh Dart Damselfly (Zygoptera: Coenagrionidae: Ceriagrion coromandelianum (Fabricius)) in central India. Journal of Threatened Taxa 10(3): 11443-11449. (in English) ["C. coromandelianum is one of the most common damselflies in the Indian subcontinent. It flies among bushes and breeds in stagnant pools, small garden tanks, tubs and ornamental cement ponds containing submerged and/or floating vegetation. The oviposition behaviour of C. coromandelianum was observed at the botanical garden of Hislop College, Nagpur, India, where small underground cement tubs are utilized to grow macrophytes. C. coromandelianum displays a refined hierarchy of preferences for oviposition and chooses floating leaves of Nymphaea nouchali (69%) over Lemna paucicostata (23%) and submerged Hydrilla verticillata (8%). In an uninterrupted oviposition bout, the female deposits 283 eggs in 16 rows (N=5) on the under surface of the N. nouchali leaf. The tiny leaves of L. paucicostata holds 7.8 eggs in 4.8 rows (N=10). In H. verticillata, the internode region of the stem can house 25.4 eggs (N=10). One or two eggs are also found neatly inserted in the thin leaf base of H. verticillata. Decaying plant material is never used for oviposition. The present investigation also clearly demonstrates that the choice of oviposition substrate not only depends upon the presence of aquatic species in the water body but also on the spatial location of the oviposition site." (Authors)] Address: Thaokar, N.R., Centre for Higher Learning & Research in Zoology, Hislop College, Civil lines, Nagpur, Maharashtra 440001, India. E-mail: nilesh.thavkar@gmail.com

16996. Theischinger, G; Richards, SJ; Toko, P.S. (2018): Nososticta moginae sp. n. (Odonata: Platycnemididae), a new damselfly from Papua new guinea. Australian Entomologist 45(1): 39-45. (in English) ["N. moginae sp. n. from Gulf Province, Papua New Guinea, is described from both sexes and its affinities are discussed. It represents the 80th species of the genus and is currently known only from a single location in the Kikori River Basin. A description of the hitherto unknown female of the morphologically similar Nososticta conifera Theischinger & Richards, 2006 is also presented." (Authors)] Address: Toko, P.S., New Guinea Binatang Research Centre, Madang, Papua New Guinea & Faculty of Science, Univ. of South Bohemia, Èeské Budìjovice, Czech Republic. E-mail: pagi.sione@gmail.com

16997. Theischinger, G. (2018): A new species of Eusynthemis Förster, 1903 from the Cooloola sand-mass in south-eastern Queensland, Australia (Odonata: Synthemistidae). Odonatologica 47(3/4): 289-297. (in English) ["Eusynthemis cooloola sp. nov. (Holotype ♂ from Searys Creek near Rainbow Beach, 25.975°S, 153.073°E) in the Cooloola sand-mass of south-eastern Queensland) is described, illustrated and discussed. It is considered to be the sister species of Eusynthemis nigra (Tillyard)." (Author)] Address: Theischinger, G., Research Associate, Australian Museum Research Inst., Australian Museum, 1 Williams Street, Sydney, NSW 2010, Australia; Research Fellow, Office of Environment & Heritage, NSW Dept of Planning & Environment, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: theischingergunther@gmail.com

16998. Theischinger, G.; Richards, S.R.; Toko, P.S. (2018): Three new damselflies from Lake Kutubu, Papua New Guinea (Zygoptera: Argiolestidae, Coenagrionidae, Platystictidae). IDF-Report 112: 1-15. (in English) ["We describe three new

species of damselflies from streams draining into Lake Kutubu in Southern Highlands Province, Papua New Guinea. They are Drepanosticta johncanni sp. nov. (Platystictidae), Pseudagrion parafarinicolle sp. nov. (Coenagrionidae) and Wahnesia kutubuensis sp. nov. (Argiolestidae). Diagnostic characters of the ♂♂ and, where available of the ♀♀, are illustrated and the probable affinities of the new species are discussed." (Authors)] Address: Theischinger, G., Office of Environment and Heritage New South Wales, Sydney, NSW, Australia, and Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia. Email: gunther.theischinger@environment.nsw.gov.au

16999. Thomas, C.; Tom, J.; Zecharia, A.P.; Abraham, N.P. (2018): Dragonfly species diversity along the waterside of Kallar river base of Pathanamthitta district, Kerala. International Journal of Research and Analytical Reviews 5(4): 900-903. (in English) ["This study aims to understand species diversity of dragonfly along the waterside of Kallarriverbase of Pathanamthitta district, Kerala.The survey was carried out by 2014. In the selected area permanent transects were laid and observations on dragonflies was done. 15 species of dragonflies were identified during six month period of study. 14 species from the family Libellulidae and one is from Gomphidae. The species diversity was calculated using Shannon index and Simpson's index." (Authors)] Address: Thomas, C., Dept of Zoology, St. Berchman's College, Changanacherry, India

17000. To, C.Q.; Phan, Q.T. (2018): A record of Sinolestes editus Needham, 1930 (Odonata: Zygoptera: Synlestidae) from the Central Highlands of Vietnam, with descriptions of the collected male and female specimens. IDF-Report 124: 1-9. (in English) ["A record of male and female specimens of Sinolestes editus Needham, 1930 collected in Dak Hro village (14°19'45" N, 108°24'23" E, alt. 1,420m a.s.l.), Dak Roong Commune, K'Bang District, Gia Lai Province, Central Highlands of Vietnam is present with a detailed description of the morphology of these two specimens." (Authors)] Address: To, C.Q., Dept of Zoology, Southern Institute of Ecology, Vietnam Academy of Science & Technology, 01 Mac Dinh Chi, Ho Chi Minh City, Vietnam

17001. Tol, J. van; Bedjanic, M. (2018): A new Drepanosticta species from Seram, Moluccas (Odonata: Platystictidae). Zootaxa 4461(1): 127-133. (in English) ["Drepanosticta seramensis sp. nov. (holotype ♂: Indonesia, Moluccas, Seram Island, 36 km SW of Wahai, S 2.9768, E 129.2269; 2-xii-1996; deposited in RMNH, Leiden), is described as new to science. It is closely related to D. moluccana Lieftinck, 1938 from Buru and D. amboinensis van Tol, 2007 from Ambon." (Authors)] Address: Tol, J. van, Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: jan.vantol@naturalis.nl

17002. Trapero Quintana, A.D.; Torres Cambas, Y.; Martínez Valle, M. (2018): Las libélulas de Cuba: una actualización taxonómica 10 años después / The dragonflies of Cuba: a taxonomic update 10 years later. Revista Cubana de Ciencias Biológicas 6(2): 1-8. (in Spanish, with English summary) ["The present work updates the systematic of the order Odonata in Cuba to 88 species, … included in six families and 41 genera. Coryphaeschna apeora Paulson, 1994; Libellula gaigei Gloyd, 1938 and Tramea binotata (Rambur, 1842) are considered new records. The order presents six endemic and they were carried out two you adjust taxonomic for the family Protoneuridae and the genus Microneura. Central Cuba is the region least studied for order, and Ciénaga de Zapata and Sagua-Baracoa are the regions of greatest interest for studies with odonates." (Authors)] Address: Trapero Quintana, A.D., Fac, de Biología, Univ. de La Habana, Cuba. E-mail: adrian.trapero@fbio.uh.cu

17003. Truong, V.K.; Vongsvivut, J.; Geeganagamage, N.; Tobin, M.J.; Luque, P.; Baulin, V.; Werner, M.; Maclaughlin, S.; Crawford, R.J.; Ivanova, E.P. (2018): Study of melanin localization in the mature male Calopteryx haemorrhoidalis damselfly wings. Journal of Synchrotron Radiation 25: 874-877. (in English) ["C. haemorrhoidalis exhibiting black wings are found in the western Mediterranean, Algeria, France, Italy, Spain and Monaco. Wing pigmentation is caused by the presence of melanin, which is involved in physiological processes including defence reactions, wound healing and sclerotization of the insect. Despite the important physiological roles of melanin, the presence and colour variation among males and females of the C. haemorrhoidalis species and the localization of the pigment within the wing membrane remain poorly understood. In this study, infrared (IR) microspectroscopy, coupled with the highly collimated synchrotron IR beam, was employed in order to identify the distribution of the pigments in the wings at a high spatial resolution. It was found that the melanin is localized in the procuticle of the C. haemorrhoidalis wings, distributed homogeneously within this layer, and not associated with the lipids of the epicuticle." (Authors)] Address: Ivanovaa, Elena, Fac. of Science, Engineering & Tech., Swinburne Univ. Tech., PO Box 218, Hawthorn, VIC 3122, Australia. E-mail: elena.ivanova@mit.edu.au

17004. Tsutsui, M.H.; Kobayashi, K.; Miyashita, T. (2018): Temporal trends in arthropod abundances after the transition to organic farming in paddy fields. PloS one [11 Jan 2018, 13(1):e0190946]: 13 pp. (in English) ["Organic farming aims to reduce the effect on the ecosystem and enhance biodiversity in agricultural areas, but the long-term effectiveness of its application is unclear. Assessments have rarely included various taxonomic groups with different ecological and economic roles. In paddy fields with different numbers of years elapsed since the transition from conventional to organic farming, we investigated changes in the abundance of insect pests, generalist predators, and species of conservation concern. The abundance of various arthropods exhibited diverse trends with respect to years elapsed since the transition to organic farming. Larval lepidopterans, Tetragnatha spiders, and some planthoppers and stink bugs showed non-linear increases over time, eventually reaching saturation, such as the abundance increasing for several years and then becoming stable after 10 years. This pattern can be explained by the effects of residual pesticides, the lag time of soil mineralization, and dispersal limitation. Ischnura asiatica did not show a particular trend over time, probably

due to its rapid immigration from source habitats. Unexpectedly, both planthoppers and some leafhoppers exhibited gradual decreases over time. As their abundances were negatively related to the abundance of Tetragnatha spiders, increased predation by natural enemies might gradually decrease these insect populations. These results suggest that the consideration of time-dependent responses of organisms is essential for the evaluation of the costs and benefits of organic farming, and such evaluations could provide a basis for guidelines regarding the length of time for organic farming to restore biodiversity or the economic subsidy needed to compensate for pest damage." (Authors)] Address: Tsutsui, M.H., Lab. Biodiversity Science, Graduate School of Agricultural & Life Sci., Univ. Tokyo, Tokyo, Japan. E-mail: tmiya@es.a.u-tokyo.ac.jp

17005. Tuhin, M.S.H.; Khan, M.K. (2018): An updated list of Odonata of southwestern Bangladesh. Journal of Threatened Taxa 10(15): 12995-13001. (in English) ["An odonate survey was conducted throughout the southwestern region of Bangladesh, concentrating on eight districts and the Sundarban, from August 2014 to August 2016. A total of 50 species under 30 genera belonging to six families was recorded during the study period. Among these, 31 species belonged to Anisoptera and 19 to Zygoptera. Libellulidae and Coenagrionidae were the most dominant anisopteran and zygopteran families with 28 and 17 species, respectively. Mortonagrion varalli was newly added to the odonate fauna of Bangladesh." (Authors)] Address: M. Sajjad Hossain Tuhin, M.S.H., Forestry & Wood Tech. Discipline, Khulna Univ., Khulna 9208, Bangladesh. E-mail: tuhin.taxon@gmail.com

17006. Uboni, C.; Merluzzi, P.; Poldini, L.; Riservato, E.; Pizzul, E. (2018): First data on the reproduction of the Vagrant Emperor Anax ephippiger in North-Eastern Italy, Friuli-Venezia Giulia Region (Odonata Aeshnidae). Bollettino della Società Entomologica Italiana 150(3): 101-106. (in English, with Italian summary) ["A. ephippiger, is a migrant dragonfly species from Africa and Middle East; in Europe only summer generation are known, without evidence of overwintering larvae. In august 2010 a reproductive breeding site for this species was found in the in Friuli-Venezia Giulia Region (north-eastern Italy). This discovery represents the first proof of reproduction for the species in north-eastern Italy. With the aim of increasing the knowledge on the species requirements, a study to delineate the emerging habitat was conducted: dragonfly community (adult and exuviae), vegetation, chemical and physical water parameters were sampled. This yielded data about larval tolerance toward salinity. This new data proves a northward move for the species, which may also have been facilitated by global warming." (Authors)] Address: Uboni, Costanza, Dept of Life Science, Univ. Trieste, Italia. E-mail: costanza.uboni@gmail.com

17007. Ueno, D.; Mizukawa, H.; Inanami, O.; Nagasaka, H.; Tatsuta, N.; Narazaki, Y.; Fujino, T.; Watanabe, I.; Kameda, Y.; Nakai, K. (2018): "Caddisfly watch," a biomonitoring program using Stenopsyche larvae to determine radioactive cesium contamination in rivers following the Fukushima nuclear disaster. Landscape and Ecological Engineering 14(1): 29-35. (in English) ["The "Caddisfly Watch" program proposes the use of larvae of the caddisfly genus Stenopsyche (Trichoptera: Stenopsychidae) to monitor the radioactive cesium (^{137}Cs) pollution, including that of suspended solids, in river environments, as a simple method was essential for this following the Fukushima nuclear disaster in March 2011. A variety of aquatic organisms were collected from rivers in Japan in 2012 and their levels of radioactive Cs measured. Amongst all the organisms collected, the highest concentrations of ^{137}Cs were observed in caddisfly larvae. These larvae occur at a high density and can be collected at regular intervals in most rivers throughout Japan. It is proposed that caddisfly larvae can be used as bioindicators of radioactive Cs contamination in rivers, as their temporal and spatial changes are easily assessed." The study includes data on Orthetrum albistylum and Sympetrum infuscatum. (Authors)] Address: Ueno, D., Dept of Environmental Sci., Fac. of Agriculture, Saga Univ., Saga, Japan. E-mail: uenod@cc.saga.u.ac.jp

17008. Underhill, L.; Loftie-Eaton, M.; Navarro, R. (2018): Dragonflies and damselflies of the Western Cape - OdonataMAP report, August 2018. Biodiversity Observations 9.7: 1-21. (in English) ["In the two-year period 1 July 2016 to 30 June 2018, citizen scientists added seven species to the list of dragonflies and damselflies in the Western Cape, bringing the total to 76 species. The database available for this report contained 11,267 records of dragonflies and damselflies. This includes the specimen record dating back to the start of the 20th century. Of these records 2,433 records (22%) were added between July 2016 and June 2017, and 4,202 (37%) between July 2017 and June 2018. Thus 59% of the entire Western Cape database of records of Odonata was contributed by citizen scientists in two years." (Authors)] Address: Les G Underhill Animal Demography Unit, Dept of Biological Sciences, Univ. of Cape Town, Rondebosch, 7701 South Africa; Biodiversity and Development Institute, 25 Old Farm Road, Rondebosch, 7700. South Africa

17009. Veljkovic, M. (2018): First record of the moustached darter Sympetrum vulgatum for the Bjelovar area, Croatia. Natura Sloveniae 20(1): 59-60. (in English) ["A juvenile female of S. vulgatum was found on 18. 7. 2017 at 11:27 a.m. in a meadow at Gornje Plavnice, Bjelovar (45°56'49.8" N, 16°51'50.0" E, 190 m above sea level), while resting on Sorghum halepense (L.) Pers.. A male specimen was found on 18.9. 2017 at 14:35 p.m., while resting on the ground in a backyard at Gornje Plavnice (45°56'32.3" N, 16°51'24.6" E, 230 m above sea level)." (Author)] Address: Veljkovic, Monika, Gornje Plavnice 56, 43000 Bjelovar, Croatia; E-mail: mv52874@gmail.com

17010. Verheyen, J.; Temmerman, K.; De Block, M.; Stoks, R. (2018): Voltinism-associated differences in winter survival across latitudes: integrating growth, physiology, and food intake. Oecologia 186(4): 919-929. (in English) ["Species that span large latitudinal gradients face strong differences in voltinism and in winter conditions within their range. Latitudinal gradients in winter survival and especially their underlying mechanisms and association with voltinism patterns are poorly stud-

ied. We tested in Enallagma cyathigerum whether high-latitude populations were better in dealing with the longer winters compared to central- and low-latitude populations and whether this was associated with changes in voltinism. We thereby evaluated whether higher initial levels and/or lower reductions during winter of energy storage (measured as fat content) and investment in immune function [measured as the activity of phenoloxidase (PO)], and/or stronger compensatory responses in food intake contributed to the higher winter survival in high-latitude populations. To this end, we simulated a long high-latitude winter at 4 °C under manipulated food conditions. Across food levels, winter survival was highest in Swedish larvae, intermediate in Belgian larvae, and lowest in Spanish larvae, indicating latitude-specific thermal adaptation that could be partly linked to differences in voltinism. The semi-voltine Swedish larvae were growing slower before winter and as a result accumulated the highest fat content and PO activity when the winter started compared to the univoltine, faster growing Belgian, and Spanish larvae. Fat content and PO activity declined during the winter, yet equally across latitudes, and were not buffered by compensatory food intake. Our data identified possible underlying physiological mechanisms of winter survival and support the hypothesis that widespread latitude-associated voltinism shifts may be a selective factor contributing to latitudinal shifts in winter survival." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

17011. Vilela, D.S.; Guillermo-Ferreira, R.; Del-Carlo, K.; Cordero-Rivera, A. (2018): Argia angelae (Odonata: Zygoptera: Coenagrionidae) sp. nov. from Chapada dos Guimarães, Mato Grosso, Brazil. Zootaxa 4415(3): 549-560. (in English) ["A. angelae sp. nov. (Holotype ♂, Brazil, Mato Grosso, Chapada dos Guimarães, Rio Salgadeira (15°21'25" S, 55°49'51" W, 305 m), 1 xi 2015, D. S. Vilela leg., in LESTES, Cod. ACR 8173A) from Chapada dos Guimarães, Brazil is described, illustrated and diagnosed based on comparison with other known sympatric species of the genus. This species inhabits streams throughout the National Park and a map of its known distribution is provided." (Authors)] Address: Vilela, D.S., Lab. Ecol. Studies on Ethology & Evol. (LESTES), Dept Hydrobiol., Fed. Univ. São Carlos, Brazil. E-mail: deeogoo@gmail.com

17012. Vilela, D.S.; Guillermo-Ferreira, R.;Cordero-Rivera, A. (2018): Description of the female of Dicterias atrosanguinea Selys 1853, with notes on male genital ligula and male behavior (Odonata: Dicteriadidae). Zootaxa 4374(3): 441-450. (in English) ["The female of Dicterias atrosanguinea Selys, 1853 is described and illustrated based on two specimens collected in Pará and Amazonas States, Brazil. We compare the female with the most closely related species, Heliocharis amazona Selys, 1853, and present SEM images of the genital ligula for both D. atrosanguinea and H. amazona males. Additionally we provide behavioral observations on D. atrosanguinea males." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept of Biology, University of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeogoo@gmail.com

17013. Vilela, D.S.; Guillermo-Ferreira, R.; Del-Claro, K.; Cordero-Rivera, A. (2018): Females of two species of Argia from Chapada dos Guimarães National Park, Brazil (Odonata: Coenagrionidae). Zootaxa 4420(3): 430-438. (in English) ["The female of Argia tupi Calvert, 1909 (BRAZIL, Mato Grosso, Chapada dos Guimarães National Park, Cachoeira do Marimbondo (15.4330° S, 55.7198° W, 370 m), 01 xi 2015) is described, illustrated and diagnosed based on comparison with sympatric species of Argia Rambur, 1842. We also augmented the description of Argia bicellulata (Calvert, 1909) female (BRAZIL, Mato Grosso, Chapada dos Guimarães National Park, Rio Paciencia (15.3438° S, 55.8322° W, 280 m), 25 x 2015)." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept of Biology, Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeogoo@gmail.com

17014. Vilenica, M.; Mihoci, I. (2018): Odonata collection of the Croatian Natural History Museum. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici 27(1): 153-184. (in English, with Bosnian summary) ["A total 1,545 Odonata specimens stored in the collection of the Croatian Natural History Museum in Zagreb have been examined. The specimens were collected in the period between 1869 and 2011, mainly in Croatia, but also in the surrounding countries (Austria, Bosnia and Herzegovina, Italy, Montenegro, Serbia, Slovenia) and Switzerland. An overview of 61 species is presented. The most numerous species were Ischnura elegans and Platycnemis pennipes." (Authors)] Address: Vilenica, Marina, Fac. of Teacher Education, University of Zagreb, Trg Matice hrvatske 12, 44250 Petrinja, Croatia. E-mail: marina.vilenica@ufzg.hr

17015. Vinko, D.; Tratnik, A. (2018): Contribution of Biology research Camp 2017 to the knowledge of dragonfly fuana of the Gorenjska region. Acta Entomologica Slovenica 26(2): 243-258.["During Biology research Camp 2017 – Predoslje 38 dragonfly species were reported from 65 localities during 20th to 28th july 2017. Geographically, research was focused on eastern part of Gorenjska region (Central-NW Slovenia). Two species are new for the area: Ophiogomphus cecilia and Anax ephippiger, each recorded on one site. A. ephippiger is also new for the whole Gorenjska region. Additional records of Lestes barbarus, Chalcolestes viridis, Erythromma viridulum, Aeshna affinis, A. isoceles, Somatochlora metallica, Libellula fulva, Sympetrum meridionale and S. vulgatum, which are known only from few sites in the region or are considered rare are added. new populations of Cordulegaster heros were recorded, for the first time in the Poljanska dolina Valley. 11 recorded species are included on Slovene red Data List, 4 are in the country protected and 2 are listed on Annexes of Habitats Directive. Also Park Brdo pri kranju was investigated, where together with our records 39 dragonfly species were recorded, and lake Pristava in Mengeš and two ponds in Hraše, which are with 43 or 30 dragonfly species one of the richest sites in Slovenia according to dragonfly fauna. Altogether 54 dragonfly species are now mapped for eastern part of Gorenjska region although, 8 species were not recorded in recent periods and 63 for the whole region." (Authors)] Address: Vinko, D., Slovensko odonatološko društvo, Verovškova

56, Si-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@-gmail.com

17016. Walia, G.K.; Katnoria, N. (2018): Morphological variation in the chromosome complement of Neurobasis chinensis chinensis of family Calopterygidae (Odonata: Zygoptera). International Journal of Life Sciences Research 6(4): 260-266. (in English) ["Chromosome complement of N. chinensis chinensis has been characterized by conventional staining and C-banding. The specimens were collected from Sadhupul (Solan), Ghumarwin (Bilaspur) of Himachal Pradesh and Lachhiwala (Dehradun) of Uttarakhand states of India. The species possesses 2n=23 as the diploid chromosome number with XO-XX sex determination. Morphological variation in the chromosome complement has been observed in the species collected from different localities. In the spermatogonial metaphase, two large sized autosome pairs are present in specimens of Lachhiwala (Dehradun) and Sadhupul (Solan) and one large pair and other smaller than it are seen in specimens of Ghumarwin (Bilaspur). Similarly, in the diakinesis, two equal sized, large autosomal bivalents possess two interstitial and terminal chiasmata in the specimens of Lachhiwala (Dehradun) and Sadhupul (Solan). On the other hand, one extra large autosomal bivalent shows terminal and interstitial chiasmata, while second small bivalent reveals terminal chiasmata as remaining bivalents in the specimens of Ghumarwin (Bilaspur). These variations have also been confirmed by C-banding. In the diakinesis, C-bands are mostly present at the terminal ends of all the bivalents, while both the autosomal bivalents of Lachhiwala (Dehradun) and Sadhupul (Solan) specimens and one extra large autosomal bivalent of Ghumarwin (Bilaspur) specimens possess terminal as well as interstitial C-bands. X chromosome is C-positive throughout the length in all the specimens." (Authors)] Address: Kaur Walia, Gurinder, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, India

17017. Walia, G.K.; Katnoria, N.; Gill, J.K. (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 the zygopteran Libellago lineata lineata of (Chlorocyphidae) 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: Walia, Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

17018. Walia, G.K.; Chahal, S.S.; Somal, D.S. (2018): Chromosome observations based on C-banding, Ag-NOR and sequence-specific staining in two Anax species from India (Odonata: Aeshnidae). Odonatologica 47(1/2): 145-160. (in English) ["The previously known male karyotypes (2n = 27, m; n = 14, m; X0 sex determination) of Anax immaculifrons and A. nigrofasciatus nigrolineatus from Himachal Pradesh are redescribed, based on conventional staining and are described for the first time using three other staining techniques. In the two species, C-bands occur on chiasmatic/non-chiasmatic bivalent ends, there is a C-positive X, while the m bivalent is C-negative in A. immaculifrons and C-positive in A. nigrofasciatus. The other details are given in the text and micrographs are provided." (Authors)] Address: Kaur Walia, Gurinder, Dept Zool. & Environ. Sci., Punjabi Univ., Patiala-147002, Punjab, India. E-mail: gurinderkaur_walia@yahoo.co.in

17019. Wang, J.; Wang, C.; Zhao, M.; Feng, Y. (2018): Mercury absorption, enrichment and water-land transfer by aquatic insects. Biotic Resources 40(6): 507-511. (in Chinese, with English summary) ["Mercury is a non-essential and toxic heavy metal element of the human body. Global mercury pollution has attracted much attention because of its damage to human health. Most of the mercury in nature enters aquatic ecosystems through river runoff and the deposition of rain and snow dust, with at least 10, 000 tons of mercury entering the aquatic ecosystem each year. As an important consumer animal, aquatic insects are an important part of the aquatic ecological food network and play an important role in the material cycle of aquatic ecosystems. This paper introduces the related research between aquatic insects and mercury in recent years, focusing on the absorption and enrichment of mercury by aquatic insects, and analyzing the role of aquatic insects in the water-land transfer of mercury. The research data show that the degree of mercury absorption by aquatic insects is related to environmental factors and is transferred to terrestrial ecosystems through different pathways, which poses a certain threat to the organisms in the upper food chain of terrestrial ecosystems. At the same time of development and utilization of aquatic insects, whether the mercury exceeds the standard should be considered." (Authors)] Address: Wang, J., Res. Inst. of Resource Insects, Chinese Acad. Forestry, Kunming 650233, Yunnan, China. E-mail: jdwang666@163. com.

