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20023. Abbott, J.C.; Bota-Sierra, C.A.; Guralnick, R.; Kalkman, V.; González-Soriano, E.; Novelo-Gutiérrez, R.; Bybee, S.; Ware, J.; Belitz, M.W. (2022): Diversity of Nearctic dragonflies and damselflies (Odonata). Diversity 2022, 14, 575: 18 pp. (in English) ["Rarely have studies assessed Odonata diversity for the entire Nearctic realm by including Canada, USA, and Mexico. For the first time, we explored Odonata diversity in this region according to a definition of natural community assemblages and generated species distribution models (SDMs). Species occurrence data were assembled by reviewing databases of specimens held by significant Odonata repositories and through an extensive search of literature references. Species were categorized as forest-dependent or non-forest-dependent, as lentic or lotic-dependent, and according to conservation status. Predicted distributions were stacked for all species across their entire ranges, including areas outside of the Nearctic. Species richness and corrected weighted endemism (CWE) were then calculated for each grid cell. We found a pattern of greater species richness in the eastern portion of the Nearctic, which can be explained by the higher aquatic habitat diversity at micro and macroscales east of the Rocky Mountains, promoting niche partitioning and specialization. In the Nearctic region, the southeastern US has the highest number of endemic species of Odonata; this degree of endemism is likely due to glacial refuges providing a foundation for the evolution of a rich and unique biota." (Authors)] Address: Abbott, J.C., Alabama Mus. Nat.l Hist. & UA Museums Dept Res. & Collections, Univ. Alabama, Tuscaloosa, AL 35487, USA. Email: jabbott1@ua.edu

20024. Adelmann, J. (2022): Im Fokus: Kleiner Blaupfeil (Orthetrum coerulescens) - Status und Verbreitung in Hessen (Odonata: Libellulidae). Libellen in Hessen 15: 79-96. (in German) ["O. coerulescens is an ecologically demanding species that occurs preferably in spring channels, meadow streams and ponds influenced by groundwater. In Hessen (Germany), O. coerulescens is widespread, but rare overall. The species is generally regarded as a "climate winner", and recently an increase in annual reports has been recorded, as in other federal states. In many cases, this involves the observation of only a single individual and the number of continuously reproducing localities is still low. The most important areas in terms of the number of individuals observed and the continuity of detections are presented and discussed." (Author/DeepL)] Address: Adelmann, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

20025. Adelmann, J. (2022): Fortschritte bei der Libellenkartierung in Hessen in den Jahren 2019 bis 2021. Libellen in Hessen 15: 49-58. (in German) [" Last year, the mapping initiative 2019 to 2021, which was launched with the aim of improving the recording of dragonfly fauna in the undermapped regions in Hesse, came to an end. As of December 2021, the state of knowledge has increased in many map sheets compared to December 2018, both in terms of the number of species detected and in the index value for assessing the state of data. This progress is presented and discussed using maps. In many cases, the progress also concerns regions that were previously well studied. On the other hand, there are still MTB quadrants in the Schwalm-Eder district, for example, where up to 25 of the species recorded in the period from 1980 to 2005 have yet to be confirmed by more recent observations. Therefore, the working group continues to support the mapping of these regions." (Author/DeepL)] Address: Adelmann, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

20026. Aghade, J.B.; Saraf, S.A.; Shinde, A.M. (2022): A review on odonate diversity and habitat in India. Journal of Entomology and Zoology Studies 10(2): 129-134. (in English) ["The current review examines 24 research articles about Odonata Diversity and Habitat, which were previously collected from all over India, and includes an update on their systematic account, sighting period, diagnostic features, measurements, distribution, and perching behavior, conservation status, and threats. If the habitats are saved and safeguarded, this is favorable for their survival." (Authors)] Address: Aghade, J.B., Dept of Zoology, Government College of Arts and Science, Dr. B. A. M. University, Aurangabad, Maharashtra, India

20027. Aguilera, E.; Busto, B.; Ramo, C. (2022): Diet and food resource partitioning among six Ibis species in the Venezuelan Llanos. Ornitología Neotropical 33: 124-132. (in English, with Spanish summary) ["This work is the first study to provide simultaneous information on the diet of all six ibis species inhabiting the Venezuelan Llanos, which was obtained by analyzing gizzard contents of birds collected in 1979-1982 (between 59 and 11 per species). The percentage of prey number for the ibis species was determined: for the Scarlet/White ibis (Eudocimus ruber/E. albus), the main prey were Coleoptera, Diptera, and Heteroptera in the dry season, and Coleoptera and Odonata ["Anisoptera"] in the wet season. For the Barefaced Ibis (Phimosus infuscatus), main prey included Coleoptera and Ephemeroptera in the dry season, and Oligochaeta, Ephemeroptera, and Coleoptera