17020. Wasscher, M.; Goudsmits, K. (2018): Unusual Chinese records of Lestes sponsa, Coenagrion armatum and Libellula quadrimaculata (Odonata: Lestidae, Coenagrionidae, Libellulidae), far south of their known range. Notulae odonatologicae 9(2): 55-59. (in English) ["In 1995 and 2017 during excursions to high-altitude mountains in the Chinese provinces of Yunnan and Sichuan small numbers of dragonflies were encountered. These included two Palaearctic (C. armatum, L. sponsa) and one Holarctic (L. quadrimaculata) species present well south of their known range. These sightings are noted and revised distribution maps of the three species are presented." (Authors)] Address: Wasscher, M., Minstraat 15 bis, 3582 CA Utrecht, The Netherlands. E-mail: marcel.hilair@12move.nl

17021. White, J.C.; House, A.; Punchard, N.; Hannah, D.M.; Wilding, N.A.; Wood, P.J. (2018): Macroinvertebrate community responses to hydrological controls and groundwater

abstraction effects across intermittent and perennial headwater streams. Science of the Total Environment 610-611: 1514-1526. (in English) ["Intermittent rivers comprise a significant proportion of river networks globally and their spatial extent is predicted to increase with rising water abstraction pressures. Despite this, the ecological implications of hydrological modifications within intermittent rivers have received limited research attention. This paper examines macroinvertebrate assemblages across intermittent and perennial sections of headwater streams within the Hampshire Avon catchment (United Kingdom) over a five-year period. The composition of faunal assemblages was quantified in relation to four hydrological metrics: the duration of flowing conditions, the geographical proximity to the nearest perennial source along each watercourse (two observed flow parameters) and two modelled groundwater abstraction influences. The results highlight that macroinvertebrate communities inhabiting sites which dry periodically and are positioned at greater distances (>c. 2.5km) above the perennial source (the most upstream point of permanent flow within a given year) possessed the highest conservation values. These sites supported species that are rare in many areas of Europe (e.g. Ephemeroptera: Paraletophlebia werneri) or with limited geographical distribution across the United Kingdom (e.g. Trichoptera: Limnephilus bipunctatus). A range of faunal community diversity indices were found to be more sensitive to the antecedent flow duration and distance from the perennial source, rather than any effects of groundwater abstraction. Taxonomic richness responded most strongly to these observed flow parameters and varied more markedly with the distance from the perennial source compared to the antecedent flow duration. Several taxa were significantly associated with the observed flow parameters, particularly those predominantly inhabiting perennially flowing systems. However, the distance that such fauna could migrate into intermittent reaches varied between taxa. This research demonstrates the overriding importance of antecedent flow durations and the geographical proximity to perennial sources on macroinvertebrate communities within intermittent and perennial headwater streams." Calopteryx splends is the only odonate species mentioned (Authors)] Address: White, J.C., Dept of Geography, Loughborough Univ., Loughborough, Leicestershire LE11 3TU, UK. E-mail: J.White2@lboro.ac.uk

17022. Wildermuth, H.; Weibel, U. (2018): Elisabeth Ris: eine Schweizerin im Namen der Balkan-Adonislibelle Pyrrhosoma elisabethae Schmidt, 1948 (Odonata: Coenagrionidae). Entomo Helvetica 11: 31-38. (in German, with English and French summaries) ["Elisabeth Ris: a Swiss lady in the name of the Greek Red Damselfly Pyrrhosoma elisabethae Schmidt, 1948 (Odonata: Coenagrionidae). - The German odonatologist Erich Schmidt (1890–1969) dedicated P. elisabethae, a damselfly endemic to northern Greece and southern Albania, to Elisabeth Ris (1872–1959), the sister of the Swiss psychiatrist and odonatologist Friedrich Ris, in consideration of her social merits. Her merits for entomology were indirect by housekeeping for the family and assistence in the mental hospital of Rheinau, thus disburdening her brother as director of the hospital and supporting him in his entomological studies. After his death in 1931 she took care of his allowance, amongst others his insect collections of which the Senckenberg Museum Frankfurt a. M. inherited the Odonata and the Naturforschende Gesellschaft in Schaffhausen the Lepidoptera. After her death in 1959, Elisabeth Ris donated 5.000 CHF and her brother's slide collection to this society." (Authors)] Address: Weibel, U., Museum zu Allerheiligen, Baumgartenstr. 6, 8200 Schaffhausen, Switzerland. E-mail: urs.weibel@stsh.ch

17023. Wiszniowska, M.; Buczynski, P. (2018): Późne stwierdzenie Anax ephippiger (BURMEISTER, 1839) (Odonata: Aeshnidae) w Polsce poludniowej A late record of Anax ephippiger (BURMEISTER, 1839) (Odonata: Aeshnidae) in southern Poland. Odonatrix 14_4 (2018): 4 pp. (in Polish, with English summary) ["A male of A. ephippiger was recorded on 8-X-2018 at the "Górnik" Pond in Katowice-Giszowiec (S Poland, 50°12'56" N, 19°04'31" E, UTM: CA66). One of the latest in both Poland and central-eastern Europe, this record is discussed in the context of this species' distribution and biology. A third generation can be ruled out, because the second generation in Poland emerges late (2nd half of July – 1st half of August) and larval development takes at least 80-90 days. The options considered are: (1) direct, late migration from the south; (2) the exceptionally late emergence of the 2nd generation in Poland, possibly resulting from later migration from the south than usual; (3) the return migration of an individual from a population that reproduced farther north. It is worth noting that the date of this Katowice record coincides with the return migration period in central Asia." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

17024. Xu, S.; Guan, Z.; Huang, Q.; Xu, L.; Vierstraete, A.; Dumont, H.J. (2018): The mitochondrial genome of Atrocalopteryx melli Ris, 1912 (Zygoptera: Calopterygidae) via Ion Torrent PGM NGS sequencing. Mitochondrial DNA Part B 3(1): 115-117. (in English) ["The mitochondrial genome of Atrocalopteryx melli was sequenced and assembled via Next-Generation Sequencing (NGS) and iteratively assembly process with a reference seed. This genome is 15,562 bp long and A + T biased (71%), with 37 genes arranged in common order of Odonata. All protein-coding genes are initiated by typical "ATN" codon, and 9 genes are terminated with a complete stop codon, except nad4, nad5, cox2, and cox3, which are terminated with an incomplete codon "T(aa)". The S5 intergenic spacer is absent in this genome, supporting that lacking of S5 as a specific character for damselflies. The A + T rich region of A. melli is 267 bp longer than that of A. atrata. This mitogenome provides new molecular information for understanding of A. melli and Atrocalopteryx." (Authors)] Address: Lin, Qiuqi, Inst. Hydrobiology, Jinan Univ., Guangzhou, China. E-mail: tlinqq@jnu.edu.cn

17025. Yamaguchi, Y.; Okubo, T.; Matsushita, M.; Wataji, M.; Iwasaki, S.; Hayasaka, K.; Akizawa, K.; Matsuo, J.; Shimizu, C.; Yamaguchi, H. (2018): Analysis of adult damselfly fecal material aids in the estimation of antibiotic-re-

sistant Enterobacterales contamination of the local environment. PeerJ 6:e5755 https://doi.org/10.7717/peerj.5755: 19 pp. (in English) ["Because damselflies are ubiquitously but focally present in natural environments and play a critical role as predators of other insect species, the fecal matter of damselflies may be useful for investigating antibiotic-resistant bacterial populations, including human pathogens, in local environments. We therefore examined the prevalence of antibiotic-resistant bacteria, including Enterobacterales, in fecal material from 383 damselflies (adults and larvae) collected from seven locations around Sapporo City, Japan, in 2016 and 2017. Fecal samples were plated on soybean casein digest (SCD) agar plates with and without antibiotics (SCD-A and SCD-w/o, respectively) to identify environmental bacteria and gut bacteria, respectively, and on MacConkey agar plates with antibiotics (MacConkey-A) to select for Gram-negative bacteria, including human pathogenic Enterobacterales species. The prevalence of colonies on each of the plates was compared, and representative colonies on MacConkey-A plates were identified to the species level using an API 20E kit and the MALDI Biotyper system. Overall, SCD-w/o plates showed a gut bacterial load of approximately 108 colony-forming units per adult damselfly or larva. There was a significant difference between the prevalence of colonies on the SCD-A and MacConkey-A plates, and a significantly increased prevalence of antibiotic-resistant bacteria on MacConkey-A plates was observed in samples collected from Shinoroshinkawa. Cluster analysis based on minimum inhibitory concentration values of 59 representative isolates from MacConkey-A agar plates revealed that samples from Shinoroshinkawa contained a higher prevalence of Enterobacterales than those from other sampling locations. Thus, fecal materials discharged by adult damselflies could be used in future studies as a simple tool for estimating antibiotic-resistant bacteria, including Enterobacterales species, in the local environment." (Authors)] Address: Yamaguchi, Y., Hokkaido Sapporo Asahigaoka Senior High School, Sapporo, Japan. E-mail: hiroyuki@med.hokudai.ac.jp

17026. Yapo, M.L.; Tuo, Y.; Koné, M.; Atse, B.C.; Kouassi, P. (2018): Diversity and distribution of odonata larvae in some tropical fish farm ponds (Southern Côte D'ivoire, West Africa). Jour. Sci. Res. Allied Sci. 3(4): 51-64. (in English) ["Diversity and distribution of Odonata larvae collected in some fish farm ponds of Southern Cote d'Ivoire were studied. In each pond, samples were collected in the water column using a 350 µm mesh hand-net and in the sediment using a van Veen grab. Environmental variables such as transparency, temperature, pH, dissolved oxygen, and conductivity were measured in situ. Water samples were taken and conducted to the laboratory where analyses of dissolved inorganic nutrients were carried out. A total of 11 taxa belonging to 3 families (Coenagrionidae, Libellulidae, and Gomphidae) were recorded. Odonata fauna was qualitatively dominated by Coenagrionidae and Libellulidae. Quantitatively this fauna was dominated by Coenagrionidae. Pseudagrion wellani was the most abundant taxa within the Odonata assemblage. Azaguie recorded the highest species richness and the highest abundance. This station recorded the maximum values of Shannon-Wiener diversity index and evenness. Odonata can be used as a potential instrument in future ecology studies in Ivorian aquatic ecosystems." (Authors)] Address: Yapo, M. L., Dépt de Biologie Animale, UFR Sciences Biologiques, Université Peleforo Gon Coulibaly, Korhogo, BP 1328 Korhogo, Côte d'Ivoire

17027. Yeo, D.; Puniamoorthy, J.; Ngiam, R.W.J.; Meier, R. (2018): Towards holomorphology in entomology: rapid and cost-effective adult–larva matching using NGS barcodes. Systematic Entomology 43(4): 678-691. (in English) ["In many taxa the morphology of females and immatures is poorly known because species descriptions and identification tools have a male bias. The root causes are problems with matching life-history stages and genders belonging to the same species. Such matching is time-consuming when conventional methods are used (e.g. rearing) and expensive when the stages are matched with DNA barcodes. Unfortunately, the lack of associations is not a trivial problem because it renders a large part of the phenome of insects unexplored, although larvae and females are useful sources of characters for descriptive and phylogenetic purposes. In addition, many collectors intentionally avoid females and immature stages, which skews survey results, interferes with collecting life-history information, and makes it less likely that rare species are discovered. These problems even exist for well-studied taxa like Odonata, where obtaining adult–larva matches relies largely on rearing. Here we demonstrate how the matching problem can be addressed with cost-effective tagged amplicon sequencing of a 313-bp segment of cox1 with next-generation sequencing (NGS) ('NGS barcoding'). We illustrate the value of this approach based on Singapore's odonate fauna which is of a similar size as the European fauna (Singapore, 122 extant species; Europe, 138 recorded species). We match the larvae and adults of 59 species by first creating a barcode database for 338 identified adult specimens representing 83 species. We then sequence 1178 larvae from a wide range of sources. We successfully barcode 1123 specimens, which leads to adult–larva matches for 59 species based on our own barcodes (55) and online barcode databases (4). With these additions, 84 of the 131 species recorded in Singapore have now been associated with a species name. Most common species are now matched (83%), and good progress has been made for vulnerable/near-threatened (55%), endangered (53%), and critically endangered species (38%). We used nondestructive DNA extraction methods in order to be able to use high-resolution imaging of matched larvae to establish a publicly available digital reference collection for odonates which is incorporated into 'Biodiversity of Singapore' (https://singapore.biodiversity.online/). We suggest that the methods described here are suitable for many insect taxa because NGS barcoding allows for fast and low-cost matching of well-studied life-history stages with neglected semaphoronts (eggs, larvae, females). We estimate that the specimen-specific amplicons in this study (c. 1500 specimens) can now be obtained within eight working days and that the laboratory and sequencing cost is c. US$600 (<US$0.40 per specimen)." (Authors)] Address: Meier, R., Department of Biological Sciences. National University of Singapore, 14 Science Drive 4, #05–20 Singapore, 117543. E-mail: meier@nus.edu.sg

17028. Yerokine, M.; Couteyen, S. (2018): Contribution à la connaissance des Odonates de l'île de la Réunion 11. Présence d'Anax tristis Hagen, 1867 et Hemianax ephippiger (Burmeister, 1839) à la Réunion (Odonata: Aeshnidae). Cahiers scientifiques de l'océan Indien occidental 9: 15-16. (in French) [L'étang de Saint-Paul 14-1-2018, A. tristis (n = 2) and H. ephippiger (n = 10).] Address: Couteyen, S., Association Réunionnaise d'Ecologie (AReE), France. E-mail: scouteyen@ecologie.re

17029. Yin, C.; Jin, L.; Sun, F.; Xu, X.; Shao, M.; Zhang, Y. (2018): Phytotoxic and antifungal metabolites from Curvularia crepinii QTYC-1 isolated from the gut of Pantala flavescens. Molecules 2018, 23, 951; doi:10.3390/molecules23040951: 9 pp. (in English) ["Four metabolites (1–4), including a new macrolide, O-demethylated-zeaenol (2), and three known compounds, zeaenol (1), adenosine (3), and ergosta-5,7,22-trien–3b-ol (4)were isolated and purified fromCurvularia crepiniiQTYC-1, a fungus residing in the gut of P. flavescens. The structures of isolated compounds were identified on the basis of extensive spectroscopic analysis and by comparison of the corresponding data with those reported in the literature previously. The new compound 2 showed good phytotoxic activity against Echinochloa crusgalli with an IC50 value of less than 5 g/mL, which was comparable to that of positive 2,4-dichlorophenoxyacetic acid (2,4-D). Compound 1 exhibited moderate herbicidal activity against E. crusgalliwith an IC50 value of 28.8 g/mL. Furthermore, the newmetabolite 2 was found to possess moderate antifungal activity against Valsa mali at the concentration of 100 g/mL, with the inhibition rate of 50%. These results suggest that the newmacrolide 2 and the known compound 1 have potential to be used as biocontrol agents in agriculture." (Authors)] Address: Yin, C., School of Life Sci., Anhui Agri. Univ., Hefei 230036, China. E-mail: yinglaozhang@aliyun.com

17030. Yoshida, M.; Kawata, N.; Uchida, S. (2018): Dragonflies (Insecta: Odonata) in and around the Yakusa Campus of Aichi Institute of Technology, central Honshu, Japan. Aichi Institute of Technology Research Report 53: 85-93. (in Japanese, with English summary) ["Records of dragonflies in and around the Yakusa Campus of Aichi Institute of Technology, central Honshu, Japan, were reviewed, and dragonfly nymphs and adults were collected eight times from April to November in 2016 at five ponds in and around the campus. We found the records of 58 dragonfly species (including two species newly found in 2016) since 1970's in the literature, but only 35 dragonfly species were collected in 2016. This decrease of species richness can be caused by the predation on dragonfly nymphs by the invasive fishes; largemouth bass, Micropterus salmoides and bluegill, Lepomis macrochirus and by the invasive crayfish, Procambarus clarkii, inhabiting four of the five ponds. We propose removal of these invasive predators from the four ponds to enrich the species diversity of dragonflies." (Authors)] Address: not translated

17031. Zhang, S.; Sunami, Y.; Hashimoto, H. (2018): Deformation behavior of dragonflyinspired nodus structured wing in gliding flight through experimental visualization approach. Scientific Reports 8:5751 | DOI:10.1038/s41598-018-24237-x: 7 pp. (in English) ["Dragonfly has excellent flight performance and maneuverability due to the complex vein structure of wing. In this research, nodus as an important structural element of the dragonfly wing is investigated through an experimental visualization approach. Three vein structures were fabricated as, open-nodus structure, closed-nodus structure (with a flex-limiter) and rigid wing. The samples were conducted in a wind tunnel with a high speed camera to visualize the deformation of wing structure in order to study the function of nodus structured wing in gliding flight. According to the experimental results, nodus has a great influence on the flexibility of the wing structure. Moreover, the closed-nodus wing (with a flex-limiter) enables the vein structure to be flexible without losing the strength and rigidity of the joint. These findings enhance the knowledge of insect-inspired nodus structured wing and facilitate the application of Micro Air Vehicle (MAV) in gliding flight." (Authors)] Address: Sunami, Y., Micro/Nano Technology Center, Tokai University, 4-1-1 Kitakaname, Hiratsuka-city, Kanagawa, 259-1292, Japan. E-mail: sunami@tokai-u.jp

17032. Zhang, Z.; Zhang, L.; Yu, Z.; Liu, J.; Li, X.; Liang, Y. (2018): In-situ mechanical test of dragonfly wing veins and their crack arrest behavior. Micron 110: 67-72. (in English) ["Highlights: •Dynamic fracture process of dragonfly wing was detected by in-situ tensile device. •The nano-mechanical test and in-situ tensile test combined. •The trend of elastic modulus and nano-hardness was consistent with the tensile test. •Veins and the membranes played a different role on function of crack prevention. Abstract: In natural biological systems, many insects in complex environments exhibit exemplary mechanical properties. Dragonfly wings are light and strong enough to withstand wind loading. Their rigid veins play supporting and strengthening roles to enhance resistance to fatigue. To explore the effect of veins on arresting cracking in the wing, the costa, subcosta, radius R1, and two areas of dragonfly hind wings were samples for in situ tensile tests. The fracture process of the samples was observed with a high-speed camera and a scanning electron microscope. The mechanical properties of the veins and the results of nanomechanical tests on the wings were analyzed. The costa was stiffer and more resistant to deformation than the subcosta and radius, but it was less tough. The results of this study may provide inspiration for the design of mechanical structures and materials." (Authors)] Address: Li, X., Key Lab of Bionic Engineering, Ministry of Education, Jilin University, Changchun 130025, China. E-mail: xiujuanli@jlu.edu.cn

17033. Zheng, D.; Shi, T.; Wang, H.; Chang, S.-C.; Dou, L.; Wang, B.; Zhang, H. (2018): Honghea xui gen. et sp. nov., the second Earliest Jurassic damsel-dragonfly (Odonata: Campterophlebiidae) from the Junggar Basin, NW China. Comptes Rendus Palevol. 17(6): 346-350. (in English, with French summary) ["A new campterophlebiid damsel-dragonfly, Honghea xui gen. et sp. nov., is described from the Lower Jurassic Badaowan Formation of the Junggar Basin, NW China. This is the second Chinese Campterophlebiidae recorded for the earliest Jurassic, reflecting the quick diversification and radiation of the damsel-dragonflies during this

period. H. nouveau onghea gen. nov. is closely related to Chinese genera Zygokaratawia and Ctenogampsophlebia, both from the Middle Jurassic of the Daohugou Biota; but differs from these genera in having a larger wing size, RP2 slightly distal of Sn, and a narrower area between IR2 and RP3/4." (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

17034. Zheng, D.; Nel, A.; Chang, S.-C.; Wang, B. (2018): A new progobiaeshnid dragonfly (Odonata, Aeshnoptera) from the Lower Cretaceous of Liaoning Province, NE China. Cretaceous Research 90: 1-6. (in English) ["The clade Aeshnoptera contains the most diverse fossil dragonfly in China, mainly recorded in the Lower Cretaceous. Here, a new aeshnopteran dragonfly, Paradecoraeshna liaoningensis Zheng, Nel and Zhang, gen. et sp. nov., attributed to the family Progobiaeshnidae, is described from the Lower Cretaceous Yixian Formation of Liaoning, NE China. Within Progobiaeshnidae, Paradecoraeshna gen. nov. shares mixed characters with Decoraeshna and Mongoliaeshna. These genera are well-differentiated from Progobiaeshna and Gobiaeshna in having an empty hypertriangle." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing, 210008, China

17035. Zheng, D.; Nel, A.; Zhang, H.; Chang, S.-C.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2018): A highly diverse coenagrionoid damselfly group (Odonata: Zygoptera: Burmacoenagrionidae fam. nov.) from mid-Cretaceous Burmese amber. Journal of Systematic Palaeontology 17(3): 239-253. (in English) ["The damselfly superfamily Coenagrionoidea is the largest zygopteran group, comprising three-fifths of all extant damselfly species. The Mesozoic fossil record of this superfamily is sparse, whilst it is relatively common in Burmese amber. A new coenagrionoid family, Burmacoenagrionidae Zheng et al., fam. nov., is established here based on four new species in three new genera: Burmacoenagrion pretiosus Zheng et al. gen. et sp. nov., Burmachistigma cheni Zheng et al. gen. et sp. nov., Electrocoenagrion elongatum Zheng et al. gen. et sp. nov. and Electrocoenagrion forficatum Zheng et al. gen. et sp. nov. The previously described damselfly genus, Burmagrion M€ostel et al., 2017, is transferred to this family. Burmacoenagrionidae Zheng et al. fam. nov. has a long pterostigma covering 3–5 cells, pigmented wings and a sigmoidally curved RA and RP1 distal of the pterostigma, differing from other coenagrionoid damselflies. Until now, this is the most diverse damselfly family reported from Burmese amber, showing that the Coenagrionoidea were already highly diversified 100 million years ago." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

17036. Zheng, D.; Zhang, H.; Wang, B.; Chang, S.-C. (2018): A new species of damsel-dragonfly (Odonata: Stenophlebiidae: Cretastenophlebia) from the Lower Cretaceous of the Jiuquan Basin, northwestern China. Earth and Environmental Science Transactions of The Royal Society of Edinburgh 107(2-3): 185-189. (in English) ["Abundant insect fossils have been recorded from the Lower Cretaceous of the Jiuquan Basin, but very few odonatans have been recorded. In this paper, a new damsel-dragonfly, Cretastenophlebia jiuquanensis sp. nov., is described from the Lower Cretaceous Zhonggou Formation in the Hanxiagou outcrop, Jiuquan Basin, northwestern China. This is the second species of the genus Cretastenophlebia Fleck et al., 2003. C. jiuquanensis sp. nov. differs from Cretastenophlebia mongolica Fleck et al., 2003 in the presence of a broad discoidal triangle, a basally straight IR1 and less cells along the posterior wing margin between IR2 and RP2. Cretastenophlebia has been previously reported from the Lower Cretaceous of Bon-Tsagaan, central Mongolia. The new discovery expands the record of Cretastenophlebia to the Jiuquan Basin in Albian." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Inst. of Geology and Palaeontology, Chinese Acad. of Sciences, 39 East Beijing Road, Nanjing 210008, China

17037. Zheng, D.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhou, Z.; Wang, B. (2018): The second mesomegaloprepid damselfly (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. Cretaceous Research 90: 131-135. (in English) ["The mesomegaloprepids are some of the most abundant fossil damselflies in mid-Cretaceous Burmese amber characterized by large size, brown colour and dense wing venation. Here we described a new damselfly, Cretamegaloprepus zhouae Zheng, Nel and Wang, gen. et sp. nov., representing the second known genus and species of Mesomegaloprepidae Huang et al. (2017). Cretamegaloprepus Zheng, Nel & Wang, gen. nov. greatly differs from Mesomegaloprepus Huang et al. (2017) in having no secondary antenodal and antesubnodal crossveins, the Arc being aligned with Ax2, free discoidal and subdiscoidal cells, base of IR2 being very far distal of Sn, shorter CuA ending on posterior wing margin before RP2 base, and a net of irregular cells near base of RP2. The diagnostic characters of Mesomegaloprepidae and Mesomegaloprepus are revised based on the new damselfly." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

17038. Zheng, D.; Nel, A.; Chang, S.-C.; Jarzembowski, E.A.; Zhang, H.; Wang, B. (2018): A well-preserved true dragonfly (Anisoptera: Gomphides: Burmagomphidae fam. nov.) from Cretaceous Burmese amber. Journal of Systematic Palaeontology 16(1): 881-889. (in English) ["Amber inclusions have been studied for several centuries, but true dragonflies are extremely rare, with only several poorly preserved wings recorded. In Burmese amber, odonatans are relatively diverse, but true dragonflies are still rare. An excellently preserved true dragonfly, Burmagomphides electronica Zheng, Nel & Wang gen. et sp. nov., representing the new family Burmagomphidae Zheng, Nel & Wang fam. nov., is described here from Cretaceous Burmese amber. This is the first well-preserved true dragonfly with complete wings in this amber. It is attributed to the clade Oligophlebiata because it has symmetrical RP

branches at the midfork and a well-developed trigonal planate as in the clade Hagenioidea, and the vein CuAa distinctly shortened with reduced pectinate branching as in Brevicubitalia; it differs, however, from the latter two in having a narrow hind wing base." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

17039. Zheng, D.; Jiang, T.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.; Wang, B. (2018): Paraburmagomphidae fam. nov., a new gomphid dragonfly family (Odonata: Anisoptera) from mid-Cretaceous Burmese amber. Cretaceous Research 92: 214-219. (in English) ["True dragonflies are comparatively common in Burmese amber. Here, we describe Paraburmagomphides zhaoi gen. et sp. nov., and establish a new family Paraburmagomphidae fam. nov. This family is placed in the clade 'Oligophlebiata' because it has a distinctly short CuAa with reduced pectinate branching (found in 'Brevicubitalia' and Burmagomphidae), and symmetrical RP branching at the midfork (developed in Hagenioidea and Burmagomphidae). Paraburmagomphidae are characterized by crossed discoidal and subdiscoidal triangles and four-celled anal loops." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

17040. Zheng, D.; Chang, S.-C.; Wang, B. (2018): A new dysagrionid damselfly (Odonata: Zygoptera: Palaeodysagrion) from mid-Cretaceous Burmese amber. Alcheringa: An Australasian Journal of Palaeontology 42(2): 300-304. (in English) ["Dysagrionidae are common in Paleogene sedimentary rocks, but rarely recorded in the Mesozoic. This family, however, is diverse in Burmese amber. A new dysagrionid damselfly, Palaeodysagrion youlini Zheng, Chang & Chang sp. nov., is described here based on a well-preserved specimen (holotype) in Burmese amber. The new damselfly provides wing apex and body characters for Palaeodysagrion. It differs from Palaeodysagrion cretacia in having Arc slightly distal of Ax2, the midfork slightly basal of the nodus, Cr and Sn almost perpendicular to RA and RP and in having a simple wing system. This is the fourth dysagrionid damselfly described from the Burmese amber." (Authors)] Address: Chang, Su-Chin, Dept of Earth Sciences, Univ. Hong Kong, Hong Kong Special Administrative Region, PR China. E-mail: suchin@hku.hk

17041. Zheng, D.; Nel, A.; Chang, S.-C.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2018): Paracoryphagrionidae fam. nov., a pseudostigmatoid damselfly from mid-Cretaceous Burmese amber showing regular series of triangular cells (Odonata: Zygoptera: Coenagrionida). Cretaceous Research 81: 93-97. (in English) ["Paracoryphagrionidae Zheng, Nel and Wang fam. nov., a new damselfly family based on the genus and species Paracoryphagrion deltoides Zheng, Nel & Wang gen. et sp. nov., is described from Burmese amber. Paracoryphagrionidae is attributed to the clade Pseudostigmatoidea, due to the presence of an extremely long, less zigzagged vein CuA covering numerous cells, reaching the pterostigmal level, and being parallel with the hindwing margin; plus numerous trigonal cells, all shared with Coryphagrion grandis Morton, 1924 of this clade. Paracoryphagrionidae differ from other pseudostigmatoid families in the absence of the kink of RP1 at the pterostigmal brace, a very long sclerotized pterostigma, only one row of cells in the poststigmal area between the costal margin and RA, and no sigmoidally curved RA and RP1 at the wing apex. Paracoryphagrion deltoides is unique within Zygoptera due to the presence of a very elongate pterostigma and many triangular cells in the postsubnodal area." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

17042. Zheng, D.; Chang, S.-C.; Nel, A.; Jarzembowski, E.A.; Zhuo, D.; Zhang, H.; Wang, B. (2018): A new Gondwanan dragonfly (Odonata: Anisoptera: Araripegomphidae) from mid-Cretaceous Burmese amber. Cretaceous Research 92: 168-173. (in English) ["The fossil dragonfly is a perfect model to study past biogeography. Araripegomphidae is an ancient Gondwanan family comprising the sole genus Araripegomphus previously from the Crato Formation (Upper Aptian) of Brazil. For the first time, a non-rock find, Araripegomphus shai sp. nov., is here described from mid-Cretaceous Burmese amber. This rare araripegomphid dragonfly extends the range of Araripegomphus to the west Burma block." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology and Center for Excellence in Life & Paleoenvironment, Chinese Acad. Sciences, 39 East Beijing Road, Nanjing 210008, China.

17043. Zheng, D.; Jarzembowski, E.A.; Chang, S.-C.; Wang, B.; Zhang, H. (2018): New cymatophlebiid dragonflies from the Lower Cretaceous of China and England (Odonata: Anisoptera: Cymatophlebiinae, Valdaeshninae). Cretaceous Research 90: 311-317. (in English) ["Cymatophlebia yixianensis sp. nov., the first Chinese Cretaceous cymatophlebiid dragonfly (cymatophlebiine), is described from the Lower Cretaceous Yixian Formation of western Liaoning, NE China. Cymatophlebia yixianensis sp. nov. has a forked RP2 near the wing margin differing from other species of Cymatophlebia Deichmüller 1886. A new valdaeshnine dragonfly, Valdaeshna mikei sp. nov., is described from the Lower Cretaceous Upper Weald Clay of southern Surrey, SE England, differentiated from Valdaeshna surreyensis Jarzembowski, 1988 in its larger size, a long Pt-brace, and a broad area between Rspl and IR2. An updated diagnosis for Valdaeshna Jarzembowski, 1988 is proposed." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiol. & Stratigraphy, Nanjing Inst. of Geology & Palaeontology and Centre for Excellence in Life & Paleoenvironment, Chinese Acad. Sci., 39 East Beijing Road, Nanjing 210008, China.

2019

17044. Abdel-Hamza, A.K.; Ward Shaher, K. (2019): Insect order that the blue-cheeked bee-eater merops superciliosus persicus Pallas, 1773 (Coraciiformes: Meropidae) chicks feed on in the provinces of Baghdad and Babylon. Plant Archives 19(2): 4121-4124. (in English) ["This study was conducted in Jadiriyah, Baghdad and the Emam, Babil provinces during 2017-2018. Results showed that there were significant

differences in the order of insects that birds feed on in the nestling during the day and between the weeks. The highest insect rate was in the first week for order Odonata in Babylon and Baghdad when scored 7 and 10 insect in the morning period respectively. Whereas it scored 7 - 8.4 insects) and (5.3 - 6 insects) in the afternoon and evening respectively. The order Orthoptera scored the lowest rate with 1.3 - 1, 0.6 - 0.6 and 0.3 - 1.3 insects for the morning, afternoon and evening periods, respectively. The number of insects orders started increasing during the second, third and fourth week when the Odonata scored (19.3, 44.3 and 61.6 insects), (14.3, 34.3 and 53.3 insects) for the morning Respectively, (11, 20.3 and 16.6 insects) (8, 15.6 and 19.6 insects) for the afternoon respectively (15.3, 35.3, 45 lactation), 12, 30 and 40.6 insects respectively for the evening period, respectively and the lowest for Orthoptera (1.3, 0.6 and 2.2 insects) (0.6, 1.6 and 1.3 insects), 0.6, 0.6 insect (respectively), 1.3 (1.3, 1.6 insect) and 0.6, 0.3 and 0.6 respectively 2 insects) for the evening. We conclude that the number of insects that chicks feed on the increase with age and prefer large insects, especially dragonflies for feeding." (Authors)] Address: Abdel-Hamza, A.K., Dept of Plant protection, College of Agricultural Engineering Sciences, University of Baghdad, Baghdad, Iraq

17045. Abdillah, M.; Millah, N.; Arroyyan, N.; Alifudin, F.; Pertiwi, W. (2019): Correlation between Libellulidae diversity and vegetation diversity at Sumber Clangap Village of Puncu, Subdistrict of Puncu, District of Kediri. The proceedings of the international symposium of remediation, biomaterial, revegetation and conservation 2018: 56-62. ["Libellulidae are the largest family in Ordo Odonata. Odonata has an antenna with olfactory function. The Odonata olfactory can be used for detecting chemical material in environmental. The environment including vegetation has role on keeping the ground water content. It statement indicate that the vegetation has role on organic material cycle including Libellulidae life. Sumber Clangap is the cold lava flow of Mount Kelud that affected by the eruption in 2014. This study was aimed to know the correlation between Libellulidae diversity and vegetation diversity at Sumber Clangap. There were 7 species of Libellulidae with the highest diversity index at third sampling plots. There were 72 plant species noted at Sumber Clangap with the highest diversity index at the first sampling plots. The paired T-test analysis showed that Libellulidae diversity significantly correlated with vegetation diversity." (Authors)] Address: Abdillah, M., Dept of Biology, Islamic State Univ. Sunan Ampel Surabaya, Jl. A. Yani, No. 117, Kota Surabaya, Indonesia

17046. Abdillah, M.M.; Prakarsa, T.B.P.; Tyastirin, E. (2019): Odonata diversity at Sumber Clangap and Sumber Mangli Puncu Village sub district of Puncu district of Kediri. Jurnal Biodjati 4(2): 236-243. (in English) ["Sumber Clangap and Sumber Mangli are geographically located at the Mount Kelud steeps. Administratively located at Puncu Village, Puncu Subdistrict and District of Kediri. They provided hab-itat for the flora than fauna especially Odonata that never been stud-ied before. We aimed to study Odonata diversity at Sumber Clangap and Sumber Mangli area. The method used in this study was natural snapshot experiment that conducted by Odonata monitoring. Micro-climate parameter including air temperature and humidity were noted. Odonata activity and behavior noted for analysis. Collected data were analyzed using Shannon-Wiener heterogeneity index. The results showed that there were 17 species from the whole location. There was Euphaea variegata, Vestalis luctuosa, Rhinocypha anisoptera, Pericnemis stictica, Pseudagrion pruinosum, Coeliccia membranipes, Gynacantha subinterrupta, Idionyx montana, Paragomphus reinwardtii, Heliogomphus drescheri, Neurothemis fluctuans, Orthetrum glaucum, O. pruinosum, O. sabina, Pantala flavescens, Trithemis festiva and Zygonyx ida. Based on the Shannon-Wiener heterogeneity index the value, Sumber Clangap had heterogeneity index higher (H'=1,97) than Sumber Mangli (H'=1,39). Sumber Man-gli has a Java endemic species P. reinwardtii and R. anisoptera that is spread only at Sumatera and East Java." (Authors)] Address: Abdillah, M.M., Biol. Dept, Fac. Sci. & Tech. UIN Sunan Ampel, Jl. Ahmad Yani No. 117, Jemur Wonosari, Kec. Wonocolo, Surabaya, East Java, Indonesia 60237. E-mail: 1abdillah.kutrik@gmail.com

17047. Agrawal, A. (2019): Passive flow control mechanism in a bio-inspired corrugated hydrofoil. SN Applied Sciences (2019) 1:1505: 17 pp. (in English) ["Corrugated hydrofoils are lately getting attention because of their superior aerodynamic performance compared to engineered hydrofoils at low Reynolds numbers (Re). A particle image velocimetry (PIV) based study on corrugated hydrofoil is conducted here to understand the flow dynamics around it at ultralow Reynolds numbers (Re = 280–11,700). Seven different angles of attack (a) are considered in this study ranging from -15° to 15°. Load cell measurements are undertaken to obtain the force coefficients and further these are compared with the results obtained from PIV data using wake survey method. The wake velocity profiles are examined to understand the variation in force coefficients in a better way. Vortices are found to be trapped in the valley of the corrugations. The lift coefficient increases as the number of vortices increases on the top (suction) surface. A temporal analysis of the data shows that the partially merged co-rotating vortices give higher lift as compared to the fully merged vortices. The maximum aerodynamic performance is obtained at -5° angle of attack for Re = 6760. The asymmetry in the geometry combined with asymmetry in the flow helps create relatively high lift for a corrugated wing. The performance of positive and negative angles of attack are compared and it is found that the fluctuation in lift coefficient is comparatively higher. It is hypothesized that the merging of trapped vortices with each other gives the effect of fluid roller bearings; this fluid roller bearing produces a travelling wave, which avoids the formation of boundary layer, thereby leading to high gliding ratio. These detailed results, covering the entire Reynolds number and angle of attack range of dragonfly flight, provide useful insights into the secret of dragonfly flight which will help in better design of micro air vehicles." (Authors)] Address: Agrawal, A., Dept of Mechanical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai 4000076, India. E-mail: amit.agrawal@iitb.ac.in

17048. Alexiou, S.; Manolas, N.; Lesparre, D. (2019): Ceriagrion georgifreyi new to the Peloponnisos, Greece (Odonata: Coenagrionidae). Notulae odonatologicae 9(3): 91-95.

(in English) ["C. georgifreyi is reported from two localities in the North-west Peloponnisos in Greece in 2014 and 2018. Together with recent records of this species from mainland Greece north-east of Athens, as well as from Lesvos island, this suggest that all former records of Ceriagrion from continental Greece and the North Aegean islands should be ascribed to C. georgifreyi as, after careful examination, were those from Thasos, Kerkira and Zakinthos." (Authors)] Address: Alexiou, S., Deutsches Institut für Lebensmitteltechnik e.V., Prof.-von-Klitzing-Str. 7, 49610 Quakenbrück, Germany. E-mail: s.alexiou@dil-ev.de

17049. Alijanovna, B.T. (2019): Review of insect fauna of urbanocenoses Kerki of the Republic of Turmenistan. XXV International scientific conference: 15-18. (in Russian, with English summary) ["The article presents some results of the study of species composition and structure of entomofauna of agrocenoses in the Eastern part of the Republic of Turkmenistan. The object of the study was the collection of imago insects living on the territory of Kerky and its surroundings. The study revealed 14 species of insects belonging to 7 groups. Dominant species and ecological groups of insects on the basis of trophic relations are revealed." Sympetrum vulgatum is the single odonate speciies listed. (Author)] Address: not stated

17050. Alves, R.J.V.; Costa, L.A.A.; Soares, A.; Silva, N.G.; Pinto, A.P. (2019): Open ocean nocturnal insect migration in the Brazilian South Atlantic with comments on flight endurance. PeerJ 7:e7583 DOI 10.7717/peerj.7583: 15 pp. (in English) ["We observed a nocturnal insect swarm aboard the oceanographic ship Cruzeiro do Sul of the Brazilian Navy, while conducting a survey of the Montague guyot (seamount), 389 km distant from the nearest land in the South Atlantic. The insects came from open sea toward the ship from all directions, attracted by the powerful light of the deck. Most insects collided with the hull and fell into the ocean, but we managed to capture and determine 17 (13 Hemiptera of a single species, three Lepidoptera of three species and one Odonata). With one exception, we are certain that none of the specimens caught originated from the ship. The geographic origin, most likely the coast of Brazil, and flight endurance of these insects were inferred using data on wind speed and direction, provided by the crew of the ship, and were reconstructed using Hysplit modeling of air current trajectories." (Authors) 1. Anax amazili (Burmeister, 1839). Material examined. One female (MNRJ ODO-0012, subsequently lost in the fire). Remarks. Species of Anax are known as migratory. They spend many weeks in migration routes undertaking distinct behaviors such as foraging (cf., May, 2013). Anax amazili is a New World species widespread in the entire American continent occurring from the USA (Needham, Westfall & May, 2000) through central America and the Caribbean Islands (Calvert, 1905) to southern Argentina (von Ellenrieder & Muzón, 2008). It also occurs as a resident species in the Pacific archipelago of Galápagos, about of 1,000 km from the coast (Calvert, 1905; Peck, 1992). The site of capture was about 380 km from the Brazilian coast and almost 800 km west of the closest archipelago, Trindade & Martin Vaz, from which Alves et al. (2019), PeerJ, DOI 10.7717/peerj.7583 5/15 only two different Odonata were recorded to date (MNRJ): P. flavescens and Rhionaeschna sp. (see Santos, 1981). The pantropical Libellulidae glider P. flavescens in the best-known migrant dragonfly species (Samways & Osborn, 1998). The hypothesis that this species forms a global panmictic population has received recent support (Troast et al., 2016). However, it is not known if there is a regular migration route among these land masses.] Address: Alves, R., Depto de Botânica, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil

17051. Alves-Martins, F.; Calatayud, J.; Medina, N.G.; De Marco, P.; Juen, L.; Hortal, J. (2019): Drivers of regional and local diversity of Amazonian stream Odonata. Insect Conservation and Diversity 12(3): 251-261. (in English) ["1. Large Amazonian rivers may act as dispersal barriers for animals with low dispersal abilities, limiting their distribution to certain interfluves. Consequently, the distribution of these taxa would be less affected by macroclimatic gradients. Conversely, high-dispersal taxa would be less constrained by large rivers and may track suitable climates. 2. We evaluate whether Zygoptera and Anisoptera, two Odonata suborders with different dispersal abilities, show differences in distribution patterns across Amazonian interfluves. We further assess the relative importance of macroclimatic and habitat factors in their community assembly. 3. We used network modularity analyses to identify biogeographic species pools and spatial buffers to define metacommunity species pools. Then, we used structural equation models to estimate the relative importance of multi-scale factors on species richness patterns. 4. Zygoptera communities are more similar in species composition within than between interfluves, suggesting that large Amazonian rivers indeed limit the distribution of Zygoptera species. Conversely, the distribution of Anisoptera extends across Amazonian interfluves. Seasonality has a strong positive effect on Odonata richness across scales. In addition, habitat integrity is negatively correlated with the regional species richness and abundance of Anisoptera and positively correlated with Zygoptera local richness. 5. The contrasting effects of habitat integrity on Anisoptera and Zygoptera suggest that the former is favored in open habitats, whereas the latter is so in forests. Despite these differences, both suborders appear to follow similar community assembly mechanisms in Amazonia, with a strong climatic control across scales and an effect of habitat filters on local communities." (Authors)] Address: Alves-Martins, Fernanda, Museo Nacional de Ciencias Naturales (MNCN-CSIC), C/Jos e Guti errez Abascal 2, 28006 Madrid, Spain. E-mail: fernandaalvesmartins@yahoo.com.br

17052. Arifi, K.; Tahri, L.; Hafiane, F.Z.; Elblidi, S.; Yahyaoui, A.; Fekhaoui, M. (2019): Diversité des macroinvertébrés aquatiques de la retenue du barrage Sidi Mohammed Ben Abdellah à la confluence avec les eaux de l'oued Grou et bioévaluation de la qualité de ses eaux (Région de Rabat, Maroc). Entomologie Faunistique – Faunistic Entomology 72: 13-20. (in French, with English summary) ["The Sidi Mohammed Ben Abdellah Dam (SMBA) in Morocco seems particularly threatened due to the lack of proper management. It is within this framework that this study of the structure and the specific richness of the benthic macroinvertebrates in the confluence zone with the Grou River and the evaluation of

the biological quality of the water at this level are inscribed. The fauna studied was collected monthly between December 2014 and November 2015. Four faunal groups were identified in this work (Annelids, Platyhelminthes, Molluscs and Arthropods). The value of the Global Standardized Biological Index (NGBI) obtained from these four faunal groups, highlights an alarming situation of the ecological quality." (Authors)] Address: Arifi, K., Université Mohammed V - Faculté des sciences, PB: 1040, Av. Ibn Batouta, Rabat, Maroc. E-mail: arifi_karim@hotmail.com

17053. Aryal, M. (2019): A note on Ischnura nursei (Morton, 1907): The first record from Nepal (Zygoptera: Coenagrionidae). Bionotes 21(2): 35-38. (in English) ["I. nursei was photographed on 24-II-2019 at 14:04 hr and on same day at 14:37 hr along the shoreline of Jagadishpur Lake (27°37'19.41"N &83° 5'41.54"E)." (Author)] Address: Aryal, M., Butwal-13, Devinagar, Rupandehi, Nepal. E-mail: aryalmilan100@gmail.com

17054. Asensio, R. (2019): Primera cita de Trithemis kirbyi Sélys, 1891 (Odonata: Libellulidae) de Bizkaia (País Vasco, España). Boln. Sociedad Entomológica Aragonesa (S.E.A.) 65: 221-224. (in Spanish, with English summary) ["The first record of T. kirbyi is reported from Biscay province, Basque Country, confirming the expansive trend across the Iberian Peninsula that began in 2007. Also, information is provided on the accompanying odonatofauna and on some observations, not formally published before, which bring forward the first records of this species by one and two years respectively for the Spanish provinces of Almería and Cáceres." (Author)] Address: Asensio, R., Cuestasensio S.C. Bilbao (Bizkaia), Spain. E-mail: cuestasensio@gmail.com

17055. Assandri, G. (2019): A critical review of the odonate fauna of Trentino: annotated check-list and new relevant data for Italy (Insecta: Odonata). Fragmenta Entomologica 51(1): 75-88. (in English) ["By the first half of the Twentieth Century, the Odonate fauna of Trentino (Oriental Alps, Italy) was quite well known; subsequently, few surveys on dragonflies were carried out, resulting in a limited update of the knowledge on this taxon. The aim of this study is to provide a critical and annotated check-list of the Odonata of this province for the period from 1851 to 2018. This synthesis is based on a total of 3814 records obtained from the literature (955 records), revision of collections (1048 records), and unpublished recent data (1811 records). An updated and comprehensive Odonatological bibliography of the region is also provided. Overall, 61 species were confirmed to occur (or have occurred) in Trentino. These represent the 64% of the species recorded in Italy and the 43% of the species recorded in Europe. Presence of five additional species (Ceriagrion tenellum, Coenagrion lunulatum, C. ornatum, Ophiogomphus cecilia, and Epitheca bimaculata) should be considered doubtful for Trentino. Further two species (Platycnemis latipes and Onychogomphus uncatus) have to be excluded from the fauna of the study area. 45 species were recorded also after 2000, whereas seven species were not confirmed after this year (Lestes dryas, L. virens, L. barbarus, Sympecma paedisca, Coenagrion scitulum, Brachytron pratense, and Sympetrum flaveolum). Several new records resulting from this study (referred to: Erythromma najas, Aeshna subarctica, A. caerulea, A. grandis, Leucorrhinia pectoralis) have a conservation or biogeographical relevance which transcends the borders of the study area, being noteworthy from an Italian or Alpine perspective and are thus commented in detail. Taxonomic notes on subspecies are also given when relevant." (Author)] Address: Assandri, G., Sezione Zoologia dei Vertebrati, MUSE - Museo delle Scienze, Corso del Lavoro e della Scienza, Trento, Italy. E-mail: giacomo.assandri@gmail.com

17056. Assandri, G.; Franceschini, A.; Lencioni, V. (2019): Dragonfly biodiversity 90 years ago in an Alpine region: The Odonata historical collection of the MUSE (Trento, Italy). Biodiversity Data Journal 7: e32391. https://doi.org/10.3897/-BDJ.7.e32391: 13 pp. (in English) ["Background: Historical collections of natural science museums play a fundamental role in documenting environmental changes and patterns of biodiversity transformation. This considered, they should have a pivotal role to plan conservation and management actions. The MUSE - Science Museum of Trento is an Italian regional museum preserving about 5.5 million items (organised in 297 collections). About one million of them are invertebrates, 70% of which are of local origin, gathered in the collection "Miscellanea Invertebrati". Odonata account for a minor part of this collection; however, most of them are of local or regional relevance. A complete catalogue of this collection does not exist to date. New information: The collection was studied in 2017-2018 and this contribution aims to present the Catalogue of the historic collection of Odonata of the MUSE - Museo delle Scienze of Trento (Italy). In all, 836 specimens of adult dragonflies and damselflies are found in the collection referring to an overall 56 species. The collection covers a period between 1924 and 1957 and refer to 74 defined localities, all located in northern Italy (most of them in Trentino - Alto Adige Region). The samples conserved in the collection are, for several species, the only indisputable confirmation of their former occurrence in that region." Authors)] Address: Assandri, G., MUSE - Science Museum of Trento, Trento, Italy

17057. Azar, D.; Maksoud, S.; Huang, D.; Nel, A. (2019): First Lebanese dragonflies (Insecta: Odonata, Aeshnoptera, Cavilabiata) from the Arabo-African mid-Cretaceous paleocontinent. Cretaceous Research 93(1): 78-89. (in English) ["A new hawker dragonfly Libanoliupanshania mimi gen. et sp. nov. is described and illustrated from the lower upper Cenomanian of Hjoula (Lebanon). Its discovery shows that the Cretaceous family Liupanshaniidae, currently recorded from South America and Eurasia, was also present in the Arabo-African Cretaceous paleocontinent. Also a new 'libelluloid' family Libanocorduliidae fam. nov. is described and illustrated on the basis of the new genus and species Libanocordulia debiei gen. et sp. nov. This taxon is characterized by a unique shape of the hindwing subdiscoidal space. Paleobiogeographic implications are discussed. The mid-Cretaceous marine outcrop of Hjoula is potentially a new insect konservat-Lagerstätte liable to provide crucial information on the entomofauna of the paleo-Arabo-African continent at that time." (Authors)] Address: Azarm, D., Lebanese University, Fac. of

Sciences II, Dept of Natural Sciences, P.O. Box: 26110217, Fanar, Matn, Lebanon

17058. Baba, Y.G.; Kusumoto, Y.; Tanaka, K. (2019): Positive effect of environmentally friendly farming on paddy field odonate assemblages at a small landscape scale. Journal of Insect Conservation 23: 467-474. (in English) ["Odonata species can be used to indicate the effects of anthropogenic disturbance on agrobiodiversity. In Japan, populations of some odonate species inhabiting rice paddy fields have decreased strongly owing to their high susceptibility to insecticides, and they therefore need to be conserved. To identify effective conservation strategies, we investigated how agricultural practices (conventional vs. environmentally friendly: EF) and surrounding landscape (area of forest at three spatial scales, namely 50, 100 and 200 m from the edge of the paddy field) influenced the abundance of odonates in rice paddies in Tochigi Prefecture, Japan. Generalized linear mixed-effect models revealed that EF farming increased the abundance of odonate adults and the number of nymphal exuviae, suggesting a strong negative effect of insecticides. The influence of forest area at the local scale on the numbers of odonate adults and nymphal exuviae was small, with the exception of a strong negative influence on adult Sympetrum infuscatum: the presence of a large area of forest within 200 m of the edge of the paddy field reduced their abundance, probably reflecting this dragonfly's oviposition site preference. Our results suggest that EF farming could generally support the conservation and recovery of local populations of odonates, but its effectiveness potentially varies depending on the ecological aspects of each species." (Authors)] Address: Baba, Y.G., Institute for Agro-Environmental Sciences, NARO, Tsukuba-shi, Japan. E-mail: ybaba@affrc.go.jp

17059. Babosova, M.; Porhajasova, J.I.; Ernst, D. (2019): Dragonflies (Odonata) of Botanical Garden's Pond of SUA in Nitra. Acta Fytotechnica et Zootechnica 22(4): 110-113. (in English) ["The faunistic research of dragonflies was realized during 2016 and 2017. The research was carried out under the conditions of Botanical garden's pond of Slovak University of Agriculture (SUA) in Nitra. 229 dragonfly individuals (105♂♂ 124♀♀) were trapped during the monitored period. Trapped individuals represented 10 species and 3 families of dragonflies. The aim of the research was to determine the species composition of dragonflies of the selected locality. Based on the representation of individual species for the monitored locality, its dominance was also calculated." (Authors)] Address: Babošová, Maria, Slovak Univ. Agriculture in Nitra, Faculty of Agrobiol. & Food Resources, Slovakia

17060. Babu, R.; Subramanian, K.A. (2019): A new species of Gomphidia Selys, 1854 (Insecta: Odonata: Anisoptera: Gomphidae) from the Western Ghats of India. Zootaxa 4652: 155-164. (in English) ["Gomphidia podhigai nov. spec.is described from southern Western Ghats, India based on a male specimen. The new species is very distinct from all the known species of Gomphidia from Indian subcontinent. Revised keys to the males and known females of Gomphidia of India and Sri Lanka are provided." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Southern Regional Centre, Santhome High Road, Chennai-600 028, Tamil Nadu, India. E-mail: subbuka.zsi@gmail.com

17061. Bashinskiy, I.V.; Senkevich, V.A.; Stoyko, T.G.; Katsman, E.A.; Korkina, S.A.; Osipov, V.V. (2019): Forest-steppe oxbows in limnophase — Abiotic features and biodiversity. Limnologica 74: 14-22. (in English) ["The aim of our study was to identify the main abiotic factors that influence the biodiversity of forest-steppe oxbows in limnophase. Experiments were performed in 2016–2017 in Penza oblast, Central Russia. In addition to disturbed water exchange, isolated oxbows experienced such human influence as logging and plowing on watersides, and the construction of roads and mounds. Under those conditions, some water bodies became unstable and temporal, while others remained stable and were relatively unaffected. Higher light intensity in unstable oxbows led to higher plant diversity because of the mass occurrence of helophytes. However, the diversity of hydrophytes in stable oxbows remained higher, which contributed to higher vegetation coverage. This resulted in increased zooplankton diversity, which was also influenced by lower fluctuations in water level and oxygen level. Disturbed water regimes impacted organisms with a full aquatic life cycle (phyto- and zooplankton, fish). The diversity of unstable oxbows decreased due to their isolation from the river and from drying. The absence of fish may positively affect the abundance and biomass of benthos; however, we found no influence on zooplankton. Instability and high fluctuations in water level may lead to the high diversity of organisms that spawn in water. The higher diversity of benthos may also be influenced by the abundance of amphibian larvae which are a necessary food resource. In addition to predation, amphibians are at risk of mass larval mortality because of drying. Although the degradation of oxbows in limnophase is an undesirable consequence of anthropogenic impact, the coexistence of all types of oxbows is necessary to conserve the freshwater biodiversity of foreststeppes." (Authors)] Address: Bashinskiy, I.V., A.N. Severtsov Institute of Ecology & Evolution RAS, Leninskiy 33, 119071, Moscow, Russian Federation. E-mail address: ivbash@mail.ru

17062. Batty, P.M (2019): Recent observations of Aeshna caerulea (Azure Hawker) in Scotland. J. Br. Dragonfly Society 35(1): 1-17. (in English) ["The population of A. caerulea in Scotland has been inferred as undergoing a decline. However, many of the apparent gains and losses are likely to be attributable to recording effort. This study revisits sites that have not been recorded from for 10 years or more and investigates other potential bog pools for breeding data through surveying for larvae. Two important breeding populations were found in Glen Garry and above Loch Quoich, extending the known range. These could be part of a much larger complex in the whole area. Breeding pools were also found at Rannoch Moor and Corrour. Recent surveys confirm the importance of higher-level upland blanket bog pools as the breeding habitat for this species. The lack of large larvae underlined the low productivity of the species and a large area may be needed to sustain the population. An update is also given

on the current situation for A. caerulea from other sources since 2012, which was the approximate cut-off date for data for the Atlas of British and Irish Dragonflies (Cham et ai, 2014). The range of A. caerulea is expanding in the Highlands. However, after extensive survey work, it appears possible that the species may have been lost from its most southerly site. More survey work is needed to investigate other, older records and to locate breeding areas." (Author)] Address: Batty, Patricia, Kirnan Farm, Kilmichael Glen, Lochgilphead, Argyll PA31 8QL, UK

17063. Bechly, G.; Rasmussen, J.A. (2019): A new genus of hawker dragonfly (Odonata: Anisoptera: Aeshnidae) from the Early Eocene Fur Formation of Denmark. Zootaxa 4550(1): 123-128. (in English) ["Parabaissaeshna ejerslevense gen. et sp. nov. (Aeshninae: Allopetaliini), is described from the Early Eocene Fur Formation (Mo-clay) of the island of Mors, northern Denmark. Its position among traditional "gomphaeschnine" dragonflies is discussed, and it is attributed to the tribe Allopetaliini as close relative to the Cretaceous genus Baissaeshna, documenting the survival of this lineage through the K-Pg mass extinction. The Recent genus Boyeria and the Eocene genus Anglogomphaeschna are also transferred to Allopetaliini." (Authors)] Address: Rasmussen, J.A., Fossil and Mo-clay Museum, Museum Mors, Nykøbing Mors, Denmark. E-mail: jan.rasmussen@museummors.dk

17064. Bellingan, T.A.; Hugo, S.; Woodford, D.J.; Gouws, J.; Villet, M.H.; Weyl, O.L.F. (2019): Rapid recovery of macroinvertebrates in a South African stream treated with rotenone. Hydrobiologia 834: 1-11. (in English) ["South Africa's Cape Fold Ecoregion supports a unique freshwater fish assemblage with many endemics. To mitigate impacts of alien invasive fishes on this unique assemblage, nature conservation authority CapeNature used rotenone to remove smallmouth bass (Micropterus dolomieu) from the Rondegat River. We investigated whether the rotenone treatments had an adverse impact on the aquatic macroinvertebrate community over the long-term, the first study of its kind in Africa. We monitored macroinvertebrates within treated and untreated (control) sites on multiple sampling events for 2 years before and 2 years after two rotenone treatments. We analysed the difference in invertebrate abundance between treatment and control sites before and after treatment, using generalised linear mixed models with sampling event as a random factor to partition out natural fluctuations in abundances over time. Populations fluctuated widely in control and treatment sites over the study period, and we found no effect that could be clearly attributed to rotenone. We conclude that macroinvertebrates recovered rapidly after treatment, probably through drift from untreated areas upstream, with no long-term adverse effects. We recommend that the presence of uninvaded upstream refuges that may provide demographic rescue be used as a key discriminating factor for future conservation purposed rotenone deployments." (Authors)] Address: Bellingan, T.A., Dept of Entomology and Arachnology, Albany Museum, Grahamstown, South Africa

17065. Bemah, H. (2019): Odonata diversity as indicators of freshwater habitat quality in the Owabi Wildlife Sanctuary, Ghana. Agrion 23(1): 25-29. (in English) ["The Odonata fauna of the Owabi Wildlife Sanctuary, Kumasi, Ghana was characterized into different disturbance gradients to assess water quality in the reserve. A total of 207 individuals from 25 species were recorded in the study area. Of these, 105 individuals belonging to 12 species and 102 individuals in 13 species were recorded as Odonata respectively. The forest habitat exhibited the largest damselfly assemblages while the disturbed habitat exhibited the largest dragonfly assemblages.] Address: Hadeeza Bemah. E-mail: hadeezahbemah@yahoo.com]

17066. Bhardwaj, M.; Soanes, K.; Lahoz-Monfort, J.J.; Lumsden, L.F.; van der Ree, R. (2019): Little evidence of a road-effect zone for nocturnal, flying insects. Ecology and Evolution 9: 65-72. (in English) ["Roads and traffic may be contributing to global declines of insect populations. The ecological effects of roads often extend far into the surrounding habitat, over a distance known as the road-effect zone. The quality of habitat in the road-effect zone is generally degraded (e.g., due to edge effects, noise, light, and chemical pollution) and can be reflected in species presence, abundance, or demographic parameters. Road-effect zones have been quantified for some vertebrate species but are yet to be quantified for insects. Investigating the road-effect zone for insects will provide a better understanding of how roads impact ecosystems, which is particularly important given the role insects play as pollinators, predators, and prey for other species. We quantified the road-effect zone for nocturnal flying insects along three major freeways in agricultural landscapes in southeast Australia. We collected insects using light traps at six points along 2-km transects perpendicular to each highway (n = 17). We sorted the samples into order, and dried and weighed each order to obtain a measure of dry biomass. Using regression models within a Bayesian framework of inference, we estimated the change in biomass of each order with distance from the road, while accounting for environmental variables such as temperature, moon phase, and vegetation structure. The biomass of nine of the ten orders [including Odonata] sampled did not change with distance from the freeway. Orthoptera was the only order whose biomass increased with distance from the freeway. From our findings, we suggest that the impacts of roads on insects are unlikely extending into the surrounding landscape over a distance of 2 km. Therefore, if there are impacts of roads on insects, these are more likely to be concentrated at the road itself, or on finer taxonomic scales such as family or genus level." (Authors)] Address: Bhardwaj, Manisha, Grimsö Wildlife, Research Station, Dept of Ecology, Swedish Univ. of Agricultural Sciences, Riddarhyttan, Sweden. E-mail: manisha.bhardwaj@live.ca

17067. Bishnoi, S.; Dang, K. (2019): Diversity of some odonatans insects in Kota, Rajasthan, India. Journal of Entomology and Zoology Studies 7(3): 301-303. (in English) ["In the present study attempt has been made to enlist Odonata in four different areas of Kota: Karani mata, C.V. garden, Bhitariya Kund and Yatayat Park. The study was conducted from September 2014 to August 2016. Present investigation revealed the presence of 12 species of Odonata belonging to 2 families (Libellulidae, Coenagrionidae). In the study area the

most dominant family was Libellulidae (7 species) and Coenagrionidae (5 species). The abundance of species was also recorded. Out of the 12 species recorded in 4 survey areas 3 species are abundant, 7 species are occasional and 2 species are rare in the study site. The study indicates a rich and diverse fauna in the survey area." (Authors)] Address: Bishnoi, Subhi, Research Scholar In C.P. Univ., Kota, Rajasthan, India

17068. Bittner, T. (2019): Landesweite Artenkartierung - Libellen. Mercuriale 18/19: 1-8. (in German, with English summary) ["Odonata mapping in the German land of Baden-Württemberg - Species distribution data represent the central basis for different nature conservation instruments and requirements. The following project is part of the special programme to strengthen biodiversity in Baden-Württemberg. The following elaborations are presented, which enable a regular update of the dragonfly distribution data. Here the work of volunteer mappers of the SGL should be explicitly relied on. The two-part concept targets the FFH dragonfly species on the one hand and all native dragonfly species on the other." (Author)] Address: Bittner, T., LUBW - Landesanstalt für Umwelt Baden-Württemberg, Griesbachstr. 1-3, 76185 Karlsruhe, Germany

17069. Bláha, M.; Grabicova, K.; Shaliutina, O.; Kubec, J.; Randák, T.; Zlabek, V.; Buric, M.; Veselý, L. (2019): Foraging behaviour of top predators mediated by pollution of psychoactive pharmaceuticals and effects on ecosystem stability. Science of the Total Environment 662: 655-661. (in English) ["Highlights: •Functional response approach was utilized as an endpoint of contaminant exposure. •WWTP effluent with real mixture of PhACs was tested. •Predator feeding behaviour was affected by all tested compounds. •WWTP effluent strengthens interaction strength by increased maximum feeding rate. •Single tested PhACS displayed decreased maximum feeding rate. Abstract: Although pharmaceuticals are recognized as a major threat to aquatic ecosystems worldwide, little is known about their ecological effect on aquatic biota and ecosystems. Drug-induced behaviour changes could have a substantial impact on consumer-resource interactions influencing stability of the community and ecosystem. We combined laboratory experiments and functional response modelling to investigate effects of real wastewater treatment plant (WWTP) effluent, as well as environmentally relevant concentrations of the antidepressants citalopram and opioid pain medication tramadol, on trophic interactions. Our biological system consisted of Aeshna cyanea larvae as predator of common carp Cyprinus carpio fry. Exposure to WWTP effluent significantly increased A. cyanea maximum feeding rate, while those parameters in tramadol and citalopram-exposed larvae were significantly lower from unexposed control group. This suggested the potential of all tested pollutants to have an effect on consumer-resource equilibrium in aquatic ecosystems. While WWTP effluent strengthened interaction strength (IS) of consumer-resource interaction dynamics making the food web more vulnerable to fluctuation and destabilization, tramadol and citalopram could inhibit the potential oscillations of the consumer-resource system by weakening the IS. Similar studies to reveal the potential of pervasive pharmaceuticals to change of consumer-resource interactions dynamics are needed, especially when real WWTP effluent consisting of mixture of various pharmaceuticals displayed very different effect from single compounds tested." (Authors)] Address: Bláha, M., University of South Bohemia in Èeské Budìjovice, Fac. of Fisheries & Protection of Waters, South Bohemian Research Center of Aquaculture & Biodiversity of Hydrocenoses, Zátiší 728/II, 389 25 Vodòany, Czech Republic. E-mail: blaha@frov.jcu.cz

17070. Bolshakov, L.V.; Lakomov, A.F. (2019): New and interesting findings of Odonata in the Tula Đrovince. Eversmannia 59-60: 6-8.["Data is given on findings in the Tula region of 8 species of dragonflies, of which 5 are registered for the first time for the fauna of the Tula region, among them Aeshna serrata (Hagen, 1856) for the first time for the Center of European Russia, the rest of the species are local or rare." (Authors)]

17071. Borges, L.R.; Barbosa, M.S.; Alves Carneiro, M.A.; Vilela, D.S., Santos, J.C. (2019): Dragonflies and damselflies (Insecta: Odonata) from a Cerrado area at Triângulo Mineiro, Minas Gerais, Brazil. Biota Neotropica 19(1), e20180609, 2019: 9 pp, erratum. (in English, with Spanish summary) ["Odonata is considered, among the aquatic insect orders, the second largest group in number of species. Its global richness is estimated in about 6,000 described species. The Brazilian richness represents around 14% of the world's odonatofauna, however, the knowledge on Brazilian dragonflies distribution is still poor. This study purpose an inventory of the dragonflies species present in aquatic habitats from a Preserved Area according to the Brazilian Forest Code, located in the Cerrado biome at Triângulo Mineiro, Minas Gerais. In the dry season, from April to June of 2017, we collected 680 specimens belonging to 36 species and six families. Among the collected species, Elasmothemis williamsoni was observed by the first time in Minas Gerais State, and we also found a new species of Tigriagrion which is being described by taxonomists. Considering the fast agricultural advance over natural Cerrado systems, species lists can be important to define priority conservation areas for odonate species." (Authors)] Address: Borges, L.R., Univ. Federal de Uberlândia, Instituto de Biologia, Av. Pará 1720, 38405-320. Uberlândia, MG, Brasil

17072. Borisov, A.S.; Borisov, S.N. (2019): Spring immigration of dragonflies (Odonata) in Tajikistan. Eurasian Entomological Journal 18(5): 305-311. (in Russian, with English summary) ["Four migratory dragonfly species, Anax ephippiger, A. parthenope, Pantala flavescens and Sympetrum fonscolombii, arriving in Tajikistan for reproduction in spring 2019 from southernmost parts of the areal, were studied. In spring, populations of the most abundant and widespread immigrant species, A. parthenope, presumably include immigrants from both southern and local residents. Ephemeral water ponds, mainly rice fields, are more preferable for oviposition of P. flavescens and S. fonscolombii, and probably typical of A. ephippiger, but a different type water reservoir is necessary for A. parthenope and for a number of local eurytopic nonmigrating dragonflies." (Authors)] Address: Borisov, A.S., Institute of Systematics and Ecology of Animals, Russian Acad.

of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk, 630091 Russia. E-mails: baswatch@gmail.com

17073. Bos-Groenendijk, G.I.; Grunsven, R.H.A. van; Poot, M.J.M. (2019): Mogelijkheden voor aantalsmonitoring en verspreidingsonderzoek rivierrombout. Rapport VS2019.025, De Vlinderstichting, Wageningen: 15 pp. (in Dutch) ["Stylurus flavipes is species that lives in the large rivers (Waal, Rijn, IJssel). The species had disappeared from the Netherlands for a long time, but was rediscovered in 1996. Due to improvements in water quality, the Dutch rivers had become suitable habitats again. The species is now found in large parts of the river area. The river snake is listed in Annex IV of the European Habitat Directive and thus enjoys a legally protected status. The species is therefore a target species within the Ecological Monitoring Network (NEM). However, it is difficult to monitor and because of its way of life it does not fit into the standard method of the dragonfly monitoring network. This report describes the current situation in terms of distribution and number monitoring of the river hummingbird and how monitoring could develop further. In 2019, number monitoring of the river scallop was started for the first time. This was a pilot project to find out whether a good picture of the population developments of the species could be obtained in this way. Based on observations from the NDFF, two locations were selected where potentially many skinks could be found. At both locations different routes are set out according to the method of the dragonfly monitoring network. These routes were visited three times and the skins of the river hawk were sought. The pilot project has produced good results at Loevestein Castle. We expect that this method will provide long-term insights into the population development of the river scoter and therefore recommend continuing this form of monitoring." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: not stated

17074. Bota-Sierra, C.A.; Sandoval-H, J.; Palacino-Rodriguez, F. (2019): Description of a new species of Andaeschna (Odonata: Aeshnidae) from the Western Colombian Andes. Zootaxa 4615(3): 594-600. (in English) ["Andaeschna is a small and poorly known genus of dragonflies that inhabits the Andes, from Venezuela to northwestern Argentina. Here we describe A. occidentalis sp. nov., first species of the genus recorded in the Western Andes, specifically from the Tatamá National Park in Colombia. Males of this species can be differentiated from the other four species in the genus by the unique shape of the distal segment of the vesica spermalis. Likewise, females can be distinguished by their smaller and broader cerci (slightly shorter than S9) and its subquadrate point. The discovery of this beautiful species expands the range of the genus, previously known only in the Eastern Andes." (Authors)] Address: Sandoval-H, Juliana, Inst. de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: julisando@gmail.com

17075. Boudot, J.P.; Havelka, P.; Martens, A. (2019): The biting midge Forcipomyia paludis as a parasite of Odonata in North Africa (Diptera: Ceratopogonidae). Notulae odonatologicae 9(4): 164-168. (in English) ["In June and July 2013, at two streams in the Middle Atlas Mountains, Morocco, ceratopogonid midges were photographed on and taken from the wings of six species of odonates. The specimens were identified as F. paludis, a widespread European ceratopogonid midge new to Africa. The data increase the range of known hosts with the addition of Cordulegaster princeps, Gomphus simillimus maroccanus and Onychogomphus boudoti." (Authors)] Address: Boudot, J.P., Immeuble Orphée, Apt 703, Cidex 62, 78 rue de la Justice, Ludres, France. E-mail: jean.pierre.boudot@numericable.fr

17076. Bried, J.T.; Hinchliffe, R.P. (2019): Improving taxonomic resolution in large-scale freshwater biodiversity monitoring: an example using wetlands and Odonata. Insect Conservation and Diversity 12(1): 9-17. (in English) ["1. Immature aquatic insects are a major source of taxonomic difficulty in large-scale freshwater biodiversity monitoring. Adult stages could improve taxonomic resolution for assessing distributions and trends of biodiversity. Odonata have accessible adult stages that should greatly enhance the amount of species-level information. 2. We used Odonata and a wetland monitoring programme in Alberta, Canada to illustrate how much taxonomic information can be lost in larval collections, and an extensive adult records database to estimate what could be gained from adult surveys. 3. Despite processing 22 638 odonate specimens from 975 wetlands throughout Alberta, larval monitoring failed to collect or identify almost 60% of the lentic breeding Odonata species known from adult records. A total of 25 lentic-breeding dragonfly species and 12 lentic-breeding damselfly species were present in adult records and not the larval data, including species of conservation concern. Due to the abundance of early instars, a substantial 82% of the processed damselfly collection and 62% of the processed dragonfly collection was left at suborder. 4. We recommend supplementing aquatic sampling with adult rearing, collecting, and observing (at least Odonata) to improve the basic inventory and overall status assessment in large-scale freshwater biodiversity monitoring. This is especially true when aquatic sampling is restricted to a suboptimal time of year for species identifications." (Authors)] Address: Bried, J.T., Dept of Biological Sciences Murray State Univ., Murry, Kentucky 42071, USA. E-mail: jbried@murraystate.edu

17077. Buczynska, E.; Buczynski, P. (2019): Aquatic insects of man-made habitats: Environmental factors determining the distribution of caddisflies (Trichoptera), dragonflies (Odonata), and beetles (Coleoptera) in Acidic Peat Pools. Journal of Insect Science 19(1): 1-15. (in English) ["As degradation of sensitive habitats like Sphagnum L. (Sphagnales: Sphagnaceae) peatbogs is endangering their invertebrate fauna, artificial peat pools may offer peatbog insect fauna a chance of survival. The entomofauna of seven peat pools in a peatbog and its surrounding natural marginal zone in SE Poland was investigated at the level of species, assemblages and faunistic metrics, indicating the key environmental drivers of the insect distribution and their implications for the biodiversity and potential conservation of these habitats. The species composition, specialists, and insect assemblages of the peat pools were linked with the fauna typical of both peatbogs and dystrophic pools

with an open water surface. The most specialized fauna was found in the pools with the largest Sphagnum cover: only tyrphobionts, of all the ecological elements, significantly discriminated the fauna of peat pools and the marginal zone. Sphagnum cover was the key structural factor affecting the distribution of all the insects. Additionally, dragonflies were dependent on pH, beetles on temperature, and caddisflies on dissolved oxygen; however, structural factors—apart from Sphagnum cover—pool perimeter and emergent vegetation cover were predominant. Our results show that appropriate management of the structural factors of peat pools, especially Sphagnum cover, and the provision of different successional stages, can enhance biodiversity and help to maintain a valuable specialist fauna. Even along small environmental gradients and in a homogeneous area, the response of insects is highly differentiated. Dragonflies probably best represent the conservation value of the overall invertebrate fauna of Sphagnum bogs." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

17078. Buczyñski, P.; Buczyñska, E.; Michalczuk, W. (2019): From southern Balkans to western Russia: Do first polish records of Pantala flavescens (Fabricius, 1798) (Odonata: Libellulidae) indicate a migration route? Journal of the Entomological Research Society 21(1): 11-16. (in English) ["P. flavescens, probably the most widespread dragonfly on Earth, has been recorded for the first time in Poland. Two single specimens (males) were observed in middle-eastern and northern part of the country in Summer 2016. Both observation sites are the valuable completion of knowledge about the distribution of this migratory species, which had been previously found only once in Central-Eastern Europe. New data indicates possible migration routes of this species in this region." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

17079. Buczynski, P.; Tarkowski, A. (2019): Southern skimmer Orthetrum brunneum (Fonsc.) (Odonata, Libellulidae) – 58th odonate species found in the Poleski National Park. Parki nar. Rez. Przyr. 38(2): 83-87. (in Polish, with English summary) ["A hunting female of O. brunneum was recorded on 14.06.2019 ona transitional peat bog in the Poleski National Park (51°24'21.6" N, 23°06'24.5" E, UTM: FB49). It was probably an individual from the meadows near the park. There are no suitable habitats for this species in the park. Including O. brunneum, 58 dragonfly species (78% of the national fauna and 85% of the fauna of the Lublin Region) have been found in the Poleski National Park so far. This confirms the importance of this area as a refugium of dragonflies and a hot spot of their species diversity." (Authors)] Address: Tarkowski, A., Katedra Zoologii i Ochrony Przyrody, Instytut Nauk Biologicznych, UMCS w Lublinie, ul. Akademicka 19, 20 – 033 Lublin, Poland. E-mail: tarkowski890@gmail.com

17080. Buczynski, P.; Buczynska, E. (2019): First records of Gomphus vulgatissimus (L.) (Odonata: Libellulidae) and Oulimnius major (REY) (Coleoptera: Elmidae) in Southwestern England (Great Britain) with other insect records from Devon County. Wiad. Entomol. 38(2): 120-121. (in English, with Polish summary) [UK, River Otter in Ottery St. Mary (50°44'37"N 3°17'00"W. UTM: VB 72): G. vulgatissimus, 18 VII 2017, 1 male in flight along die river bank.] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

17081. Bylak, A.; Rak, W.; Wójcik, M.; Kukula, E.; Kukula, K. (2019): Analysis of macrobenthic communities in a post-mining sulphur pit lake (Poland). Mine Water and the Environment 38(3): 536-550. (in English) ["The objective of the study was to define the primary environmental factors affecting the composition of the macrobenthic community in an abandoned open cast sulphur mine pit lake that had been filled with water from a nearby river. We investigated habitats at various depths and the macrobenthic communities; samples were collected by scuba divers. Although rush and submerged vegetation in the subsaline pit lake was abundant and provided potentially good habitat conditions for mayflies, caddisflies, coleopterans, or damselflies, the native insects were scarce. The taxa do not have many representatives in waters with elevated salinity, so those present in the Machów pit lake were mainly euryhaline species. Chironomids were the most abundant macroinvertebrates in shallower zones, whereas non-native zebra mussels were the quantitatively dominant taxon in deep-water zones. Moreover, these non-native mussels were the dominant biomass of invertebrates at all sites in all seasons. The current composition of the invertebrate assemblage was probably primarily determined by the salinated water, which limited the abundance of native species and gave non-native species an edge." (Authors)Address: Bylak, Aneta, Dept of Ecology & Environmental Monitoring, Univ. of Rzeszow, Rzeszow, Poland. E-mail: abylak@ur.edu.pl

17082. Cabana, M.; Ferreiro, R.; Pardo, L.; Romeo, A. (2019): Primeras citas de Brachytron pratense (Odonata: Aeshnidae) en la provincia de Lugo (noroeste de la Península Ibérica). Boln. S.E.A. 64: 251-252. (in Spanish, with English summary) ["First records of Brachytron pratense (Odonata: Aeshnidae) in the province of Lugo (NW Iberian Peninsula). 17 specimens from five dates in May 2019 are documented." (Authors)] Address: Cabana, M., Grupo de Investigación en Bioloxía Evolutiva (GIBE), Depto de Bioloxía. Facultade de Ciencias. Universidade da Coruña. Campus da Zapateira, s/n. 15.071 A Coruña, Spain. E-mail: mcohyla@gmail.com.

17083. Cai, Y.; Nga, Y.P.Q.; Ngiam, R.W.J. (2019): Diversity and distribution of dragonflies in Bukit Timah Nature Reserve, Singapore. Gardens' Bulletin Singapore 71(Suppl. 1): 293-316. (in English) ["Biodiversity baselines were established for dragonflies of Bukit Timah Nature Reserve, Singapore, based on quantitative and qualitative samplings. Surveys were conducted from December 2014 to February 2016. Hydrological, physicochemical parameters and habitats were analysed to understand the main drivers structuring the dragonfly community. A total of 829 odonate specimens were recorded during the quantitative sampling, comprising 36 species of 28 genera in 11 families. The species diversity in each

of the six sampling sites was compared using the Shannon-Wiener Index (H'). Hierarchical clustering and Detrended Correspondence Analysis (DCA) indicated that three main groupings of sites existed, each with a distinct community of associated species. Further analysis by Non-metric multidimensional scaling (NMDS) on the relevant distance based on species composition at the six sampling sites, together with 21 environmental variables showed that these groups were significantly associated with respective environmental variables. An updated species list of Bukit Timah dragonflies is provided for future reference, with 55 species of 43 genera in 12 families. Disturbance and threats to the odonate fauna of the Bukit Timah Nature Reserve are identified and conservation management measures are discussed." (Authors)] Address: Cai, Y., National Biodiversity Centre, National Parks Board, 1 Cluny Road, 259569 Singapore. E-mail: cai_yixiong@nparks.gov.sg

17084. Calvao, L.B.; Juen, L.; Barbosa de Oliveira, J.M.; Batista, J.D.; De Marco, P. (2019): Land use modifies Odonata diversity in streams of the Brazilian Cerrado. Journal of Insect Conservation 22(5–6): 675-685. (in English) ["The presence of riparian vegetation provides microclimatic regulation of stream conditions [e.g. luminosity (lux), air temperature (°C) and relative humidity (%)], which varies naturally throughout the day. These variables explain the diurnal behaviour patterns of ectotherms such as Odonata in natural areas. However, human land uses (e.g. pastures) modify the abiotic conditions of riparian environments, favouring the presence of disturbance-tolerant species. In this context, we assess relationships between riparian land use (control streams-natural areas and pasture), abiotic conditions habitat integrity index (in control and pastures streams), (air temperature, luminosity and humidity in control streams), and Odonata diversity (between pasture and control streams and throughout the time of day) in Brazilian savannah (Cerrado) streams. First, the control streams had higher habitat integrity index than pasture. Higher abundance and difference in composition of Odonata species were observed in streams surrounded by pasture relative to natural areas. The conversion of natural areas to pasture near streams was also accompanied by an increase in overall body size of Odonata species. Odonata species richness and abundance in natural areas varied throughout the day, but peaked around 12:00 h, coinciding with changes in air temperature and luminosity. Our study highlights that changes in the physical characteristics of streams through conversion of natural habitats to pasture will change environmental conditions and act as a filter on the distribution and persistence of Odonata species in Cerrado streams." (Authors)] Address: Calvão, L.B., Depto de Ciências Biológicas, Univ. do Estado de Mato Grosso, Nova Xavantina, Brazil

17085. Camargo-Martínez, P.A.; Rodríguez-Villamil, D.R. (2019): Anidación del Búho campestre (Asio flammeus bogotensis) en la Sabana de Bogotá, Colombia - Nesting of the Short-eared Owl (Asio flammeus bogotensis) in the Sabana de Bogotá, Colombia. Ornitología Colombiana 17: eA02: 1-11. (in Spanish, with english summary) ["Reproduction is one of the most important aspects of a species biology. However, this information is scarce for nocturnal species such as owls, for which we do not know basic details of the natural history, particularly of species with a Neotropical distribution. The Short-eared Owl is a widely distributed species, the little that is known about its reproductive biology has become a generalized statement from studies in temperate zones. We made observations of three reproductive events of the Short-eared Owl in the Bogotá Savannah between 2014 and 2018. We include data on habitat, nest architecture, eggs, chicks, juveniles and adults description, determination of vocalizations and diet description through the analysis of 18 pellets. Asio flammeus bogotensis nests on the ground, in open areas such as grasslands, with an average clutch size of two white and rounded eggs (n = 3). … Regarding the diet we found 136 food items, including insects (beetles and odonates [Rhionaeschna marchali]) 61.76%, small mammals (rodents and shrews) 33.82%, and birds (pigeons and passerines) 4.42%. The predominant prey were Coleoptera (Ancognatha vulgaris) and the common mouse (Mus musculus). There are still several aspects of the natural history of this and other species that we hope will continue to be studied by ornithologists in the Neotropics." (Authors)] Address: Rodríguez-Villamil, D.R., Grupo de Ornitología de la Universidad Pedagógica Nacional (UPN-O). Departamento de Biología. Énfasis Biología de la Conservación UPN. E-mail: bionaturaldavid@gmail.com

17086. Cannings, R.A. (2019): Odonata of Canada. ZooKeys 819: 227-241. (in English) ["Since Corbet's thorough 1979 overview of Canadian Odonata, hundreds of regional works on taxonomy, faunistics, distribution, life history, ecology and behaviour have been written. Canada records 214 species of Odonata, an increase of 20 since the 1979 assessment. Estimates of unrecorded species are small; this reflects the well-known nature of the fauna. A major impetus for surveys and analyses of the status of species is the work of the Committee on the Status of Endangered Wildlife in Canada which provides a scientifically sound classification of wildlife species potentially at risk. As of 2017, six species have been designated "Endangered" and two "Special Concern" (only five of which are officially listed under the Federal Species at Risk Act (SARA)). The Order provides a good example of molecular barcoding effort in insects, as many well-accepted morphological species in Canada have been barcoded to some degree. However, more barcoding of accurately identified specimens of many species is still required, especially in most of the larger families, which have less than 70% of their species barcoded. Corbet noted that the larvae of 15 Canadian species were unknown, but almost all larvae are now well, or cursorily, described. Extensive surveys have greatly improved our understanding of species' geographical distributions, habitat requirements and conservation status but more research is required to better define occurrence, abundance and biological details for almost all species." (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville St, Victoria, BC, V8W 9W2, Canada. E-mail: rcannings@royalbcmuseum.bc.ca

17087. Cano Villegas, F.J. (2019): Situación actual de Aeshna affinis Vander Linden, 1820 (Odonata: Aeshnidae) en la provincia de Córdoba (Andalucía, Sur de España). Boln. S.E.A. 64:

253-254. (in Spanish, with English summary) ["The second record of A. affinis in Cordoba is presented, revising his situation in Andalusia, threats and protection status." 2-VI-2016, 22-VII-2018, las Jaras, UTM 30SUH30). (Author)] Address: Cano Villegas, F.J., Asociación Odonatológica de Andalucía. C/ Isla Mallorca nº 2 Portal 6 4ºA; 14011 Córdoba, Spain

17088. Cano-Villegas, F.J. (2019): Primera cita de Libellula quadrimaculata Linnaeus, 1758 (Odonata: Libellulidae) de la provincia de Córdoba (Andalucía, sur de España). Boln. Sociedad Entomológica Aragonesa (S.E.A.) 65: 219-220. (in Spanish, with English summary) [14-V-2019, lateral del Embalse de la Encantada (cuadrícula UTM 30SUH30 a 460 m. s.n.m.).] Address: Cano-Villegas, F.J., Asociación Odonatológica de Andalucía. C/ Isla Mallorca nº 2 Portal 6 4ºA; 14011 Córdoba, Spain

17089. Cao, L.-z.; Wu, K.-m. (2019): Genetic diversity and demographic history of Globe Skimmers (Odonata: Libellulidae) in China based on microsatellite and mitochondrial DNA markers. Scientific Reports 9(8619): 8 pp. (in English) ["To analyze genetic characters of migratory dragonflies, we used 10 microsatellite markers and a partial sequence of the mitochondrial gene Cytb to investigate genetic diversity and demographic history among 19 populations of P. flavescens in eastern the monsoon region of China. In a Bayesian clustering analysis of the microsatellite data, three distinct clades were present, and each population consisted of a mixture of individuals from the three clusters. An AMOVA of the data from both the microsatellite loci and Cytb revealed that genetic variation was mainly within each population. For the 543 individuals from the 19 regions, 77 unique haplotypes were obtained by DnaSP 4.0, and a median-joining network showed no obvious geographical pattern and displayed high gene flow and minimal population genetic structure among the 19 populations. According to a Mantel test, there was no significant association between genetic distance and geographic distribution and no isolation by distance. Mismatch distribution and neutrality tests showed no demographic expansion for the 19 populations. Microsatellite and mitochondrial DNA data suggested there was high gene flow and low differentiation among the populations. These results will help provide valuable information to study the migratory route of insects, especially important agricultural pests." (Authors)] Address: Wu, K.-m., Inst. of Plant Protection, Chinese Acad. of Agricultural Sci., Beijing, 100193, P.R. China. E-mail: kmwu@ippcaas.cn

17090. Casanueva, P.; Sharifi, F.S.; Hernández, M.A.; Campos, F. (2019): Colour of the gonapophyses in Cordulegaster boltonii (Golden-ringed Dragonfly) can help determine the stage of metamorphosis in female final instar larvae. J. Br. Dragonfly Society 35(1): 33-38. (in English) ["The degree of darkening of the gonopophyses in female final instar (F-0) larvae of C. boltonii is compared with the four stages (here referred to as 1 - 4) of metamorphosis described by Ferreras-Romero & Corbet (1999) in this species. There is a reasonable degree of correlation, with larvae showing no darkening of the gonopophyses falling mainly in stages 1 and 2, whereas those with more than 25% of darkening fall almost exclusively into stages 3 and 4. The method described in the current study is a simple method for determining the stage of metamorphosis but it is suggested that, for maximum accuracy, both methods should be used." (Authors)] Address: Casanueva, Patricia, Dept of Experimental Sciences, European Univ. Miguel de Cervantes, Cl Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

17091. Catalano, S.; Nadler, S.A.; Fall, C.B.; Marsh, K.J.; Leger, E.; Sened, M.; Priestnall, S.L.; Wood, C.L.; Diouf, N.D.; Ba, K.; Webster, J.P. (2019): Plagiorchis sp. in small mammals of Senegal and the potential emergence of a zoonotic trematodiasis. IJP: Parasites and Wildlife 8: 164-170. (in English) ["Trematodes of the genus Plagiorchis have a wide geographical distribution and can exploit a variety of hosts. The occurrence and zoonotic potential of Plagiorchis spp. have been characterised across several countries in Asia; in contrast, information on Plagiorchis parasites in Africa remains anecdotal. We isolated a previously undescribed Plagiorchis species from the biliary tract and small intestine of 201 out of 427 small mammals collected in the region of Lake Guiers, Senegal, with local prevalence ranging from 38.6% to 77.0%. Conversely, Plagiorchis isolates were not observed in the 244 small mammals sampled in and around the town of Richard Toll, Senegal. Molecular phylogenetics of the internal transcribed spacer region, nuclear ribosomal DNA, and of the cytochrome c oxidase subunit 1 gene, mitochondrial DNA, supported the monophyly and multi-host spectrum of this newly discovered West African Plagiorchis species. Sequencing of individual cercariae shed by Radix natalensis (Gastropoda: Lymnaeidae) suggested that these freshwater snails may act as suitable first intermediate hosts. Phylogenetic analysis yielded a highly resolved topology indicating two different clades, one composed by Plagiorchis spp. infecting rodents, insectivores, and birds, while the other included parasites of bats. Our findings showed the low host specificity and high prevalence of the isolated Plagiorchis sp. in the Lake Guiers region, with Hubert's multimammate mice (Mastomys huberti) appearing to play a primary role in the epidemiology of this parasite. The results raise concern about the zoonotic potential of Plagiorchis sp. in local communities of the Lake Guiers region, and highlight food-borne trematodiases and their link to land-use change as a neglected public health issue in regions of West Africa." (Authors)] Address: Catalano, S., Centre for Emerging, Endemic & Exotic Diseases, Dept of Pathobiology & Population Sci., The Royal Veterinary College, Univ. of London, Hatfield, AL97TA, UK. E-mail: scatalano@rvc.ac.uk

17092. Chelli, A.M.; Zebsa, R.; Khelifa, R. (2019): Discovery of a new population of the endangered Calopteryx exul in central North Algeria (Odonata: Calopterygidae). Notulae odonatologicae 9(4): 150-154. (in English) ["C. exul, is reported from Algeria. The species was found on the Bousselam river in Bejaia province, central North Algeria, in three different localities. Reproductive behaviour was observed. These new findings extend the known geographic range of the extant populations of the species in Algeria." (Authors)] Address: Chelli, A.M., Laboratoire de Zoologie Appliquée et d'Ecophysiologie Animale, Faculté des Sciences de la Nature et de

la Vie, Université de Bejaia, Algeria. E-mail: mchelli70@yahoo.fr

17093. Chelmick, D. (2019): Coenagrion mercuriale (Southern Damselfly) at Povington, Isle of Purbeck, Dorset. J. Br. Dragonfly Society 35(1): 18-32. (in English) ["C. mercuriale is found very locally in Southern Britain where it breeds in base rich, slow flowing streams and mires; its two year larval life cycle in the UK requires permanent waters. On the Isle of Purbeck, Dorset, C. mercuriale has been found in six sites, only one of which (Harland Moor) is currently thriving. One of the sites, at Povington, which is on MOD land, was discovered in May 1992, and in 1995 the colony was thought to comprise approximately 1500 adults and was the most important in Purbeck. Since that time the colony has declined and in 2016 only one adult was seen. This was the last sighting of this species at Povington. On behalf of the British Dragonfly Society, the author undertook a study of the habitat to investigate the decline. In summary: The colony at Povington came about as a result of changing water flows associated with clay workings, probably in the 1980s. In 1996 it was proposed that the water flows would be diverted entirely away from the site. Following negotiations, a compromise solution was made, allowing some water to continue to flow through the site. Unfortunately, this compromise has provided insufficient water to maintain the colony. Although the water flow has improved, the reduced grazing of the area has led much of the habitat to become overgrown. The problems with water flow and grazing mean that it is unlikely that C. mercuriale survives at Povington." (Authors)] Address: Chelmick, D., Macromia Scientific 31 High Beech Lane, Haywards Heath RH16 1SQ, UK. E-mail: david.chelmick@gmail.com

17094. Chertoprud, M.V.; (2019): Macrofauna communities in the mountain streams of Sri Lanka (Ceylon). Inland Water Biology 12(2): 199-209. (in English) ["The rheophilic macrobenthic communities of the mountainous part of the island of Sri Lanka have been studied based on the material of 170 quantitative stations of small rivers and streams. Thirteen types of communities are described by taxonomic structure (mainly at the genus level) and habitats; similarities with other regions are also shown. A difference between the communities in the lowland (tropical) and highland (subtropical) zones is observed. This paper provides a taxonomic review of the macrofauna sampled and a description of the regional features of its ecology and diversity. Characteristics of the oriental tropical rheophilic communities in comparison with subtropical and boreal Palearctic communities, the influence of altitudinal zonation, the effect of the island on the community structure, and the biogeographic position of Sri Lanka are discussed." (Author)] Address: Chertoprud, M.V., Moscow State University Moscow, Russia. E-mail: lymnaea@yandex.ru

17095. Chien, W.-C.; Li, M.-H.; Li, H.-J. (2019): Appropriate management practices help enhance odonate species richness of small ponds in peri-urban landscapes. Urban Ecosystems 22: 757-768. (in English) ["Adult odonate biodiversity was investigated to understand their relationship with pond management practices and environmental conditions in a rapidly urbanized landscape. Twenty-four farm ponds in Taoyuan City were selected and classified into five pond groups based on pond management practices. In total, 21 species, 17 genera, and 6 families of odonates were recorded for a total of 5701 individuals between June 2014 and July 2015. The abundance of Odonata was unrelated to pond size or distance to the nearest pond; however, odonate species richness was negatively and significantly correlated with pond size. Pond management practices considerably affected pond aquatic macrophytes and dike construction materials. Ecology park ponds under intense human management and undisturbed ponds without any human management had higher species richness than did the ponds in the other three fish farming groups. Species richness was highest in small and human-modified ponds. By contrast, species richness was lowest in two fish farming pond groups. These results suggest that pond management practices can increase or reduce odonate species richness depending on the alteration of pond microhabitat features. Our observations suggest that the enhanced habitat quality of small ponds provides an opportunity to protect freshwater biodiversity for local governmental civil servants in urbanized landscapes." (Authors)] Address: Li, M.-H., Environmental Ecology Lab, Dept of Geography, National Taiwan University, 1 Section 4 Roosevelt Roads, Taipei 106, Taiwan. E-mail: meihuili@ntu.edu.tw

17096. Choong, C.Y. (2019): Odonata fauna of Pulau Pangkor, Perak, peninsular Malaysia. The Malaysian Forester 82(1): 271-276. (in English) ["Records of Odonata collected at sites in Pangkor Island, Perak on 1620 July 2017 are presented. Adult odonates were caught during the field survey using hand-held net. A total of 30 species from seven families was recorded; 17 species were Libellulidae, six were Platycnemididae, three were Coenagrionidae, and one each was Devadattidae, Euphaeidae, Platystictidae and Aeshnidae. Of these, 11 species were new records for Pulau Pangkor. Interesting species recorded were Mortonagrion arthuri, Drepanosticta fontinalis and Amphicnemis gracilis. At present 44 species from nine families are known to Pulau Pangkor." (Author)] Address: Choong, C.Y., Centre for Insect Systematics, Univ. Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

17097. Chovanec, A. (2019): Syntope Vorkommen von Erythromma lindenii, E. najas und E. viridulum (Odonata: Coenagrionidae) am Unterlauf der Rott (Bayern, Deutschland). Mercuriale 18/19: 27-42. (in German, with English summary) ["Odonatological investigations of the lower reach of the river Rott in Bavaria (Germany) in June and July 2018 revealed syntopic occurrences of E. lindenii, E. najas and E. viridulum at two sites. These localities were characterised by submerged macrophytes reaching the water surface, floating leaf plants and strongly reduced flow velocities. One site was situated in an impounded section of the main river, the other in a bypass channel. Further species recorded were, among others, Gomphus pulchellus, G. vulgatissimus, Onychogomphus forcipatus and Orthetrum albistylum." (Author)] Address: Chovanec, A., Krotenbachgasse 68 A–2345 Brunn am Gebirge, Autria. E-mail: andreas.chovanec@bmnt.gv.at

17098. Chovanec, A. (2019): Nachweis von Orthetrum brunneum (Odonata: Libellulidae) an einer kleinen überrieselten Asphaltstraße in Niederösterreich: Verhaltensbeobachtungen und Aspekte der Habitatwahl. Mercuriale 18/19: 43-57. (in German, with English summary) ["Records of O. brunneum at a small, wet asphaltstreet in Lower Austria: observations of behavioural patterns and aspects of habitat selection. – In 2018, a temporary water course with a maximum length of 120 m on a small street caused by a drainage pipe was colonised by O. brunneum. Numbers of individuals and occupied territories were dependent on the length of the wet section. Behavioural patterns, such as the choice of perching sites, are described. Aspects of habitat selection and the role of certain anthropogenic systems as ecological traps for dragonflies are discussed." (Author)] Address: Chovanec, A., Krotenbachgasse 68 A–2345 Brunn am Gebirge, Autria. E-mail: andreas.chovanec@bmnt.gv.at

17099. Conze, K.-J. (2019): In memoriam of Prof. Dr. Eberhardt Schmidt, 20 July 1935 to 9 July 2018. Agrion 23(1): 5. (in English) [Verbatim: In July 2018 Prof. Dr. Eberhardt Schmidt died after a severe illness but in the good custody of his family. Nearly all his life he was an odonatologist, from early beginnings as a pupil in Berlin to more than seventy years of experience in his later years. He published more than 250 scientific papers, around 180 of them about dragonflies! In 1971 he was involved in the foundation of the SIO (Societas Internationalis Odonatologica) and for several years he also worked on the board of this international scientific community of odonatologists from around the world. Together with Rainer Rudolph he founded the GdO (Gesellschaft deutschsprachiger Odonatologen) and for a long time he was the 'guiding spirit' of this society. Early on he gave advice on how to determine and document dragonflies by photographs; this knowledge is even today still very helpful and necessary. Also from the start of GdO he proclaimed long-term monitoring as an important task for odonatologists. We should certainly learn from him! But his huge body of work for the sake of the dragonflies is now a significant part of our baseline knowledge. Many of his papers produced ideas to be followed up and developed further e.g. using dragonflies as bioindicators for nature conservation of watercourses. No doubt, Ebi (as his friends called him) will always stay in our memory! The GdO is now preparing a dedicated supplement of Libellula to honour Eberhardt Schmidt.] Address: Klaus-Jürgen Conze. E-mail: kjc@loekplan.de

Cordero-Rivera, A.; Romeo Barreiro, A.; Cabana Otero, M. (2019): Forcipomyia paludis (Diptera: Ceratopogonidae) in the Iberian Peninsula, with notes on its behaviour parasitizing odonates. Boletín de la Sociedad Entomológica Aragonesa 64: 243-250. (in English, with Spanish summary) ["The adults of Odonata are parasitized by the ceratopogonid dipteran F. paludis, which is widely distributed in Europe, but has not been formally cited in the Iberian Peninsula, although it has been cited in the Balearic Islands. However, its presence in photographs stored in citizen science websites, books on odonates, as well as the finding of this species in Galicia in at least two locations, indicate that its distribution in the Iberian Peninsula is wide, particularly on the Mediterranean coast. A detailed map of the distribution of F. paludis in the Iberian Peninsula is provided, as well as photographs under the scanning electron microscope, to facilitate its identification. In Galicia it has been found for several years parasitizing odonates in the lagoon of Doniños (Ferrol), where its main hosts are Enallagma cyathigerum and Ischnura elegans, although always at very low frequencies. Other species occasionally parasitized in this lagoon were Sympetrum sanguineum, Erythromma viridulum and Lestes virens, in these last two cases a newly emerged individual. Likewise, several adults of F. paludis have been observed attacking an individual of Onychogomphus uncatus at the time of the emergence, in this case on the Ulla river, a behaviour that is described and discussed." (Authors)] Address: Cabana Otero, M., Grupo de Investigación en Bioloxía Evolutiva (GIBE). Depto de Bioloxía. Fac. de Ciencias. Universidade da Coruña. Campus da Zapateira, s/n. 15071 A Coruña, Spain. E-mail: mcohyla@yahoo.es

17100. Cordero–Rivera, A.; Sanmartín–Villar, I.; Sánchez Herrera, M.; Rivas–Torres, A.; Encalada, A. C. (2019): Survival and longevity in neotropical damselflies (Odonata, Polythoridae). Animal Biodiversity and Conservation 42.2: 293-300. (in English, with Spanish summary) ["Survival and longevity in neotropical damselflies (Odonata, Polythoridae). Longevity among insect orders varies greatly, and has mainly been studied in insects in temperate biomes, where seasonality determines high synchronization of reproductive activities and limits lifespan. Most forest damselflies in tropical regions have low population densities and are almost never observed in copula. We hypothesized that selection will favour a high survival rate and hence high lifespan, allowing the animals to be ready for the occasional events that favour reproduction. We studied Polythore mutata and P. derivata, in Ecuador, using mark–recapture methods. We found that sex affected the rate of recapture, but daily survival rate was affected by sex only in one population. We found evidence that suggests stabilizing or directional selection on body size. The maximum lifespan was 54–63 days. We conclude that the survival rate of Polythore damselflies in tropical forests is comparable to that of similar damselflies in temperate zones." (Authors)] Address: Cordero–Rivera, A., ECOEVO Lab, Escola de Enxeñaría Forestal, Universidade de Vigo, Campus A Xunqueira, 36005 Pontevedra, Galiza, Spain. E-mail: adolfo.cordero@uvigo.es

17101. Corso, A.; Janni, O.; Pavesi, M.; Sammut, M.; Sciberras, A.; Vigano, M. (2019): Update to the status of Lindenia tetraphylla (Vander Linden, 1825) (Odonata Gomphidae) in Italy, with special reference to the Molise region. Biodiversity Journal 10(1): 7-12. (in English) ["Data concerning a new reproductive population of L. tetraphylla, found by the authors in Molise, Central Italy, between 2012 and 2018, are here reported. The species was recorded in some artificial farm ponds of the inland agricultural area, where localized but conspicuous reproductive populations are annually found. A single sighting from 2017 is also reported from the Abruzzo region, where the species has never been recorded before. The data here discussed update the status for Italy and enlarge the known distribution area. All the sites

where the species is found in Molise are listed and mapped, brief data concerning habitat used are also reported." (Authors)] Address: Corso, A., Via Camastra 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.com

17102. Corso, A.; Janni, O.; Fracasso, C.; Biscaccianti, A.; De Lisio, L. (2019): New data on the distribution of the endangered dragonflies Oxygastra curtisii (Dale, 1834), Somatochlora meridionalis (Vander Linden, 1825) and S. flavomaculata Nielsen, 1935 in central-southern Italy (Odonata Corduliidae). Biodiversity Journal 10(3): 195-200. (in English) ["For S. curtisii we reports for the first time its presence in Abruzzo and Molise regions, while for meridionalis we report the national south most known sites, while for flavomaculata a range extension of more than 200 km south.] Address: Corso, A., Via Camastra 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.com

17103. Crane, A.L.; Bairos-Novak, K.R.; Jefferson, D.M.; Chivers, D.P.; Ferrari, M.C.O. (2019): Survival, behaviour, and morphology of larval wood frogs, Lithobates sylvaticus, under threat from an exotic crayfish predator, Orconectes virilis. Aquatic Ecology 53(3): 383-392. (in English) ["There are numerous examples of species introductions that have caused declines in native populations. In many cases, exotic species are predators of native prey which do not respond correctly to these new and often much different threats. Amphibians, as a group, have been strongly affected by introductions of fish and other aquatic predators such as crayfish. Our goal in this study was to explore the potential impacts of exotic crayfish on the behaviour, morphology, and survival of native wood frog tadpoles, L. sylvaticus. In mesocosms, groups of tadpoles were exposed to either a native predator (larval beetle or dragonfly nymph) or an exotic crayfish, Orconectes virilis. Tadpoles were the largest following exposure to dragonflies, indicating that dragonflies were selecting smaller tadpoles. Vertical space use of tadpoles was highest in the presence of crayfish, suggesting that tadpoles were learning to avoid crayfish in the benthos. Mortality was highest in the presence of beetles and lowest with crayfish, and hence in isolation, exotic crayfish were poorer predators of wood frog tadpoles. However, half way through the experiment, we replaced each predator with a new predator of either the same species or a different species to assess how the impact of the new predator was affected by experience with the first predator. When crayfish were added following beetles, the mortality due to crayfish increased significantly, possibly due to differences in predator space use and foraging mode." (Authors)] Address: Crane, A.L., Dept of Biol. Concordia Univ. Montreal Canada

17104. Cuellar-Cardozo, J.A.; Lozano-Bernal, M.F.; Díaz-Guamán, J.-W. (2019): Estudio, curaduría y nuevos registros de odonatos presentes en la colección del Museo de La Salle. Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales 43(168): 489-493. (in Spanish, with English summary) ["Study, curation and new records of odonates present in the collection of the Museum of La Salle. Colombia is the fifth country with the most Odonata species in Latin America totaling 437 distributed among 11 families, which represent 7.2% of the world's richness. This is reflected in a large number of specimens present in many collections in the country. The collection of the Museum of La Salle has records since 1968 and it evidences problems in the taxonomic identification and the preservation mode that can put at risk the specimens and the information they represent in the long term. Taking into account this, the objective of this project was to carry out a taxonomic update and to improve the storage conditions of the odonates deposited in the museum. For this, the specimens were identified up to the minimum possible taxonomic level and, at the same time, we undertook curative conservation and storage optimization actions. As a result, a total of 903 individuals were identified belonging to 81 species distributed in 14 departments, Huila being the most representative with 363 specimens, most of them collected between 2010 and 2017. Through a bibliographic review, we found new records for several departments of the country, Cundinamarca being the one with the largest amount. We concluded that the collection of the Museum of La Salle has valuable pieces of information regarding the spatial and temporal distribution of Odonata species in the country. Likewise, we highlight the importance of using the correct technique for specimen preservation and storage." (Authors)] Address: Cuéllar-Cardozo, J.A., Bioprospección y Conservación Biológica, Univ. de La Salle, Bogotá, D.C., Colombia. E-mail: josecuellar1094@gmail.com

17105. Cunha, D.L.; Mendes, M.P.; Marques, M. (2019): Environmental risk assessment of psychoactive drugs in the aquatic environment. Environmental Science and Pollution Research 26(1): 78-90. (in English) ["The consumption of psychoactive pharmaceuticals has increased worldwide, and wastewater treatment plants are not able to eliminate them from the effluent. An extensive review was carried out to assess the environmental risk (ERA model) based on secondary data about potential impacts on non-target organisms of seven psychoactive drugs consumed worldwide (alprazolam, bromazepam, citalopram, clonazepam, diazepam, lorazepam, and oxazepam). Risk quotients (RQs) were calculated according to the European Medicines Agency (EMA) on ERA of Medicinal Products For Human Use based on (i) the predicted and measured environmental concentrations (PEC and MEC, respectively) of the psychoactive drug in surface water, groundwater, and wastewater effluent and (ii) the predicted no-effect concentration (PNEC) derived from ecotoxicological assays or ECOSAR software. Furthermore, this study reviews and discusses non-standardized ecotoxicity assays, such as sublethal and behavioral effects on different organisms. In total, 903 MEC entries of psychoactive drugs and 162 data on ecotoxicological assays were gathered from the literature survey addressing behavioral effects (115), acute/chronic effects (35), and sublethal effects (12). Citalopram and diazepam were the only substances that are likely to pose an environmental risk (RQ > 1) to surface waters. Even though there is considerable amount of data on behavioral effects of psychoactive drugs to aquatic species, results are currently not integrated into the EMA risk assessment framework. The large amount of data on psychoactive drug concentrations and effects on nontarget organisms collected, interpreted, and discussed in the present study should be used as a baseline for future improvement of ERA strategies." (Authors)] Address: Cunha, D.L., Dept of Sanitary and Environmental Engineering, Rio de Janeiro

State Univ., R. São Francisco Xavier, 524, Rio de Janeiro, RJ, CEP 20550-900, Brazil. deivisson_cunha@uerj.br.

17106. Czechowski, P.; Dubicka, A.; Hadwiczak, M.; Jêdro, G. (2019): New stand of Aeshna subarctica Walker, 1908 (Odonata: Aeshnidae) in southern part of Lubuskie voievodship. Przegad Przyrodniczy 30(1): 52-58. (in Polish, with English summary) ["The paper presents a new stand for the A. subarctica in the southern part of the Lubuskie Voivodeship. The stand was discovered on 18.08.2017 on a small mire near the village of Szprotawka, in the Szprotawa municipality. On the observation day, a dozen or so imagines were found. The presence of a large number of imagines indicates that this is most likely breeding ground for this species. Additionally, paper describes the composition of the mire's odonatofauna. In total, 18 species of dragonflies were found, including two protected species and four species characteristic for this type of habitat. ... Aeshna subarctica Walker, 1908 was discovered in 2017 on a small mire near the village of Szprotawka, in the Szprotawa municipality in the Lubuskie voievodship, UTM WT40 square. On 18.08.2017, a dozen or so imagines were observed on the mire. The described site is a small (area of ca. 80 acres) acid transition mire with the vegetation of Scheuchzerietalia palustris order, surrounded by pine forests. On the site there is a periodically drying, small water reservoir. This is the new stand of this protected dragonfly species for the southwestern part of Poland. Observation in 2018 showed complete drying of the mire, which may negatively affect the composition of odonatofauna recorded there and the dragonfly species itself. Apart from A. subarctica, 17 dragonfly species were found on the described stand. Of these, 14 are indigenous or probably indigenous. The detected position along with other places described in this part of the country and neighboring Brandenburg in Germany are probably a component of a large metapopulation inhabiting this part of Europe." (Authors)] Address: Czechowski, P., Instytut Administracji i Turystyki, Filia Uniw. Zielonogórskiego, w Sulechowie, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: p.czechowski@wzs.uz.zgora.pl

17107. Czechowski, P. (2019): Data on the occurrence of the Broad Scarlet Crocothemis erythraea (BRULLÉ, 1832) (Odonata: Libellulidae) in Lubusz province (western Poland) in 2016-2018. Odonatrix 15_5 (2019): 8 pp. (in Polish, with English summary) ["Crocothemis erythraea … was recorded at 23 localities in 20 UTM squares (10 x 10 km). Breeding behaviour and/or development was found to be taking place at 11 localities. Broad Scarlets were observed at 18 localities during one season only and at the other 5 sites during two seasons. They were found in various habitats. The largest numbers of these dragonflies were recorded near fish ponds (6 localities), oxbows (3) and beaver ponds (3). The data presented here extend our knowledge of this species in western Poland." (Author)] Address: Czechowski, P., Instytut Administracji i Turystyki, Wydział Zamiejscowy w Sulechowie, Uniwersytet Zielonogórski, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: paczechow@gmail.com

17108. da Silva, M.H.; Teixeira-Gamarra, M.C.; Rodrigues, M.E.; Aoki, C. (2019): Survey of odonate fauna (Insecta: Odonata) in a stretch of the Maracaju Hills, State of Mato Grosso do Sul, Brazil. Oecologia Australis 23(4): 961-968. (in English) ["The scarcity of studies on fauna inventories, especially those addressing insects, is a large problem in many regions of Brazil. To contribute to taxonomic knowledge and broaden the distribution of the order Odonata, we present a survey of odonate fauna of the Maracaju Hills in the state of Mato Grosso do Sul, Brazil. Ten samplings were performed between September 2013 and April 2015, totaling 38 h of active searches. A total of 386 individuals belonging to five families, 21 genera and 37 species were collected. Eleven species belonged to the suborder Zygoptera and 26 belonged to the suborder Anisoptera. The family Libellulidae was the richest and most abundant (25 species; 285 individuals), followed by Coenagrionidae (nine spp.; 81 individuals). Lestidae, Gomphidae and Calopterygidae were each represented by a single species and totaled little more than 5% of the overall sample. Among the genera, Erythrodiplax stood out in terms of richness (eight spp.), followed by Erythemis (three spp.). The most abundant species were Erythrodiplax paraguayensis (N = 75), E. famula (n = 50), Ischnura fluviatilis (N = 48) and Micrathyria spuria (N = 45). The sampling effort represented by the species accumulation curve indicated that the richness of Odonata is close to actual richness, since the curve approached the asymptotic one. Aphylla molossus, Erythemis mithroides and Oxyagrion basale constitutes new records for the state of Mato Grosso do Sul, raising the richness of the state to 212 species." (Authors)] Address: Maria Helena da Silva, Univ. Federal de Mato Grosso do Sul, Campus de Aquidauana (Unidade II), Rua Oscar Trindade de Barros, nº 740, Bairro Serraria, CEP 79200-000, Aquidauana, MS, Brazil. E-mail: maria_helena1212@hotmail.com

17109. Das, J.; Maity, J. (2019): Seasonal variation of aquatic hemiptera and odonata diversity in River Kangsabati, West Bengal. Indian Journal of Entomology 81(3): 609-612. (in English) ["A seasonal study was carried out on aquatic insect diversity of Kangsabati River at three sites, Gandhighat region (site-A), Kangsabati Rail bridge region (site-B), Vidyasagar park region (site-C) of district Paschim Medinipur, near Midnapore town, West Bengal. Nine species of aquatic insects were observed. The order Hemiptera was numerically the most abundant (78.60%), with seven species. Odonata constituted of 21.40% with Laccotrephes ruber being the dominant species. Ranatra elongata and Anax guttatus were similarly present. …. Families Aeshnidae and Coenagrionidae … constituted 68% and 32%, respectively. Species diversity and evenness of sampling sites when compared, maximum was in site-A and the least in site-B." (Authors)] Address: Maity, J., Dept of Aquaculture Management and Technology, Vidyasagar University, Midnapore, 721102, West Bengal, India. E-mail: jmaity@mail.vidyasagar.ac.in

17110. David, S.; Sacha, D. (2019): The annotated Odonata Checklist of the Slovak Republic. Ochrana prírody, Banská Bystrica 33: 49-78. (in Slovakian, with English summary) ["Since 1977, when Teyrovský published first Checklist of Odonata of then existing Czechoslovakia, several papers have been published putting forward Odonata checklists for

Slovakia. Some of them hard to acquire since published in regional journals, some as table annexes of faunistic reports on dragonflies and overall not widely used. Dragonfly research has intensified in Slovakia over the last decades, leading to confirmation of new species, e.g. Coeangrion armatum, Anax ephippiger, Cordulegaster heros, Somatochlora meridionalis, Leucorrhinia rubicunda. Other species were confirmed to have been wrongly reported from Slovakia, based on misidentifications, e. g. Nehalenia speciosa, C. mercuriale, Aeshna caerulea, Gomphus pulchellus, G. simillimus, C. boltonii. In this paper we present all 79 taxa of the Odonata, which have ever been reported from Slovakia. Out of them, reports of 9 taxa were based solely on misidentifications and they do not occur in Slovakia (Lestes macrostigma, C. mercuriale, C. boltonii, Ischnura elegans subsp. pontica, A. caerulea, Gomphus simillimus, G. pulchellus, Lindenia tetraphylla). From among 69 taxa with solid evidence of their occurence, 64 have permanent populations, while 5 species do not have any reproducing population here (Chalcolestes parvidens, Sympecma paedisca, A. ephippiger and L. albifrons). One species (C. lunulatum) was only observed in 1959 and is considered missing in Slovakia.Transitional forms between species Ch. viridis and Ch. parvidens and Orthetrum coerulescens and O. coerulecens subsp. anceps are mentioned in the paper. With taxa dubiously reported from Slovakia, historical records and taxa whereby evidence of their occurence (specimens) is missing, we add brief comments. Overview of synonymous names and notes on nomenclature are also added, as appropriate." (Authors)] Address: David, S., Katedra ekológie a environmentalistiky, FPV UKF v Nitre, Trieda A. Hlinku 1, SK-949 01, Nitra, Slovakia. E-mail: sdavid@ukf.sk

17111. Dawn, P. (2019): Description of the last instar larva of Calicnemia eximia (Selys, 1863) (Odonata: Platycnemididae) from West Bengal, India. Zootaxa 4657(1): 183-187. (in English) ["The final instar larva of C. eximia is described for the first time from a grass-bed under a waterfall in Buxa Tiger Reserve, Dooars of Darjeeling Himalayas. The larva shows a semi terrestrial nature like other congeneres but is unique in having no premental setae and a longer labium. One C. miniata larva was also collected from the same locality and is compared with the C. eximia larva here." (Author)] Address: Dawn, P., Dept Zool., Shyampur Siddheswari Mahavidyalaya, Ajodhya, Howrah–711312, India. E-mail: prosenjit.dawn@gmail.com

17112. De Knijf, G.; Berx, D. (2019): Leucorrhinia albifrons, a new species for Belgium (Odonata: Libellulidae). Brachytron 20(2): 78-81. (in Dutch, with English summary) ["9-VI-2016 a male of L. albifrons was observed near an oligotrophic fen in the Maten in Genk-Diepenbeek. A male, probably the same individual was resighted on 11 and 12 June at the same locality. Although the site and its surroundings were properly surveyed the next days the individual was not seen again until the 19-VI-2016. No further observations are available from this site or other locations in Belgium. Hence, this must be considered as a wandering individual. This observation of L. albifrons is the first record for Belgium." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

17113. De Knijf, G. (2019): First reproduction proof of Orthetrum albistylum in Belgium. Brachytron 20(2): 55-62. (in Dutch, with English summary) ["We report the first records of O. albistylum for Belgium at six different locations. The species was observed with one individual at four locations (Averbode, Etalle, Lavaux-Sainte-Anne, Neerpelt) in 2016, one in 2017 (Ethe), one in 2018 (Etalle) and at two locations (Etalle, Wanlin) in 2019. Proof of successful reproduction was only detected at the site in Etalle, with one male and one teneral male being observed on 1 July 2018 and approximately 10 individuals present on 30 June 2019, among them two copulae, a teneral and one exuvia. At the other four sites, only solitary males and females could be observed. All 114 records of O. albistylum are from the period of 30 June to 1 September. The two latest records (15 August and 1 September) are the only two records for Flanders, indicating vagrant individuals. The occurrence of the species in Belgium and the at least temporary reproduction in the southern part of Belgium coincide with ongoing range expansion in western Europa." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

17114. del Palacio, A.; Lozano, F.; Muzón, J. (2019): Redescription of the last instar of Remartinia luteipennis luteipennis (Burmeister, 1839) (Odonata: Aeshnidae). International Journal of Odonatology 22(1): 89-94. (in English) ["The final instar of R. l. luteipennis is described and illustrated based on reared specimens from Salta Province, Argentina. It is compared with R. secreta and R. l. florida, and with Calvert's original description of R. l. luteipennis. R. l. luteipennis can be differentiated by the length of the lateral valvae of the female gonapophyses (equal to the central ones in R. l. luteipennis, slightly shorter in R. secreta, and longer in R. l. florida), and length of S6 lateral spines (1.24 mm in R. l. luteipennis 0.4–0.5 mm in R. secreta, and 0.2 mm in R. l. florida)." (Authors)] Address: del Palacio, A., Lab. de Biodiversidad y Genetica Ambiental (BioGeA), Universidad Nacional de Avellaneda, Pineyro, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com

17115. del Palacio, A.; Muzón, J. (2019): Redescription of Erythrodiplax chromoptera Borror 1942 with comments on the morphology of the vesica spermalis (Odonata: Libellulidae). Zoologischer Anzeiger 278: 90-94. (in English) ["A redescription of the male of E. chromoptera is provided based on specimens collected in Misiones, Entre Ríos and Buenos Aires provinces, Argentina. The morphology of the vesica spermalis is described and the relation between the Basalis, Connata and Nigricans groups is analyzed. E. chromoptera is easily distinguished from the other congeners by the shape of the basal spot of the hind wing and the shape of the median process of the vesica spermalis." (Authors)] Address: del Palacio, A., Lab. de Biodiversidad y Genetica Ambiental (BioGeA), Universidad Nacional de Avellaneda, Mario Bravo 1460, Pi~neyro, CP1870, Avellaneda, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com

17116. Demnati, F.; Allache, F.; Cohez, D. (2019): Contribution à la connaissance de l'odonatofaune du bassin du

Chott Melghir (Algerérie). Bulletin de la Société zoologique de France 144(2): 95-104. (in French, with English summary) ["Odonata are identified from the Chott Melghir basin, which includes the large Ramsar wetlands of Chott Melghir and Merouane, located in the arid bioclimatic zone.The inventory was carried out at 13 sites at lake level altitudes in the basin. The sampling produced 82 individuals of Odonata, representing 11 species, six genera and three families. Libellulidae was the most abundant family, with 71% of individuals, followed by Coenagrionidae (22%) and Aeshnidae (7%). Notes are given on the status and distribution of Orthetrum nitidinerve, Sympetrum meridionale, Trithemis kirbyi and S. sinaiticum. Further studies at the catchment level are needed to establish a conservation plan for these bio-indicators at regional and Mediterranean levels." (Authors)] Address: Demnati, Fatma, Dépt des Sciences Agronomiques, Univ. Mohamed Khider, Biskra, Algeria. E-mail: fat_demnati@yahoo.fr

17117. Dinova, D.; Boudot, J.-P.; Conze, K.-J.; Vilenica, M.; Ferreira, S.; Nielsen, R.E.; Jovic, M. (2019): New localities for some important Odonata species in central and southwestern Republic of North Macedonia and the trans-boundary Ohrid Prespa region between Republic of North Macedonia and Albania. Bulletin of the Natural History Museum 12: 153-178. (in English) ["Data related to the 41 species of the dragonfly fauna of central and southwestern Republic of North Macedonia and nearby Albania, gathered during the post European Congress on Odonatology 2012 fieldtrip on July 6-13th, 2012 are presented. The Ohrid . Prespa region was particularly investigated. The majority of previous data available for this area is old and outdated. Additionally, recent species made new surveys necessary. The presence of Gomphus schneiderii and S. flavomaculata in the region was confirmed whereas L. pectoralis was not found again. Conversely, Coenagrion scitulum was observed in Albania for the first time. The national Odonata checklists contain now 63 species in Republic of North Macedonia and 59 in Albania.] Address: Dinova, Despina, Macedonian Ecological Society, Blvd. Boris Trajkovski St.7-a, 1000 Skopje, Republic of North Macedonia

17118. Djukic, A.; Miriæ, R.; Skejo, J.; Rajkov, S.; Tot, I. (2019): Survey on the damselflies and dragonflies fauna (Insecta: Odonata) of the landscape of outstanding features “Vlasina”. Kragujevac J. Sci. 41: 133-146. (in English) [" In this paper we present data on damselflies and dragonflies (Insecta: Odonata) of the Landscape of outstanding features (LOF) “Vlasina”. Most of the data were collected during research camps of the Scientic Research Society of Biology and Ecology Students "Josif Panèic" that took place from 2013 to 2018, when 27 Odonata species were recorded. If this research is combined with previously published data, 37 species of Odonata were recorded in Landscape of Outstanding Features “Vlasina”. The paper presents distribution and reproduction status of the recorded species, as well as their diversity in this area. The most important species is Epitheca bimaculata, because Vlasina represents one of its southernmost and highest habitats in Europe. For Sympetrum flaveolum, Vlasina is one of the most important habitats in Serbia, as well as for Leucorrhinia pectoralis which is Natura 2000 species." (Authors)] Address: Djukic, A., Scientific Research Society of Biology and Ecology Students “Josif Panèic”, Trg Dositeja Obradoviæa 2, 21000 Novi Sad, Serbia. E-mail: dbe.aleksandar.djukic@student.pmf.uns.ac.rs

17119. Dobson, V.; Childs, A. (2019): First record of Diplacodes trivialis (Rambur, 1842), a new dragonfly for Oman. Journal of the Emirates Natural History Group 27: 65-66. (in English) [14-XI-2019, south-west of the island near to Ra’s Sanaghal, Oman, 20°13.569' N, 58°37.647' E.] Address: Dobson, Victoria, 34, Aristide Tjamali Street, Konia, Paphos, Cyprus. E-mail: vicky2@cytanet.com.cy

17120. Dow, R.A. (2019): Amphicnemis rigiketit sp. nov. from Sarawak, with notes on Amphicnemis remiger Laidlaw, 1912 (Odonata: Zygoptera: Coenagrionidae). Zootaxa 4701(4): 371-382. (in English) ["A. rigiketit sp. nov. is described from southwestern Sarawak (holotype ♂ in forest around stream, near road from Kota Samarahan to Siburan, Samarahan Division, Sarawak, Malaysian Borneo, 21 ii 2018, deposited in the Natural History Museum, London). The new species is allied to A. remiger Laidlaw, 1912. The female of A. remiger is described for the first time and a description of the male from a fresh specimen is provided along with notes on variation." (Author)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

17121. Dow, R.A. (2019): Odonata from Sri Aman Division south and west of the Lupar River and from the Kelingkang Range, Sarawak. International Dragonfly Fund - Report 137: 1-26. (in English) ["Records of Odonata from the southwest of Sri Aman Division and the extreme east of Serian Division in Sarawak are presented. The sampled areas are interesting not only because they are poorly known for Odonata but also because many are just to the south and west of the Lupar Line which is a division between the ancient Sunda shelf and more recent geological formations. Differences between the odonate faunas on either side of the Lupar Line are discussed. Eightyfive species of Odonata were recorded during the surveys reported on. The single most notable record is that of Coeliccia southwelli Dow & Reels, 2011, which represents a considerable extension to the known range of this species. Other interesting records include Telosticta dupophila (Lieftinck, 1933), T. species cf longigaster Dow & Orr, 2012, Podolestes parvus Dow & Ngiam, 2019 and Heliogomphus species cf olivaceous Lieftinck, 1961. Variation in the markings of Stenagrion dubium (Laidlaw, 1912) across its range is discussed and a gene tree using the COI marker is presented to illustrate the high variability of this species in this marker. However the variability in COI does not appear to be correlated with other characters." (Author)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

17122. Dow, R.A.; Ngiam, R.W.J. (2019): A new species of Podolestes Selys, 1862 from peat swamp forest in Sarawak (Odonata: Zygoptera: Argiolestidae). Zootaxa 4586(3): 505-

516. (in English) ["Podolestes parvus sp. nov. is described and illustrated from both sexes from Sarawak, Malaysian Borneo (holotype ♂ Maludam National Park, Betong Division, Sarawak, 10 vii 2012, deposited in RMNH). The new species is closest to P. atomarius Lieftinck, 1950 and is the smallest species yet known in its genus. A full set illustrations of P. atomarius is provided for comparison.]" (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

17123. Dressler, P.E. (2019): Gut content analysis of aquatic macroinvertebrates using DNA-based methods. Winthrop University; https://digitalcommons.winthrop.edu/source/SOURCE2019/posterpresentations/40/: (in English) [Verbatim: With the great deal of complexity associated with aquatic food webs, many questions regarding species interactions remain unanswered. One such question of importance is: Who is eating whom? This is a question that morphologically based analysis techniques have failed to answer with great accuracy. However, with the advent of DNA-based analysis methods, this question can be answered. DNA-based analysis methods allow for greater certainty in taxonomic identification, because specific gene regions can be targeted using group-specific primers as a means for DNA detection. This approach was used to analyze dragonfly (Odonata, Anisoptera) gut contents using group-specific primers for midges (Chironomidae) and mosquitoes (Culicidae) as potential prey groups. Specimens were collected in Big Dutchman Creek and Winthrop Lake in Rock Hill, South Carolina. DNA was extracted from gut contents of collected specimens. A polymerase chain reaction was performed on each of the extracted samples in order to amplify DNA concentrations. Gel electrophoresis was used as a presence-absence test for DNA from target prey groups. We found that one individual of the genus Progomphus contained DNA from the family Chironomidae, but not Culicidae. A second Progomphus individual tested negative for both families, illustrating individual variation in feeding. These refined methods will allow for testing of more Progomphus individuals and potential prey groups as well as other aquatic macroinvertebrate predators.]

17124. Drury, J.P.; Barnes, M.; Finneran, A.E.; Harris, M.; Grether, G.F. (2019): Continent-scale phenotype mapping using citizen scientists' photographs. Ecography 42: 1436-1445. (in English) ["Field investigations of phenotypic variation in free-living organisms are often limited in scope owing to time and funding constraints. By collaborating with online communities of amateur naturalists, investigators can greatly increase the amount and diversity of phenotypic data in their analyses while simultaneously engaging with a public audience. Here, we present a method for quantifying phenotypes of individual organisms in citizen scientists' photographs. We then show that our protocol for measuring wing phenotypes from photographs yields accurate measurements in two species of Calopterygid damselflies. Next, we show that, while most observations of our target species were made by members of the large and established community of amateur naturalists at iNaturalist.org, our efforts to increase recruitment through various outreach initiatives were successful. Finally, we present results from two case studies: 1) an analysis of wing pigmentation in male smoky rubyspots Hetaerina titia showing previously undocumented geographical variation in a seasonal polyphenism, and 2) an analysis of variation in the relative size of the wing spots of male Calopteryx splendens in Great Britain questioning previously documented evidence for character displacement. Our results demonstrate that our protocol can be used to create high quality phenotypic datasets using citizen scientists' photographs, and, when combined with metadata (e.g. date and location), can greatly broaden the scope of studies of geographical and temporal variation in phenotypes. Our analyses of the recruitment and engagement process also demonstrate that collaborating with an online community of amateur naturalists can be a powerful way to conduct hypothesis-driven research aiming to elucidate the processes that impact trait evolution at landscape scales." (Authors)] Address: Drury, J.P., E-mail: jonathan.p.drury@durham.ac.uk

17125. Dumont, H.J., (2019): In memoriam Wolfgang Schneider (1953–2019). Odonatologica 48(3/4): 167-184. (in English) ["Personal recollections of a life-long friendship with Wolfgang Schneider and a brief outline of his life and scientific career are presented." (Author)] Address: Dumont, H.J., Department of Biology, University of Ghent, 9000 Gent, Belgium

17126. Dwivedi, Y.D.; Sudhir Sastry, Y.B. (2019): An experimental flow field study of a bio-inspired corrugated wing at low Reynolds Number. INCAS Bulletin 11(3): 55-65. (in English) ["The present paper examined experimentally the glide flight flow visualization and boundary layers of a bio-inspired corrugated dragonfly wing performing a comparison with the results obtained with a flat plate, at low to moderate range of chord Reynolds numbers. The experimental work is performed in an open-end low speed subsonic wind tunnel at different angles of attack ranging from 0 to 120 and Reynolds number 2.25×105. The boundary layer measurements were done at a fixed chord location (0.7 x/c) and three different semi span locations such as 30%, 60% and 90% of the wing's semi span from the right side of the longitudinal axis of the wing. The flow patterns were visualized by using colored tufts, placed at different span locations. The flow reversal was observed at selected Reynolds numbers and angles of attack only. The boundary layer measurements demonstrated that there exists a clear distinction on the pressure and velocity parameters in all the three tested locations on both types of the wings. The corrugated wing showed significant delay in stall and flow separation compared with the flat plate. The visualization of flow in both wings showed that there subsists a spanwise flow moving from wing tip to root, indicating three dimensional natures of airflows." (Authors)] Address: Dwivedi, Y.D., Dept of Aeronautical Engineering, Institute of Aeronautical Engineering, Dundigal, Hyderabad, 500043, Telangana, India. E-mail: yddwivedi@gmail.com

17127. El-Latief, M.E.A.; Elsayed, K.; Abdelrahman, M.M. (2019): Aerodynamic study of the corrugated airfoil at ultra-low Reynolds number. Advances in Mechanical Engineering 11(10): 1-18. (in English) ["In this study, Aeshna cyanea

dragonfly forewing mid-cross-section corrugated airfoil was simulated at ultra-low Reynolds number. The corrugated airfoil was compared with its smooth counterpart to study the effect of the corrugations upon the aerodynamic performance. Unsteady two-dimensional laminar flow was solved using FLUENT. This study was divided into gliding phase and flapping phase. In the gliding phase, the corrugated airfoil produced a higher lift force with respect to the profiled airfoil at both tested Reynolds numbers (1400, 200) with comparable drag coefficient for all the tested angles of attack. In the flapping phase, both the corrugated airfoil and the flat-plate have a very similar flow behavior which yields a very similar aerodynamic performance at Re=1400. A structural analysis was performed to compare the corrugated airfoil with the flat-plate. The analysis revealed the superiority of the corrugated airfoil over the flat-plate in decreasing the deflection under the applied load. The reduced frequency was varied to study its impact on the aerodynamic performance. By increasing the reduced frequency, the thrust and the lift forces increased by 82% and 75%, respectively. Any increase in the reduced frequency will increase lift and thrust forces, but the propulsive efficiency will deteriorate." (Authors)] Address: Mahmoud E Abd El-Latief, Aerospace Engineering Dept, Fac. Engineering, Cairo Univ., Ain Shams, Giza 12411, Egypt. E-mail: Mahmoud.Ebrahim@bue.edu.eg

17128. Fitria, F.; Hidayati, N.A.; Pranata, A.Y.; Saputra, H.M.; Afriyansyah, B. (2019): Komposisi Odonata di Kabupaten Bangka Selatan. Ekotonia: Jurnal Penelitian Biologi, Botani, Zoologi dan Mikrobiologi 4(2): 31-36. (in Bahasa Indonesian, with English summary) ["The existence and diversity Odonata in an area could reflect the quality of a habitat's environment such as pH, temperature, light intensity, conditions of chemical and availability of water and foods. The purpose of this study was to record the composition Odonata in Regency of Southern Bangka. This research was conducted in two habitats namely natural in the form of rivers and artificial in the form of tin mining lakes in Regency of Southern Bangka. The method used was the transect line with a transect length of 100 m. Odonata was captured using an insect net then the number of species is recorded. Abiotic factors measured include temperature, light intensity and pH of water. Result showed that 1,166 individuals Odonata that were found at the study site consisted of 18 species which belong to four family and two suborder. Both the species number and individual found around the river was greater then the tin mining lake. The highest number of species found in the river was 17 and the lowest found tin mining lake was 10. The highest number of individuals found in the river was 694 and the lowest found tin mining lake was 472. The highest diversity indices was at Sebagin river (2.20) and the highest evenness indices was at Nyelanding tin mining lake (0.9639)." (Authors)] Address: Fitria, F., Jurusan Biologi Universitas Bangka Belitung, Bangka, Indonesia. E-mail: fitriafadilatul5@gmail.com

17129. Fleck, G.; Neiss, U.G. (2019): The larva of the genus Misagria Kirby, 1889 (Odonata: Libellulidae). Zootaxa 4706(3): 461-468. (in English) ["The ultimate stadium of Misagria parana Kirby, 1889 is described and illustrated for the first time based on reared material. The larva was hitherto unknown for the genus. Based on M. parana, M. divergens Westfall, 1992 and M. cf. calverti a larval generic diagnosis is given. Larva of the genus Misagria is briefly compared to the strongly similar larvae of the Neotropical genera Cannaphila Kirby, 1889, and Dasythemis Karsch, 1889. Larvae of Misagria can be separated from those of Dasythemis by the number of palpal setae (seven in Misagria vs four in Dasythemis) and by the shape of ventral tarsal setae (trifid setae present in Misagria), and from those of Cannaphila by the number of palpal setae (seven vs five or six) and the chaetotaxy of middorsal abdominal segments (segments three to nine with a diffuse clump of long setae in Misagria vs no diffuse clump in Cannaphila)." (Authors)] Address: Neiss, U.G., Instituto de Criminalística, Departamento de Polícia Técnica-Científica, Manaus, Amazonas, Brazil. E-mail:ulisses.neiss@gmail

17130. Fleck, G.; Juillerat, L. (2019): The genus Navicordulia Machado & Costa, 1995 (Insecta: Odonata: Corduliidae s.str.): new species, identification key for males and data on ecology and distribution. Zoosystema 41(27): 553-565. (in English, with French summary) ["Based on male specimens a new species of the genus Navicordulia Machado & Costa, 1995 is described from South French Guiana. This is the second species of the genus recorded for this country. The male of Navicordulia pascali n. sp. can be easily separated from all known males of the other species of the genus by the presence of a remarkable large ventral tooth at the base of the cerci. Navicordulia pascali n. sp. is a forest dwelling species inhabiting hilly landscape at low altitude. Adults seem to be on flight during the rainy season. The new species is most closely related to N. errans (Calvert, 1909) and N. leptostyla Machado & Costa, 1995, both from Cerrado of central Brazil. Affinities with the Venezuelan lowland N. vagans (De Marmels, 1989) are also probable. A differential diagnosis is given, and a key for Navicordulia species based on male characters is provided. The distributions are also given for all species of the genus. Aspects of ecology and biogeography are discussed." (Authors)] Address: Fleck, G., Entomologiste indépendant, F-07150 Lagorce, France. E-mail: fleckgunther@gmail.com

17131. Fontenla, J.L. (2019): Libélulas (Insecta: Odonata) de Playas del este, La Habana, Cuba/ Dragonflies and damselflies (Insecta: Odonata) of Playas del Este, La Habana, Cuba. Poeyana 509: 1-7. (in Spanish, with English summary) ["Odonata species composition at eight sites of Eastern Beaches was determined. The observations were made between November 2014 and July 2019. Distances traveled among sites fluctuated between 450m and 1200m. There were observed two species of Zygoptera and 15 species of Anisoptera. Species richness among sites varied between two and 11 species. The most frequent species were Erythrodiplax umbrata, Orthemis ferruginea, Erythemis vesiculosa and Crocothemis servilia. In general sense, species composition is characterized by widespread species. Spatial distribution adopted a nested pattern, and species were concentrated in sites that presented temporal ponds of pluvial origin. It is emphasized the presence of rare species in Cuba, like Celithemis eponina or habitat specialists like Erythrodiplax berenice. This landscape

may represent an important reservoir for biodiversity in urbanized areas with intense flow of people." (Author)] Address: Fontenla, J.L., Instituto de Ecología y Sistemática, carretera Varona 11835, Rpto. Parajón, Boyeros, 11900, La Habana, Cuba. E-mail: fontenla@ecologia.cu

17132. Foo Tse Fen, V.; Lim, K.K. (2019): Malayan spineleg dragonfly at Upper Seletar Reservoir. Singapore Diversity Records 2019: 104. (in English) [Verbatim: "Subject: Merogomphus femoralis. Subject identified by: Lim Kim Keang and Robin Ngiam. Location, date and time: Singapore Island, Central Catchment Nature Reserve, Upper Seletar Reservoir; 11-VIII-2019; around 1145 hrs. Habitat: Secondary forest edge, at the shore of a freshwater lake. Observers: Lim Kim Keang and Veronica Foo Tse Fen. Observation: On a hot and sunny morning, an example estimated to be around 4 cm body length was observed perched for a few minutes on a leaf of a Syzygium tree at about 5 m from the ground. A dorso-lateral view of the dragonfly is shown in the accompanying photograph. Remarks: In Singapore, this rare and 'critically endangered' dragonfly is known only from Nee Soon swamp-forest (Soh et al., 2019: 15) which is located at the southern shore of the Upper Seletar Reservoir. The female is apparently undescribed (Tang et al., 2010: 119). The featured dragonfly is believed to be a female of the M. femoralis. Compared to the male (see Tang et al., 2010: 119), it has thicker abdominal segments with broader whitish bands. The first abdominal segment also has a single greenish whitish side bar next to the dorsal bar. The male M. femoralis has a total body length of 45 mm (Tang et al., 2010: 119). Without the specimen in hand, it is not possible to gauge the female's exact size from the photograph." (Authors)] Address: veronfoo@yahoo.com

17133. Fulan, J.A.; Dos Anjos, M.R. (2019): Variation of the rainfall regime in the northern region and its effect on the Odonata (Insecta) in Been River, Amazonas, Brazil. Acta zoológica mexicana N.S. 35: 1-6. (in English, with Spanish summary) ["The goal of this work was to know the effect of precipitation in four periods (Rising, Flood, Lowing and Dry) on Odonata larvae living near to the macrophyte Salvinia auriculata Aubl., in Been River, Amazonas, Brazil. The biological material was collected in the Been river in the section near the river Madeira, state of Amazonas, Brazil. Sampling was conducted in stands of three macrophytes S. auriculata in four periods: rising (November 2012), flood (February 2013), lowing (May 2013), and dry (August 2013). A total of 286 Odonata larvae were identified in the river studied. Six families and 14 genera were identified. The flood period showed the highest abundance in the studied period. Acanthagrion presented a positive correlation with flood period in axis 1 and Telebasis also positive, but in the dry period. In conclusion, although there are few studies on Odonata larvae associated with floating macrophytes in the Amazon, the results of this work showed the importance of knowing the distribution of larval abundance throughout the year. Flood and dry period showed to be the period with the highest abundance of Odonata genera. In addition, the principal component analysis showed that some species are more sensitive to the periods of the year, Telebasis in the dry period and Acanthagrion in the flood period." (Authors)] Address: Fulan, J.A., Universidade Federal do Amazonas, Instituto de Ciências Biológicas, Depto de Biologia, Instituto de Ciências Biológicas. Av. General Rodrigo Octavio, 6200 - Coroado I - CEP: 69080-900 - Manaus, Amazonas, Brazil. E-mail: joaofulan@gmail.com

17134. Futahashi, R.; Matsuki, K. (2019): Melanized specimens of Sympetrum darwinianum (Selys, 1883. Tombo 61: 46-47. (in Japanese, with English summary) ["A male and female of melanized S. darwinianum are recorded from Inzai city, Chiba Prefecture. Both nuclear and mitochondrial DNA analyses indicated that the melanized female is S. darwinianum. The wings and abdomen of this female were slightly malformed, probably a consequence of the melanized phenotype." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

17135. Futahashi, R., Yamahama, Y.; Kawaguchi, M.; Mori, N.; Ishii, D.; Okude, G.; Hirai, Y.;Kawahara-Miki, R.; Yoshitake, K.; Yajima, S.; Hariyama, T.; Fukatsu, T. (2019): Molecular basis of wax-based color change and UV reflection in dragonflies. eLife 2019;8:e43045 doi: 10.7554/eLife.43045: 24pp. (in English) ["Many animals change their body color for visual signaling and environmental adaptation. Some dragonflies show wax-based color change and ultraviolet (UV) reflection, but biochemical properties underlying the phenomena are totally unknown. Here we investigated the UV-reflective abdominal wax of dragonflies, thereby identifying very long-chain methyl ketones and aldehydes as unique and major wax components. Although little wax was detected on young adults, dense wax secretion was mainly found on the dorsal abdomen in mature males of Orthetrum albistylum and O. melania, while pruinose wax secretion was identified on the ventral abdomen in mature females of O. albistylum and Sympetrum darwinianum. Comparative transcriptomics demonstrated drastic upregulation of ELOVL17 gene, a member of the fatty acid elongase family, whose expression reflected the distribution of very long-chain methyl ketones. Synthetic 2-pentacosanone, the major component of dragonfly's wax, spontaneously formed light-scattering scale-like fine structures with strong UV reflection, suggesting its potential utility for biomimetics." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Japan. E-mail: ryo-futahashi@aist.go.jp

17136. Galindo-Ruiz, N.; Velasquez-Velez, M.I.; Cano-Cobos, Y.; Sanchéz-Guillén, R.A.; Realpe, E. (2019): Description of a putative hybrid between Ischnura cyane and I. capreolus from Colombia (Odonata: Coenagrionidae). Notulae odonatologicae 9(4): 144-151. ["Putative hybrids between the sibling species Ischnura capreolus and I. cyane from the Colombian Cordillera Oriental are reported from the department of Cundinamarca, central Colombia, where species are known to occur sympatrically. I. capreolus is quite widespread in South America, from sea level to 1 750 m a.s.l., while I. cyane is a Colombian endemic restricted to altitudes between 1 300 and 2 200 m a.s.l.. Hybridisation may be a result of the changes

in distribution of both species leading to increasing sympatry. The putative hybrid is described and illustrated and compared with both putative parental species." (Authors)] Address: Galindo-Ruiz, N., Lab. de Zoología y Ecología Acuática, Depto de Ciencias Biológicas, Univ. de los Andes, Bogotá, Colombia. E-mail: nf.galindo1363@uniandes.edu.co

17137. Garrison, R.W. (2019): Argia nataliae n. sp. from Colombia (Odonata: Coenagrionidae). Zootaxa 4590(4): 477-486. (in English) ["Argia nataliae n. sp. (Holotype ♂: COLOMBIA, Antioquia Department, Estación Cristalina, about. 28 km west of Puerto Berrio, ca. 6.41 N, 74.58 W, 16 ii 1917, Jesse Hunter & Edward Bruce Williamson leg., in University of Michigan [UMMZ]) is described and illustrated and compared with similar species." (Authors)] Address: Garrison, R.W., Plant Pest Diagnostics Center, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail: argiavivida@gmail.com

17138. Garrison, R.W.; Ramon Cabrera, G.M. (2019): Argia mauffrayi n. sp. from Ecuador (Odonata: Coenagrionidae). Zootaxa 4545(2): 286-292. (in English) ["A. mauffrayi n. sp. (Holotype ♂: ECUADOR, Pichincha Province, San Miguel de Los Bancos Cantón, Recinto Milpe, Milpe Bird Sanctuary, Mirador Uno Trail, 0.0333° N, 78.8661 W, 4 ix 2018, William F. Mauffray leg., in Laboratorio de Zoología Terrestre USFQ [ZSFQ]) is described and illustrated and compared with similar species." (Authors)] Address: Garrison, R.W., Ass. Insect Biosystematist, Plant Pest Diagnostics, California Dept of Food & Agri., 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

17139. Gassmann, D.; Richards, S.J. (2019): Two new damselflies of the genus Idiocnemis Selys from Gulf Province, Papua New Guinea (Odonata: Platycnemididae). Zootaxa 4560(1): 121-140. (in English) ["Two new species of the genus Idiocnemis Selys, 1886 from southern Papua New Guinea are described: Idiocnemis lakekamuensis sp. nov. from the Lakekamu Basin and I. milou sp. nov. from Lakekamu and the Kikori River lowlands. Males and females are illustrated and compared with other species of the Idiocnemis bidentata group. Both new species are known only from the Papuan Gulf Foreland area of endemism and may be considered endemic to it." (Authors)] Address: Gassmann, D., Arachnida Section, Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany. E-mail: dirk.gassmann@gmail.com

17140. Gauci, C. (2019): An update on the status of some of the less common odonate species in the Maltese Islands. J. Br. Dragonfly Society 35(2): 61-69. (in English) ["Four new sightings of Aeshna mixta in the Maltese Islands are reported. Anax ephippiger, which in recent years has been regularly seen ovipositing in small numbers in autumn, has shown a dramatic increase in numbers in the last two years although, to date, there has been no confirmation of successful breeding. The status of Sympetrum striolatum, a common species over most of Europe but very rare in the Maltese Islands, is discussed and records of three new sightings are presented." (Author)] Address: Gauci, C., 28, Triq il-Kissier, Mosta, Malta MST1822

17141. Geraeds, R.P.G. (2019): Oviposition sites of the Western Willow Spreadwing (Chalcolestes viridis) in different herbs along the Vlootbeek brook. Brachytron 20(2): 87-93. (in Dutch, with English summary) ["During an inventory of dragonflies along the Vlootbeek brook on 21 August 2019, tandems of Ch. viridis were observed while they were ovipositing in Beggar Ticks (Bidens frondosa). Normally, Ch. viridis lay their eggs in the bark of branches of shrubs and trees that hang above water. Ovipositing in herbs is rare. As far as known egg-laying in herbs has only been observed in Great Willowherb (Epilobium hirsutum) in the Netherlands. Along the Vlootbeek brook, ovipositing marks on Beggar Ticks were found at three different locations on eleven different plants. Ovipositing has also been observed on Spearmint (Mentha citrata) (two plants), Redshank (Persicaria maculosa), Greater Stinging Nettle (Urtica dioica) and Great Willowherb (one plant each)." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

17142. Gheza, G.; Ancarani, G.; Chiari, C.; Corazzato, C.; Galliani, C.; Minicò, A.; Sacchi, F.; Sand, M.L.; Piglia, A. (2019): Breeding of Trithemis annulata in quarry lakes in the continental area of Italy (Odonata: Libellulidae). Libellula 38(3/4): 137-155. (in English, with Italian and German summaries) ["In August 2018, an abundant breeding population of T. annulata was discovered in some quarry lakes located east of Milan (Lombardy, central Po Plain, northern Italy) and in Poncarale (province of Brescia, Lombardy). The autochthony of the species was confirmed due to the collection of ten exuviae and the observation of several dozens of tenerals and some hundreds of adult individuals. These are the first records of breeding populations of the species in the continental biogeographical zone of Italy. The presence of these populations is discussed from the perspective of the progressive colonization of southern Europe and Italy by this Afrotropical species, which is fostered by ongoing global warming." (Authors)] Address: Gheza, G., Via G. Falcone 23, 27020 Tromello (PV), Italy, gheza.gabriele@gmail.com

17143. Giuliano, D.; Bogliani, G. (2019): Odonata in rice agroecosystems: Testing good practices for their conservation. Agriculture, Ecosystems & Environment 275: 65-72. (in English) ["Highlights: •Rice crops have recently lost their original value as surrogate wetland habitat. •Ditches may be insufficient to improve paddy suitability for breeding Odonata. •Odonata benefit from a well-developed vegetation, especially on paddy banks. •Semi-natural wetlands are essential to achieve Odonata conservation in rice crops. •Low frequency and rotational mowing should be implemented on paddy and canal banks. Abstract: Paddy systems have recently lost their original value as surrogate habitat for several wetland species due to rice farming intensification. Changes in water regimes largely compromised the survival of many aquatic organisms formerly abundant in rice fields, such as Odonata, inducing the introduction of new agricultural practices supposed to mitigate the negative impacts of intensive rice cultivation on biodiversity. For instance, the construction of a water retention structure (ditch) within paddies has been incentivized in Italy, in order to reduce the detrimental effects of

drying periods on aquatic organisms. In this research, we investigate the effects of ditch occurrence and dimensions on Odonata diversity in rice fields, and furthermore we evaluate the response of these insects to vegetation height on paddy and canal banks, as an approximation of grass management intensity. Field surveys revealed that ditch occurrence may not be sufficient to improve the suitability of rice fields as breeding habitat for Odonata, especially for sensitive species. Paddies with ditches of larger dimensions supported more abundant adult populations than other field types, but no clear differences have been observed concerning larval stages. Conversely, the occurrence of a well-developed bank vegetation produced clear benefits for these insects in rice fields, while a not significant effect have been observed along irrigation canals. In order to achieve Odonata conservation in rice agroecosystems, together with the excavation of large ditches within paddies, the creation of a network of semi-natural wetlands should be encouraged, as well as the implementation of extensive grass management strategies on rice field and canal banks." (Authors)] Address: Giuliano, D., Dept of Earth and Environmental Science, University of Pavia, Via Ferrata 9, 27100 Pavia, Italy. E-mail: davide.giuliano@alice.it

17144. Goertzen, D. (2019): Parkteiche als Lebensraum für Libellen – Einfluss von Wasservögeln und Fischen auf die Libellendiversität. Libellula Supplement 15: 71-91. (in German, with English summary) ["City park ponds as habitats for dragonflies – Impact of waterfowl and fish on dragonfly diversity – City park ponds are characterized by high abundances of waterfowl and fish, poor littoral and aquatic vegetation, and artificial shorelines. I investigated how these factors affect dragonfly diversity at city park ponds by conducting experiments at four park ponds in Dortmund (North Rhine Westphalia, Germany) in 2011 and 2012. (1) I investigated the effects of fish and waterfowl predation as well as the presence of submerged vegetation on the diversity of dragonfly larvae by using exclosures. Protection against predators did not have any effect, but the presence of submerged plants promoted diversity. (2) I compared survival and growth rates of larvae of Coenagrion puella and Ischnura elegans kept in enclosures in two of the ponds, of which one was almost free of dragonfly larvae, while the other was inhabited by a population of I. elegans. Both species survived and grew in both ponds. (3) I assessed the effects of shoreline treatment by comparing the diversity of adult dragonflies along transects of different littoral structures (sealed area, mowed lawn, reeds, and aquatic vegetation), including one experimental transect type in which lawn mowing was intermitted for one season. The presence of reeds as well as of aquatic vegetation were essential for increased diversity of adults. These were also the only shoreline structures where reproduction behaviour was observed. From my experiments, I conclude that the degraded littoral zone with often poor vegetation is probably the major reason for depleted dragonfly diversity in city park ponds. This degradation is connected with high waterfowl and fish density, causing eutrophication, turbid water conditions, and grazing, and additionally, with physical pressures (trampling, artificial structures) exerted by recreational use of the ponds." (Author)] Address: Goertzen, Diana., TU Braunschweig, Institut für Geoökologie, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: d.goertzen@tu-braunschweig.de

17145. Gogoi, M.J.; Payra, A. (2019): Echo perornata recorded in north-eastern India (Odonata: Calopterygidae). Notulae odonatologicae 9(3): 113-115.["A single male of E. perornata, a species new to the Indian fauna, was recorded and photographed on 11-vi-2013 in Hunli (28.3271°N, 95.9575°E, 1 280 m a.s.l.) in the Mishmi Hills, Arunachal Pradesh, India. Previously this species was only known from the adjacent Motuo (Medog) County in Tibet." (Authors)] Address: Gogoi, M.J., Scientist-A, Bombay Natural History Society, Hornbill House, Mumbai 400 001, Maharashtra, India. E-mail: monsoonjyoti@gmail.com

17146. Golab, M.J.; Johansson, F.; Sniegula, S. (2019): Let's mate here and now – seasonal constraints increase mating efficiency. Ecological Entomology 44(5): 623-629. (in Engish) ["1. Latitudinal climatic conditions shape the length of the mating season and could thus influence reproductive traits. Knowledge of how animals behave along latitudinal clines will increase understanding of the impact of climate on sexual selection and might help in the prediction of whether peripheral populations will spread or shrink in response to changes in climate. 2. This study investigated variation in the mating efficiency of a temperate insect, Lestes sponsa, under semi-natural field conditions along a latitudinal gradient covering three regions of the species' distribution: south, central and north. 3. A comparison was done of the proportion of copulating males, the proportion of males that formed tandems but did not copulate (unsuccessful males), and the proportion of males that did not attempt to form a tandem (passive males) in these three regions. 4. It was found that the proportion of copulations was significantly higher at northern latitudes than in the southern and central regions. Southern latitudes had a higher proportion of successful copulations compared with central latitudes. The northern region had a significantly lower frequency of passive males. The southern region had an intermediate proportion of passive males, and the central region had the highest proportion. The proportion of unsuccessful males did not differ between regions. The population density across sites did not affect these results. 5. The study shows that damselflies inhabiting northern populations mate more intensively than individuals from southern and central populations. This suggests that more restrictive environmental conditions during a brief mating season select for higher mating efficiency." (Authors)] Address: Golab, Maria, Institute of Nature Conservation, Polish Academy of Science, 31-120 Krakow, Poland. E-mail: marysiagolab@gmail.com

17147. Gorb, S.N. (2019): Wing surface in the damselfly Mecistogaster ornata (Zygoptera, Pseudostigmatidae): interactions between nanoscale wax and sticky spider webs. International Journal of Odonatology 22(1): 51-57. (in English) ["The representatives of the damselfly family Pseudostigmatidae are known for their ability to catch small orb web spiders, or in some cases small kleptoparasitic spiders in the webs of other spiders. In this paper, I demonstrate that the nanoscopic crystalline wax coverage of wings in M. ornata is partially

altered due to the presence of fluid-contaminated spots corresponding in their shapes and distribution to the typical beads-on-a-string (BOAS) geometry of sticky threads of orb web spiders. The spider fluid has the ability to wet superhydrophobic crystalline wax coverage. Also residues of the sticky threads were revealed in high quantities on the wing surface. The data suggest that the pseudostigmatid damselflies, due to their specific prey capturing method, have some costs and risks of being trapped by the sticky spider webs. However, high resolution SEM images revealed that the crystalline wax coverage of wings, in spite of its wettability by the spider glue, functions as a sacrificial anti-adhesive layer protecting the damselfly surface against spider adhesive traps." (Author)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zoological Inst., Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

17148. Grand, D.; Marinov, M.; Jourdan, H.; Cook, C.; Rouys, S.; Mille, C.; Theuerkauf, J. (2019): Distribution, habitats, phenology and conservation of New Caledonian Odonata. Zootaxa 4640: 1-112. (in English, with French summary. ["Compared to other archipelagos of the Pacific, the New Caledonian Odonata fauna is rich and diverse with 56 valid species or subspecies (23 endemics, 41%) from eight families (four Zygoptera: Argiolestidae, Coenagrionidae, Isostictidae, Lestidae, and four Anisoptera: Aeshnidae, Corduliidae, Synthemistidae, Libellulidae) and 31 genera (including four endemics, 13%). In Zygoptera, we record 19 species including 12 endemics (63%), and among Anisoptera, we record 37 species or subspecies, including 11 endemics (30%). We removed five species from the list that had been erroneously recorded as occurring in New Caledonia: Tramea carolina, Austroargiolestes icteromelas, Ischnura torresiana, Xiphiagrion cyanomelas and Hemicordulia oceanica. The occurrence of Tramea limbata appears also doubtful, but we were unable to clarify to which taxon this record referred hence we excluded it from our update. From a biogeographic perspective, the New Caledonian fauna has mostly Australian affinities with some connections with southeast Asia and the Pacific region. We provide for each species, whenever information was available, a distribution map with a brief review of its known ecology, behaviour and phenology. We also evaluated each species' conservation status, in light of known threats (range restriction, scarcity and human activity including altered water flow). We consider 17 species (30%) endangered. The most immediate threats concern water pollution including alteration to the flow of water courses caused by mining, deforestation and fires. Invasive species, such as alien fish, may be predators of concern for Odonata larva, although this has not yet been proven in New Caledonia." (Authors)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation, Plant Health Team Ministry for Primary Industries 14 Sir William Pickering Drive Christchurch 8053, New Zealand. E-mail: milen.marinov@mpi.govt.nz

17149. Graziani, F.; Ceccolini, F.; Cianferoni, F. (2019): New records of Selysiothemis nigra (Vander Linden, 1825) and Erythromma viridulum (Charpentier, 1840) from Cephalonia Island (Greece) with an updated checklist of the odonatofauna for the island. Graellsia 75(2): e093: 5pp. (in English, with Spanish summary) ["S. nigra and E. viridulum are recorded from the Greek island of Cephalonia for the first time, on the basis of photographic data. With the present note we also give an updated checklist of the odonatofauna for the island." (Authors)] Address: Cianferoni, F., Zool. Section "La Specola", Natural History Museum of the University of Florence - Via Romana 17, I-50125 Florence, Italy. E-mail: fabio.cianferoni@unifi.it

17150. Grimm, H.; Unger, C. (2019): Zur Nahrung des Baumfalken Falco subbuteo L. in Nordthüringen. Vernate 38: 125-134. (in German, with English summary) ["The food use of a pair of Hobbies and their offspring at a nest site in Esperstedter Ried (northern Thuringia), was recorded by examination of prey–pluckings and pellets at the end of the breeding season in 2018 and 2019. In the poorly structured landscape, only 20 species of birds were used as prey (148 individuals): the Swallow Hirundo rustica, the House Martin Delichon urbicum, the Skylark Alauda arvensis and the Tree sparrow Passer montanus accounted for 2/3 of the total avian prey. The maximum sizes of captured birds are discussed. Conditions were favourable for hunting small mammals and ground living insects, due to leaving of early stubble. The latter were mainly captured by the juveniles. A total of 14 individual small mammals (2 species) and 646 invertebrates were detected. Due to the dry weather, the proportion of dragonflies remained low, while that of grasshoppers was relatively high." (Authors)] Address: Grimm, H., Nordstr. 17, 06567 Bad Frankenhausen, Germany. E-mail: herbert_grimm@t-online.de

17151. Günther, A. (2019): Freilandnachweis von Pantala flavescens in Deutschland (Odonata: Libellulidae). Libellula 38 (3/4): 127-136. (in German, with English summary) ["First field record of Pantala flavescens in Germany (Odonata: Libellulidae) – On 6-VII-2019 a single male of P. flavescens was observed and photographed in the early post-mining landscape of Lower Lusatia (SE-Brandenburg, Germany). This was the first record of this migratory species in Germany not attributable to human transportation." (Author)] Address: Günther, A., Naturschutzinstitut Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

17152. Günther, A. (2019): Successful breeding by Pantala flavescens in Germany (Odonata: Libellulidae). Odonatologica 48(3/4): 203-210. (in English) ["On 06-vii-2019 a single male of P. flavescens was recorded in the early postmining landscape of Lower Lusatia, south-eastern Brandenburg, Germany. This was the first record of this migratory species in Germany not attributable to human transportation. On 17-viii-2019 an exuviae and a single adult in late teneral condition were found at the same site. According to current knowledge this is the first confirmed record of a successful breeding of P. flavescens in Europe." (Author)] Address: Günther, A., Naturschutzinstit. Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

17153. Günther, A. (2019): Reproductive behaviour of Chlorocyphidae. Part 1. Genus Sclerocypha Fraser, 1949 (Odonata). Odonatologica 48(3/4): 285-304. (in English) ["The reproductive behaviour of S. bisignata was studied in various

fast flowing streams in mountainous regions of Central Sulawesi. Using high speed cinematography males were shown to exhibit protracted threatening flights with a stationary display of the fore wings. In steady threatening flight the abdomen was held horizontally and the stroking of the hind wings paused briefly and regularly every 2-5 wing beats. These flights were interrupted periodically by short bursts of increased intensity were males arched their abdomens upwards and the hind wing beat was continuous. This flight style differs in several respects from any chlorocyphid species yet studied. During courtship the males presented all three pairs of legs; as courtship intensified they briefly raised their abdomen and presented stationary fore wings. Oviposition took place with the female completely submerged. Unlike most Chlorocyphidae, oviposition sites and male display sites were well separated and ovipositing females were unguarded." (Author)] Address: Günther, A., Naturschutzinstit. Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

17154. Gunnarsson, K.; Ekblom, R. (2019): Review of the diet specialisation of the Blue-cheeked bee-eater (Merops persicus). Journal of Ornithology 160(1): 275-279. (in English) ["Ecological specialisation, e.g. in terms of prey preferences, can have important implications for population biology. Bee-eaters are considered diet specialists; they hunt aerial insects, particularly hymenopterans. However, M. persicus has been considered a special case, as it preferentially feeds upon dragonflies. Here we review current literature on the diet of M. persicus, and conclude that this species is not as restricted to dragonflies as previously suggested. Instead, populations in different parts of the breeding and wintering ranges seem to specialise on various types of insects (such as wasps, bees, dragonflies, butterflies and mosquitoes)." (Authors)] Address: Gunnarsson, K., Dept of Ecology & Genetics, Uppsala Univ., Uppsala, Sweden

17155. Haber, W.A. (2019): Gynacantha vargasi (Odonata: Anisoptera: Aeshnidae) sp. nov. from Costa Rica. Zootaxa 4612: 58-70. (in English, with Spanish summary) ["The male and female of G. vargasi sp. nov. are described from three sites on the Caribbean slope of Costa Rica. The species is distinguished from its congeners by lime-green lateral thoracic stripes, orange-brown hind femur tipped with black, dorsal side of the hind tibia yellow, unique cercus shape, diurnal behavior, and barcode analysis. A key to all species of Gynacantha recorded from Mexico and Central America is provided." (Author)] Address: Haber, W.A., Apdo. 50-5655, Monteverde, Costa Rica. E-mail: bill.haber01@gmail.com

17156. Hadjadjia, S.; Amari, H.; Bouiedda, N.; Guebailia, A.; Boucenna, N.; Mayache, B.; Houhamdi, M. (2019): Emergence ecology and body size dimorphism in Sympetrum fonscolombii and S. meridionale (Odonata: Libellulidae). Zoology and Ecology 29(1): 8 pp. (in English) ["The study of dragonfly emergence provides insights into the understanding of their life history, ecology, and adaptation to abiotic and biotic factors. Here we investigate the emergence ecology and body size of two congeneric dragonflies (S. fonscolombii, and S. meridionale) in Northeast Algeria, highlighting the seasonal pattern, sex ratio at emergence, sexual size dimorphism (SSD), and vertical stratification. We found that both species, S. fonscolombii in particular, showed quite asynchronous emergence. In both species, and especially in the larger S. meridionale, sex ratio was found to be female-biased, which is in line with the hypothesis of a negative relationship between SSD and sex ratio. There was no seasonal pattern of body size observed in both species. In S. meridionale, SSD with regard to both body and wing sheath length was male-biased, while in S. fonscolombii, it was male-biased with regard to body length and female-biased with regard to wing length. Vertical stratification depended on support height (the higher the support, the higher the height of exuvia fixation) but had a complex relationship with the body size. The biological significance and implications of the vertical stratification-body size relationship are discussed." (Authors)] Address: Amari, H., Dept Biology, Faculty of natural and life sciences, Univ. of Chadli Benjedid, El Taref 36000, Algeria. E-mail: amari.hichem@yahoo.fr

17157. Hämäläinen, M.; Kosterin, O.E.; Kompier, T. (2019): Euphaea cyanopogon sp. nov. from the Cardamom ecoregion in Cambodia and Vietnam (Odonata: Euphaeidae). Zootaxa 4555(1): 28-44. (in English) ["Euphaea cyanopogon sp. nov. is described and illustrated from specimens of both sexes collected in the Kampongsaom Peninsula in southern Cambodia and the adjacent Phu Qu.c Island in Vietnam, both in the Cardamom ecoregion; the holotype male (at RMNH, Leiden) is from Kbal Chhay Waterfall, Cambodia. The male is characterized by having rather narrow wings without areas of strong pigmentation and a face marked with bright blue. The differences and affinities of the new species with E. pahyapi Hämäläinen, 1985 and some of its other congeners are discussed." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, the Netherlands. E-mail: matti. hamalainen@helsinki.fi

17158. Harabiš, F.; Rusková, T.; Dolný, A. (2019): Different oviposition strategies of closely related damselfly species as an effective defense against parasitoids. Insects 10(1), 26; https://doi.org/10.3390/insects10010026: 9 pp. (in English) ["Parasitoidism is one of the main causes of insect egg mortality. Parasitoids are often able to detect eggs using semiochemicals released from eggs and disturbed plants. In response, female insects adopt a wide variety of oviposition strategies to reduce the detectability of eggs and subsequent mortality. We evaluated the proportion of parasitized and undeveloped eggs of three common damselfly species from the family Lestidae, the most diverse group of European damselflies, in terms of oviposition strategies, notably clutch patterning and the ability to utilize oviposition substrates with different mechanical properties. We assumed that higher costs associated with some oviposition strategies will be balanced by lower egg mortality. We found that the ability of Chalcolestes viridis to oviposit into very stiff substrates brings benefit in the form of a significantly lower rate of parasitoidism and lower proportion of undeveloped eggs. The fundamentally different phenology of Sympecma fusca and/or their ability to utilize dead plants as oviposition substrate resulted in eggs that were completely free of parasitoids. Our results indicated that ovipositing into

substrates that are unsuitable for most damselfly species significantly reduces egg mortality. Notably, none of these oviposition strategies would work unless combined with other adaptations, such as prolonging the duration of the prolarval life stage or the ability to oviposit into stiff tissue." (Authors)] Address: Harabiš, F., Dept Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 00 Praha–Suchdol, Czech Republic

17159. Hardersen, S.; Toni, I. (2019): Proposal for a time-based standard sampling method for the monitoring of Gomphus flavipes (Charpentier, 1825) and Ophiogomphus cecilia (Fourcroy, 1785) (Odonata: Gomphidae). Fragmenta Entomologica 51(1): 55-62. (in English) ["Monitoring of conservation status is an obligation arising from Article 11 of the Habitats Directive for all species of community interest. However, the development of monitoring methods for invertebrate species has received relatively little attention. G. flavipes and Ophiogomphus cecilia are two dragonfly species, listed in the annexes of the Habitats Directive, which suffered severe declines in the last century and have since recovered. Methods for the monitoring of these two gomphids have been proposed, but these have not been extensively tested and no abundance classes have been proposed for the evaluation of the conservation status of these species. A time-based standard sampling method is proposed for both species and results from numerous sites in Lombardy, northern Italy, are presented. Applying the standard method revealed that it is common for rivers that high water levels preclude sampling of exuviae through the summer and it is better to allow for two seasons when planning the monitoring. A further result is the fact that it was not always possible to sample the same stretches as the dynamic nature of the rivers and fluctuations in water level lead to some river banks becoming unsuitable for sampling during some visits. In these cases the time-based approach was advantageous, as the method did not need to be modified in response to the original bank section becoming unsuitable." (Authors)] Address: Toni, I., Centro Naz. per lo Studio e la Conservazione della Biodiv. Forestale “Bosco Fontana” Carabinieri, Marmirolo, Italy. E-mail: ilariatoni2010@gmail.com

17160. Havermeier, L.; Büchner, T. (2019): Erfolgreiche Reproduktion von Anax ephippiger im Niederspreer Teichgebiet, Oberlausitz, Sachsen (Odonata: Aeshnidae). Libellula 38(3/4): 205-210. (in German, with English summary) ["Early in August 2019, next to drained carp ponds in the Oberlausitz (Saxony), around 60 exuviae were found along the edges of two concrete tanks made for harvesting carp. The exuviae were identified as those of A. ephippiger. Two teneral females were spotted close by. These observations serve as another proof of reproduction of A. ephippiger in Saxony." (Authors)] Address: Havermeier, Lena, Dresdener Str. 22, 10999 Berlin, Germany. E-mail: lenahavermeier@gmx.de

17161. Hayasaka, D.; Kobashi, K.; Hashimoto, K. (2019): Community responses of aquatic insects in paddy mesocosms to repeated exposures of the neonicotinoids imidacloprid and dinotefuran. Ecotoxicology and Environmental Safety 175: 272-281. (in English) ["Pesticides are one of major threats to wetland environments and their communities, and thus the information about ecological impact assessment of agrochemicals on ecosystems is essential for future effective pesticides management. Here, effects of the yearly application of two neonicotinoids, imidacloprid and dinotefuran on aquatic insect communities of experimental rice fields were assessed during two years of monitoring. Both neonicotinoid-treated fields and controls were monitored biweekly throughout the 5-month experimental period until harvest (late October) in each year. Maximum concentrations of imidacloprid (157.5 ìg/l in 2014 and 138.0 ìg/l in 2015) and dinotefuran (10.54 ìg/l in 2014 and 54.05 ìg/l in 2015) in water were relatively similar in both years, but maximum residues of imidacloprid (245.45 ìg/kg) and dinotefuran (419.5 ìg/kg) in the sediment in the second-year were 18 and 175 times higher than in the first year, respectively, with great variability of concentrations among sampling dates. In addition, remaining soil residues of both neonicotinoids were approximately 1 ìg/kg (ppb) at the start of the second-year. A total of 6265 individuals of 18 aquatic species belonging to 7 orders were collected. No differences in the number of species between controls and the two neonicotinoids-treated paddies were found between years. However, clear differences in community structures of aquatic insects among the imidacloprid- and dinotefuran-treated mesocosms, and controls and between years were shown by PRC analysis. In particular, imidacloprid likely decreased Crocothemis servilia mariannae nymphs, Chironominae spp. larvae, and Aedes albopictus larvae, whereas dinotefuran tended to decrease Guignotus japonicus, Orthetrum albistylum speciosum nymphs, and Tubificidae spp. In addition, long-living species of Coleoptera and Odonata were most sensitive to both neonicotinoids. Changes in composition of feeding functional groups (FFGs) of aquatic insects were more prominent in the first year and became subtler in the second year. One of the possibilities of this phenomenon may be functional redundancy in which species that had low sensitivity to imidacloprid and dinotefuran replaced the vacant niche caused by decreases of other species with high susceptibility within the same feeding functions, although further studies are needed to verify this explanation. Thus, feeding functional traits can be a good indicator for evaluation of changes in ecosystem processes under pesticides exposures. Consequently, the current study emphasized that more realistic prediction of community properties after the repeated application of agrochemicals in successive years should consider for 1) long-term population monitoring, 2) cumulative effects at least over the years, and 3) species' functional traits." (Authors)] Address: Hayasaka, D., Faculty Agri., KINDAI Univ., Nakamachi, 3327-204, Nara, Nara, 631-8505, Japan. E-mail: hayasaka@nara.kindai.ac.jp

17162. Haywood, B.T. (2019): Swamp Bluet Coenagrion Lyelli Tillyard (Odonata: Zygoptera: Coenagrionidae) In South Australia. Victorian Entomologist 49(4): 80-83. (in English) ["C. lyelli is recorded from South Australia for the first time. Adult males were observed in a small plantation wetland, 16km east south east of Mt Gambier in Caroline Forest. The species is suggested to be a wind assisted vagrant until such time that breeding is observed in South Australia." (Authors)] Address: Haywood B.T., Moorak, SA, 5291, Australia. E-mail: brytonwood@bigpond.com

17163. He, Z.; Zhao, M.; Wang, C.Y.; Sun, L.; Jiang, Y.Y.; Feng, Y. (2019): Purine and uric acid contents of common edible insects in Southwest China. Journal of Insects as Food and Feed 5(4): 1-8. (in English) ["Edible insects have recently been considered as a potential food source that may solve problems of malnutrition and starvation worldwide. However, studies exploring insects as food sources are mainly focused on entomophagy and nutrition rather than the potential risks of excessive metabolite contents, such as purine and uric acid. In this study, we analysed guanine, hypoxanthine, xanthine, adenine and uric acid concentrations in 11 species of edible insects from Yunnan and Guizhou provinces in Southwest China, including 5 species of dragonfly, 3 species of wasp and a single species of locust, mealworm and silkworm. Purine and uric acid contents differed distinctly between these insects, and guanine and xanthine were the dominant purines in all samples. The proportions of 4 purines in the total purine content of these insects differed markedly from those in meat samples from poultry and livestock, and uric acid contents varied significantly between aquatic insects and terricolous insects, such as silkworm pupa. Taken together, the present data show that most edible insects are potent food sources of purine." (Authors)] Address: Research Institute of Resource Insects, Chinese Academy of Forestry, Key Laboratory of Cultivating and Utilization of Resource Insects of State Forestry Administration, Bailongsi, Kunming, 650233 Yunnan, China P.R.

17164. Hedberg, R. (2019): Biodiversity of aquatic invertebrates in urban ponds: effects of land use. Bachelor thesis, Uppsala University, Disciplinary Domain of Science and Technology, Biology, Biology Education Centre. (Department of Ecology and Genetics): 17 pp. (in English) ["Urban ponds have the potential to hold large abundance and diversity of aquatic invertebrates, which could maintain an overall high biodiversity in the urban landscape. Little is known about how aquatic systems, such as ponds, are affected by the fast rate of urbanisation caused by an increasing human population together with the expansion of cities. The aim of this study was to investigate how landscape variables affect the abundance of six invertebrate groups. Thirty ponds in Stockholm, Sweden, were studied by sampling aquatic invertebrates of the taxonomic groups: Bivalvia, Gastropoda, Odonata, Trichoptera, Coleoptera and Hemiptera. The percentage of open land, developed land, forest and other water bodies around the ponds were investigated to examine possible correlations with invertebrate abundances. In addition, the relationship between the ponds distance to the city centre and invertebrate abundances were examined. The results indicate that the surrounding landscape has an important effect on the abundance of aquatic invertebrates living in the urban ponds. Odonata abundances showed increasing abundances with percentage of forest cover and decreasing abundances with more developed land. Bivalvia and Trichoptera abundances together with Odonata were found positively correlated with distance to the city centre. No significant results were found for Coleoptera, Hemiptera and Gastropoda. Since the taxonomic groups were affected differently by the landscape variables in the urban area, further investigation on how landscape variables affect the diversity of aquatic invertebrates are needed. Such knowledge would contribute to understand how the landscape variables should be optimised to maintain a high biodiversity in urban ponds." (Author)] Address: not stated

17165. Henseler, D.; Müller, M.; Hoess, R. (2019): Pantala flavescens neu für die Schweiz, inklusive Entwicklungsnachweis (Odonata: Libellulidae). Libellula 38 (3/4): 211-218. (in German, with English summary) ["First record of P. flavescens from Switzerland, including proof of development – During a dragonfly survey on 23-viii-2019 in a nature reserve at Holderbank (canton of Aargau) an immature male of P. flavescens was observed. On 04-ix-2019 an exuviae was found at the same locality, thus proving development of the species." (Authors)] Address: Henseler, D. SKK Landschaftsarchitekten AG, Lindenplatz 5, CH-5430 Wettingen, Switzerland. E-mail: dominik.henseler@skk.ch

17166. Hjalmarson, E.A.; Patten, M.A. (2019): Win–win urban ecology: near-home fishing promotes diversity of Odonata. Urban Ecosystems 22(6): 1201-1206. (in English) ["It is generally thought that increased human activity or infrastructure automatically translates to decreased wildlife activity or abundance. We surveyed Odonata at 14 urban parks with water features to determine factors that promote or hinder species richness or overall abundance. We constructed basic decision trees with either richness or abundance as a response variable and a suite of park characteristics (e.g., size, footprint of the water feature(s), habitat heterogeneity, presence and extent of infrastructure) as predictors. We found that the key predictor of both higher odonate richness and higher odonate abundance was the presence and extent of fishing activities. Despite higher human use at parks that promoted angling, as well as more infrastructure and increased management at these parks—factors that typically are thought to be correlated negatively with biodiversity—odonates and humans benefit from maintaining them and, we suggest, ensuring proper water quality persists. If it is good for fish, it is good for aquatic insects." (Authors)] Address: Hjalmarson, Emily, Oklahoma Biological Survey and Department of Biology, University of Oklahoma, Norman, USA

17167. Hoess, R. (2019): Erstnachweis einer zweiten Jahresgeneration von Orthetrum brunneum (Odonata: Libellulidae) für Mitteleuropa. Libellula 38(1/2): 97-102. (in German, with English summary) ["First evidence of a second annual generation of O. brunneum in Central Europe – In a rice field at Schwademau (Switzerland), a teneral female of O. brunneum and its exuvia were found in August 2018. The rice field was created in April 2018. As there is no hint of larval displacement, a bivoltine development is likely. A second annual generation is therefore evidenced for this species for the first time in Central Europe. Larval development is assumed to have lasted about 75 days." (Authors)] Address: Hoess, R., Normannenstrasse 35, CH-3018 Bern, Switzerland. E-mail: r.hoess@1st.ch

17168. Holtmann, L.; Brüggeshemke, J.; Juchem, M.; Fartmann, T. (2019): Odonate assemblages of urban stormwater ponds: the conservation value depends on pond type. Journal

of Insect Conservation 23(1): 123-132. (in English) ["Urbanisation is among the most severe drivers of the recent biodiversity crisis. It has been shown that stormwater ponds have a high value for the conservation of Odonata in urban areas. However, information on the relevance of different types of stormwater ponds is lacking so far. The aim of this study was to compare the Odonata assemblages of three types of urban stormwater ponds (n per type?=?10): (i) ponds only containing temporary water bodies (TEMP), (ii) ponds with temporary and small perennial water bodies (TEMP/PERE) and (iii) ponds with one large perennial water body (PERE). We observed distinct differences in environmental conditions and Odonata assemblages among the three types of stormwater ponds. In particular, vegetation structure and the partly interrelated microclimate differed considerably between TEMP on the one hand, and TEMP/PERE and PERE on the other hand. Odonate species richness and exuviae density of threatened species differed, too. Due to their early successional stages with low cover of riparian woodland and shallow water bodies, TEMP were characterised by a warmer microclimate than TEMP/PERE and PERE. Odonate species richness and exuviae density of threatened species were highest in TEMP and lowest in PERE. Moreover, indicator species were only identified for TEMP. Our study showed that stormwater ponds with a temporary hydroperiod play an important role for the conservation of odonates in urban areas. This is especially the case for specialised threatened species, such as Libellula depressa and Ischnura pumilio." (Authors)] Address: Fartmann, T., Dept Biodiversity & Landscape Ecology, Osnabrück Univ., Osnabrück, Germany

17169. Hoppenbrouwers, P. (2019): The discovery of a population of the Lilypad Whiteface (Leucorrhinia caudalis) in the Gelderse Poort. Brachytron 20(2): 82-86. (in Dutch, with English summary) ["In 2018 a small population of L. caudalis was found in an old oxbow of the river Waal in the Ooijpolder of the Gelderse Poort, the Netherlands. In 2016 a male of this species was observed and photographed near Lake Wylerberg in the Gelderse Poort, which was the reason to start searching for the species in 2018. At least seven males and one female were observed in 2018." (Author)] Address: peter.hoppenbrowers@planet.nl

17170. Huang, D.; Fu, Y.; Nel, A. (2019): A possible true Mesozoic Gomphidae s. str. from the mid-Cretaceous Burmese amber (Odonata: Anisoptera). Cretaceous Research 95: 341-345. (in English) ["Gunterbechlya pumilio gen. et sp. nov., first accurate Mesozoic Gomphidae sensu stricto, is described from the mid-Cretaceous Burmese amber. It is remarkable in its reduced venation with quadrangular discoidal triangles, only found in the extant gomphid genera Lestinogomphus and Archaeogomphus, the 'libelluloid' Cordulephyidae and the Libellulidae: 'Tetrathemistinae'. All these taxa are small dragonflies with reduced venation. Possibly the particular quadrangular discoidal triangles of these insects are related to their small sizes. The positions of some Mesozoic taxa currently attributed to the Gomphidae are discussed and none can be considered as genuine representatives of this family." (Authors)] Address: Huang, D., State Key Lab. of Palaeobiology & Stratigraphy, Center for Excellence in Life & Paleoenvironment, Nanjing Inst. Geology & Palaeontology, Chinese Acad. Sciences, Nanjing 210008, PR China

17171. Huda, K.A.; Dhia, K.K. (2019): Morphological study of three native Odonata species from Basrah Governorate – South of Iraq. International Journal of Biosciences 14(5): 141-155. (in English) ["The specimens were collected from three different regions, during the period from December 2017 to November 2018. The diagnostic features of the adults and naiads of the breeding species: Orthetrum sabina, Crocothemis servilia and Diplacodes trivialis, shows the diversity of specific characters for each species which were photographed and figured." (Authors)] Address: Huda Kadhim Ahmed, College of Education for pure science, University of Basrah, Basrah, Iraq. E-mail: hudamcs@yahoo.com

17172. Humphreys, R.K.; Ruxton, G.D. (2019): A review of thanatosis (death feigning) as an anti-predator behaviour. Behavioral Ecology and Sociobiology 72:22: 16pp. (in English) ["This study examined the growth of aquatic animals in the canal system constituting the main, lateral, and farm drains in a consolidated paddy field, with emphasis on canal structure and year-round water flow in the canals. A field survey at six sites, which involved three different canal levels, was carried out in Chikusei, Ibaraki Prefecture, Japan (36°21´N, 139°59´E). Sampling was conducted at monthly intervals from April 2001 to March 2002. Of the freshwater fish, young-of-the-year (YOY) Zacco platypus appeared in September, while YOY Misgurnus anguillicaudatus appeared in May. Last instars of Calopteryx atrata were collected only in June, suggesting emergence about this time, while those of the dragonfly Orthetrum albistylum speciosum were collected in May and July, suggesting a longer duration of emergence. Since populations of the four species decreased during the non-irrigation season when the water level was low, I propose that a marsh be developed as a wintering site in the lower reaches of the canal system in consolidated paddy fields." (Author)] Address: Humphreys, Rosalind, School of Biology, University of St Andrews, Dyer's Brae House, St. Andrews, Fife KY16 9TH, UK. E-mail: rosalindkh08@gmail.com

17173. Hunger, H. (2019): Aktualisierter Kenntnisstand zur Verbreitung von Coenagrion scitulum in Baden-Württemberg, Stand 2018 (mit Ergänzungen 2019) (Odonata: Coenagrionidae). Mercuriale 18/19: 9-16. (in German, with English summary) ["Updated state of knowledge of the occurrence of C. scitulum in Baden-Württemberg (SW-Germany) - An update of the current state of knowledge about the distribution of C. scitulum in Baden-Württemberg is presented. A new finding at an elevation of 685 m a.s.l. represents the highest known record of this species in Baden-Württemberg hitherto. The species keeps expanding its range rapidly." (Author)] Address: Hunger, H., INULA - Institut für Naturschutz und Landschaftsanalyse Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

17174. Hyde-Roberts, S.; Barker, L.; Chmurova, L.; Dijkstra, K.-D.B.; Schütte, K. (2019): Rediscovery of Libellulosoma minutum in the littoral forests of southeast Madagascar

(Odonata: Corduliidae). Notulae odonatologicae 9(4): 125-133. (in English) ["After a period of 109 years without detection, we can here confirm the rediscovery of Libellulosoma minutum Martin, 1907, in the southeast of Madagascar. Previously known only from historical collections with vague locality data, five individual males were observed in and around the littoral forest fragments of Sainte Luce between 2016–2017. These observations represent the first reported sightings of this 'Data Deficient' (IUCN) species in the wild since René Martin first described it in 1907. Although we cannot be certain Sainte Luce represents the type locality for the species, it must be considered an important area for future monitoring and conservation. A crucial correction is provided regarding the species name." (Authors)] Address: Hyde-Roberts, S., SEED Madagascar. Studio 7, 1A Beethoven Street, London, W10 4LG, UK. samhyderoberts@seedmadagascar.org

17175. Iloba, K.I.; Akawo, N.; Anani, C. (2019): Sand dredging impact on macrobenthic invertebrates of a hallowed river in Delta State of Nigeria. Science World Journal 14(1): 171-176. (in English) ["River Ethiope is one of the most revered water bodies in Delta State by communities along its course. Macroinvertebrate samples were collected from threes communities; Obi- Iloh, Ebedei-Adonishaka, Ebedei Obi-Ukwuole designated as Station 1, 2 and 3 respectively, that forbids women entrance but allows men folk to sand dredge. The survey conducted between March and April, 2015, identified 17 taxa of macro invertebrate with 219 individuals. Of the nine order, Hemiptera constituted the most abundant set 42.25%, followed by Decapoda 16.90%, Coleoptera 11.74%, Plecoptera and Arachnida 6.57%, Odonata 5.16%, Diptera 4.23%, Annelida (Lumbriculida and Arhynchobdelida) 3.76% and the least Trichoptera 2.82%. However, non-statistical significant richness exists among these organisms at the stations (p =0.05). Computed biological indices and lower macro invertebrates census revealed that the macro invertebrates were more abundant in stations 3 and 1 than in station 2, identifying the last two stations as unstable and moderately deteriorated. The enlisted significant correlated variables expressed manifold hydrological factors pinpointing human disturbance as impact." (Authors)] Address: Iloba, K.I., Dept of Animal & Environmental Biology, Fac. Sci., Delta State Univ., Abraka, Delta State, Nigeria. E-mail: kisyiloba@gmail.com

17176. Iseni, G.; Aliu, H.; Abdija, X.; Iseni, B.; Rushiti, A. (2019): New data about Large Golden-Ringed Dragonfly (Cordulegaster heros Theischinger, 1979) in the Lipkovo region. Journal of Natural Sciences and Mathematics of UT 4(7-8): 30-33. (in English) ["Three individuals of C. heros were observed on 27-V-2016, near the river over the village of Matec. Four individuals of C. heros were observed in the same locality on 15-VI-2017. Other species of dragonflies were also observed: on May 27, (29 May) 2016: Calopteryx virgo, Coenagrion puella, Pyrrhosoma nymphula, Ischnura elegans, I. pumilio, Orthetrum cancellatum, Onychogomphus forcipatus, Gomphus vulgatissimus, and on June 5, 2017, were observed: Libellula depressa, Sympetrum meridionale, and S. sanguineum. This data provides an important part of the information on the spread of this species, and this was the first field trip that confirmed the occurrence of C. heros in this region." (Authors)] Address: Rushiti, A., Dept of Biology, Faculty of Natural Sciences and Mathematics, University of Tetova, RNM. E-mail zshi@unite.edu.mk

17177. Ismail, N.I.; Yusoff, H.; Budin, S.; Yamin, A.F.M. (2019): An experimental mechanism of a tandem flapping wing for micro aerial vehicle. Journal of Physics: Conference Series 1349 (2019) 012014; doi:10.1088/1742-6596/1349/1/012014: 4 pp. (in English) ["Micro Aerial Vehicles, otherwise known as MAVs, is defined as an aerial vehicle that has a 15cm or less wingspan with a take off wight of less than 200g. Its miniature size and manoeuvrability allows it to fly in confined space at low Reynolds number flight conditions (100 – 100,000). In this study, an entothopter design inspired by dragonfly wings was investigated using a subsonic wind tunnel to see the effect of tandem wing configuration on the lift generation. The study was done at different flapping frequency (5-11Hz) and at different flight speed (5m/s, 7m/s, and 9m/s). It was observed that in phase flapping configuration produces better lift for all flapping frequency and all flight speed." (Authors)] Address: Ismail, N.I., Fac. of Mechanical Engineering, Univ. Teknologi MARA, Cawangan Pulau Pinang. E-mail: hamidyusoff@ppinang.uitm.edu.my

17178. Janra, M.N.; Yadi, S.; Ilham; Varizal; Pertiwi, I.B.L. (2019): New distributional record of Rhinagrion macrocephalum Selys, 1862 in Sumatra based on photographic evidence. Agrion 23(2): 44-46. (in English) [12-XII-2017, male of R. macrocephalum, in logged secondary lowland rainforest, interspersed with patches of more mature secondary or primary forest, in a riparian plot (2° 9' 10.1232" S, 103° 21' 42.2496" E, 93 m), one of a total of four pairs of riparian.] Address: Janra, M.N., The Biology Department, Andalas University, Jalan Kampus Unand Limau Manis Pauh, Padang, West Sumatra 25163, Indonesia. E-mail: mnjanra@sci.unand.ac.id

17179. Jedro, G.; Zydalowicz, K. (2019): Night-time record of Sympetrum danae (Sulzer, 1776) (Odonata: Libellulidae) in the Slowiński National Park. Odonatrix 1511 (2019): 4 pp. (in Polish, with English summary) ["One male S. danae turned up at a white screen illuminated by a 250 W mercury vapour bulb during night-time trapping of moths in the village of Gac (Slowiński National Park, northern Poland) on 30.07.2019. It remained there for some 3 hours. This record provides further confirmation that dragonflies occasionally "visit" sites where this kind of re-search is being carried out." (Authors)] Address: Jedro, G., Slowiński Park Narodowy, ul. Bohaterów Warszawy 1A, 76-214 Smoldzino, Poland. E-mail: rufinus@o2.pl,

17180. Ji, Y.; Yu, X. (2019): Molecular test shows the color pattern is not so reliable in diagnostic of genus Dysphaea Selys (Odonata: Euphaeidae). Zoological Systematics 44(2): 91-99. (in English) ["A molecular study based on COI, 16S and 28S genes reveals that a batch of specimens (7 males and 4 females) of Dysphaea Selys, 1853 collected from central Vietnam, which include different color patterns of wings and body, and were originally identified as three different species, are all the same species. This study implies that, in

some group of Odonata, identification only depending on color pattern may be unreliable, no matter what huge variations there are." (Authors) D. basitincta, D. gloriosa and D. haomiao] Address: Yu, X., College of Life Sciences, Chongqing Normal University, Chongqing 401331, China. E-mail: lannysummer@163.com

17181. Johnson, J. (2019): An Epitheca (Tetragoneuria) canis × spinigera (Beaverpond × Spiny Baskettail) hybrid in Oregon. Argia 31(4): 16-18. (in English) [Golden Coyote Wetlands, Josephine County, Oregon, USA, 8 June 2019.] Address: jt_johnson@comcast.net

17182. Jonsson, M.; Andersson, M.; Fick, J.; Brodin, T.; Klaminder, J.; Piovano, S. (2019): High-speed imaging reveals how antihistamine exposure affects escape behaviours in aquatic insect prey. Science of The Total Environment 648: 1257-1262. (in English) ["Highlights: •High-speed imaging was successful at capturing fast escape responses. •Antihistamine exposure altered prey escape responses. •The changed behaviour indicates a reduced ability to evade predator attacks. •High-speed imaging should be used in environmental risk assessment. Abstract: Aquatic systems receive a wide range of pharmaceuticals that may have adverse impacts on aquatic wildlife. Among these pharmaceuticals, antihistamines are commonly found, and these substances have the potential to influence the physiology of aquatic invertebrates. Previous studies have focused on how antihistamines may affect behaviours of aquatic invertebrates, but these studies probably do not capture the full consequences of antihistamine exposure, as traditional recording techniques do not capture important animal movements occurring at the scale of milliseconds, such as prey escape responses. In this study, we investigated if antihistamine exposure can impact escape responses in aquatic insect, by exposing damselfly (Coenagrion hastulatum) larvae to two environmentally relevant concentrations (0.1 and 1 μg L-1) of diphenhydramine. Importantly, we used a high-speed imaging approach that with high-time resolution captures details of escape responses and, thus, potential impacts of diphenhydramine on these behaviours. Our results show overall weak effects of antihistamine exposure on the escape behaviours of damselfly larvae. However, at stage 2 of the C-escape response, we found a significant increase in turning angle, which corresponds to a reduced swimming velocity, indicating a reduced success at evading a predator attack. Thus, we show that low concentrations of an antihistamine may affect behaviours strongly related to fitness of aquatic insect prey – effects that would have been overlooked using traditional recording techniques. Hence, to understand the full consequences of pharmaceutical contamination on aquatic wildlife, high-speed imaging should be incorporated into future environmental risk assessments." (Authors)] Address: Jonsson, M., Dept of Ecology & Environmental Science, Umeå University, SE 90187 Umeå, Sweden. E-mail: micael.jonsson@umu.se

17183. Joshi, S.; Sawant, D. (2019): Ceriagrion chromothorax sp. nov. (Odonata: Zygoptera: Coenagrionidae) from Sindhudurg, Maharashtra, India. Journal of Threatened Taxa 11(7): 13875-13885. (in English) ["Ceriagrion chromothorax sp. nov. is described from Western Ghats, India, based on six ♂♂ and one ♀ collected from Sindhudurg District of Maharashtra." (Authors)] Address: Joshi, S., National Centre for Biol. Sciences, Tata Inst. Fundamental Research, Rajiv Gandhi Nagar, Kodigehalli, Bengaluru, Karnataka 560097, India.

17184. Karube, H.; Terayama, H.; Sakabe, K. (2019): Is the decline of Sympetrum maculatum in the Tonoh area in Gifu Prefecture caused by neonicotinoid insecticide? Tombo 61: 1-7. (in Japanese, with English summary) ["S. maculatum is an endemic dragonfly of Japan and an endangered species in the Japanese Red List. Recently serious decline of the species has been observed in the Tonoh area located in the southeastern part of Gifu Prefecture. The reason of the decline is still not clear, but we consider the reason being lead from chemical pollution of neonicotinoid insecticides. We detected these insecticides in the habitat of S. maculatum. In particular, concentration of acetamiprid in the habitat exceeded the allowable limit set by the Ministry of the Environment. It is possible neonicotinoid insecticides are one of the factors of dragonfly decline." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

17185. Karube, H.; Katatani, N. (2019): Rediscovery of the genus Dubitogomphus - description of a new species from Laos and proposal for new combination of D. bicornutus. (Odonata: Gomphidae). Tombo 61: 8-16. (in English, with Japanese summary) ["Dubitogomphus laosensis sp. nov., is described from Dak Cheung, Sekong Province, S. Laos. It is related to D. bidentatus Fraser, 1930, described from NE India. Davidius bicornutus Selys, 1878 is newly placed to this genus Dubitogomphus bicornutus comb. nov. and illustrated. In addition, we for the first time record the latter species from Vietnam. Historical record of the genus Dubitogomphus is reviewed." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

17186. Katatani, N. (2019): Description of Prodasineura bolavenensis sp. nov. from southern Laos (Odonata: Platycnemididae). Tombo 61: 25-32. (in English, with Japanese summary) ["Prodasineura bolavenensis sp. nov. is described from the Bolaven Plateau, south of Paksong, Champasak Province, Laos (15°04' N., 106° 12' E.). The species has a blue pattern, and the male is characterized by pruinescent dark violet stripes on synthorax, instead of visible blue antehumeral stripes in other blue colored congeneric species. Black colour of head and blue colour at the terminal of the abdomen and cerci are also species specific." (Author)] Address: Katatani, N., Nara City, Nara Pref., Japan. E-mail: katatani@pearl.ocn.ne.jp

17187. Kazmi, Q.B.; Ghory, F.S. (2019): Inventory of freshwater arthropods in Pakistan. Arthropods 8(4): 143-175. (in English) ["Inventory of free-living freswater arthropods, with synonymical bibliography, occurring in the Pakistani fresh waters is drawn up, almost entirely from taxonomical literature

checked until now. 632 taxa have been recorded since 1892, of these 239 species and sub-species are of Crustacea, 368 species and sub-species are of Insecta, 25 species and sub-species are of Arachnida as well as few unidentified species. The present inventory is composed of the collated records from the publications of the library and internet. Totally 266 selected publications are arranged as resource references." (Authors)] Address: Ghory, Farhana, Marine Reference Collection & Resource Centre, Univ. Karachi, Karachi, Pakistan. E-mail: farhanaghory@yahoo.com

17188. Kelly, R.S.; Nel, A. (2019): Revision of some damsel-dragonflies (Odonata, Liassophlebiidae and Anglophlebiidae new family) from the Triassic/Jurassic of England and Antarctica. Journal of Paleontology 92(6): 1035-1048. (in English) ["Fossil insects from the Triassic-Jurassic boundary of England could provide an important resource for investigating the severity of extinction events in the terrestrial realm of the uppermost Triassic. However, the fossil record is poorly understood for this period even though there are abundant historical collections. Many of these collections are still in need of taxonomic revision before they can be used to reconstruct past entomofaunas and make inferences about diversity change through time. This paper is part of a larger project to revise the taxonomy of insects across the Triassic-Jurassic boundary of England to better understand changes in insect diversity through the Triassic-Jurassic boundary and associated extinction period. Herein, the damsel-dragonfly family Liassophlebiidae Tillyard, 1925 is revised and an additional specimen from the Early Jurassic of Antarctica is included. Rossiphlebia new genus is erected for Liassophlebia jacksoni Zeuner, 1962; L. batheri Tillyard, 1925 is considered nomen dubium and another specimen originally attributed to L. batheri is identified as L. withersi Tillyard, 1925. Liassophlebia (?) clavigaster Tillyard, 1925 and L. (?) hopei (Brodie, 1845) are considered incertae sedis at the generic level. Liassophlebia gigantea Zeuner, 1962 is based on a fragmentary specimen but has several unique key characteristics. We redescribe it in Anglophlebia new genus and tentatively in Anglophlebiidae new family in Heterophlebioptera. Also discussed are L. magnifica Tillyard, 1925, L. withersi, and L. pseudomagnifica Whalley, 1985, which are redescribed with updated figures. Caraphlebia antarctica Carpenter, 1969 was originally described from the Early Jurassic of Antarctica as being closely related to Liassophlebia; it is herein confirmed in Selenothemistidae Handlirsch, 1939." (Authors)] Address: Kelly, R.S., School of Earth Sciences, Univ. of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, England, United Kingdom. E-mail: richard.kelly@bristol.ac.uk.

17189. Kennedy, A.C.; White, H.B.; Tallamy, D.W. (2019): Predation of dragonfly nymphs by Passerines. Northeastern Naturalist 26(3): 21-26. (in English) ["Avian predation of Odonata is fairly well-documented, but most observations are restricted to non-passerine birds eating adult odonates. As nymphal odonates are aquatic, most passerine birds would not encounter them while foraging but instead are more likely to catch teneral adults on their maiden flights. Photographs taken by naturalists over the past several years suggest that passerine predation on odonate nymphs, while apparently rare, occurs across a wider range of species than previously documented." (Authors)] Address: Kennedy, Ashley, Univ. of Delaware, Dept of Entomology & Wildlife Ecology, Newark, DE 19716, USA. E-mail: kennedya@udel.edu.

17190. Khudhair, N.; Yan, C.; Liu, M.; Yu, H. (2019): Effects of habitat types on macroinvertebrates assemblages structure: Case study of Sun Island Bund wetland. BioMed Research International Volume 2019, Article ID 2650678, https://doi.org/-10.1155/2019/2650678: 13 pp. (in English) ["Sun Island Bund Wetland (SIBW) is a river floodplain wetland located at the south part of Heilongjiang Province in Northeast China. An investigation of the influence of habitat type on macroinvertebrates assemblages structure was conducted in July 2016. Nine (9) sampling sites were selected based on sediment type, water condition, and aquatic vegetation type. Macroinvertebrates attributes including density, biomass, and four diversity indices (Simpson diversity index, Margalef richness index, Shannon-Weiner index, and Pielou evenness index) were assessed. A total of 53 taxa were collected during the study period, with the highest density dominated being from aquatic insects and gastropods. Bellamya purificata and Exopalaemon annandalei were the most dominant among all the species. The results showed that the assemblages structure of macroinvertebrates in different habitats was significantly different. Also, the results with PCA showed that the higher values of invertebrates density, biomass, diversity indices, and species richness had a greater association with the habitat types of silt-humus sediment, closed lentic area, and submerged-flouting-emergent vegetation.] Address: Liu, M., College of Wildlife Resources, Northeast Forestry University, Harbin 150040, China. E-mail: manhong@nefu.edu.cn

17191. Kiany, M.; Sadeghi, S.; Ehteshami, F. (2019): New record of Lestes dryas Kirby, 1890 (Odonata: Lestidae) with the notes on Platycnemis kervillei (Marin, 1909) from Iran (Odonata: Platycnemididae). Iranian Journal of Science and Technology, Transactions A: Science 43: 2123-2127. (in English) ["L. dryas is being reported for the first time in northwestern Iran. This species has also been reported from Turkey, Armenia, Azerbaijan and Afghanistan. The specimens were collected from Deylaman (Gilan Province) on 25-V-2015. P. kervillei have also been collected from Ardabil province on 23-V-2015, and from Isfahan province on 21-VI-2017. Photographs from habitats and important specimens' characteristics are provided." (Authors)] Address: Kiany, M., Biology Dept, Shiraz Univ., Shiraz, Iran. E-mail: mohsen.kiany1@gmail.com