in the wet season. For the Glossy Ibis (Plegadis falcinellus), Spinicaudata, Coleoptera, and plant material were the main items consumed in the dry season, and Coleoptera, Decapoda, Odonata, and Heteroptera in the wet season. For the Sharptailed Ibis (Cercibis oxycerca), Pisces, Lepidoptera, Coleoptera, and Orthoptera were mainly consumed in the dry season, and Coleoptera, Orthoptera, and Oligochaeta in the wet season. For the Buff-necked Ibis (Theristicus caudatus), main prey were Coleoptera, Orthoptera, Arachnida, and Lepidoptera in the dry season, and Coleoptera and Orthoptera in the wet season. Finally, for Green Ibis (Mesimbrinibis cayennensis), we found that Coleoptera, Gastropoda, and Orthoptera were the most consumed in the dry season, without data for the wet season. We also found that rainfall seasonality has a great influence on the prey eaten by the ibises: diet overlap between the dry and wet season varied between 0.07 and 0.45 (Schoener's index), de-pending on the species. Moreover, diet overlap between pairs of species showed extremely low to medium values (0.13-0.44 in the dry sea-son, 0.03-0.60 in the wet season, according to Schoener's index), which suggests that the coexistence of these species is largely facilitated by food resource partitioning." (Authors)] Address: Ramo, Cristina, Dpto. Ecología de Humedales, Estación Biológica de Doñana (EBD-CSIC), Sevilla, Spain. E-mail: cristina@ebd.csic.es

20028. Aguilar-Baldosea, W.; López- Ramírez, I.C.; Chávez-Mosquera, L.Y.; Murillo, L.R.; Halaby-Guerrero, J.C. (2022): Efecto de la mineria en macro invertebrados acuáticos de la ciénaga plaza seca, Atrato, Chocó. Revista Politécnica 18(35): 9-23. (in Spanish, with English summary) [oas 64a; "The wetland ecosystems of the middle Atrato basin have been affected by factors such as mining, which interrupt the natural ecological dynamics of these aquatic communities, including the assemblage of aquatic macroinvertebrates. The effect of gold mining contamination in the Plaza Seca marsh, Middle Atrato basin, Chocó, Colombia, was determined. The structure and dynamics were analyzed. Macroinvertebrate specimens were collected from substrates such as macrophytes, sediment and riparian vegetation, fixed with 70% alcohol; physicochemical and hydrological parameters were measured. A total of 175 organisms were collected, distributed in 2 classes, 7 orders, 22 families and 27 genera. The order Odonata was the most representative (34%), followed by Coleoptera (28%). The Shannon-Wiener diversity index showed low values (1.92 bits/ind). The physicochemical variables were influenced by mining activity in the areas surrounding the marsh." (Authors)] Address: Murillo, L.R., Maestrante en Gerencia y Prácticas de Desarrollo. Investigador, Contratista Vicerrectoría de Investigaciones UTCH. Grupo de Investigación Sistemas Productivos, Colombia. Email: leyserrengifo123@gmail.com

20029. Ahire, D.K. (2022): Diversity of Odonates in Agricultural Field's of Satana (Baglan) Taluka, Nashik District, Maharashtra, India. YMER 21(6): 1086-1093. (in English) ["The present survey has been carried out on Odonata of agricultural field, Satana (Baglan) Nashik district, Maharashtra because it is now clear that agricultural fields are unique ecosystem that provides several services to Odonates. So, the different Odonates depend on these fields and their diversity also signs of good health of agroecosystems. But nowa-day agricultural land are gradually decreasing due to the rapid growth of highways, housing and factories. So, Odonates of these fields are also under risk. This side of the agricultural area is less highlighted so the main aim of this study to prepare a list of those odonates which use these fields. There is the study was carried out for a period of two years i.e. July 2019 to July 2021. There are total of 21 species of Odonates were recorded during the period of the study. Maximum of 9 species falls under family Libellulidae followed by 6 species falls under Coenagrionidae and followed by 4 species fall under Platycnemididae and Lestidae and Aeshnidae showed less species diversity and represented by only one species. There are the maximum species richness reported from Monsoon and post-Monsoon season." (Authors)] Address: Ahire, D.K., Dept of Zoology, P.V. P. College, Pravaranagar, At- Loni- 413713, Ahmednagar, MS, India. Email: dilipahire7272@gmail.com

20030. Alkhayat, F.A.; Ahmad, A.H.; Rahim, J.; Imran, M.; Sheikh, U.A.A. (2022): Distribution and diversity of aquatic insects in different water bodies of Qatar. Brazilian Journal of Biology 84, e255950: 10pp. (in English, with Portuguese summary) ["Aquatic insect fauna remains an important tool for bio indication of environmental disturbance, while maintaining a healthy aquatic system. The purpose of the study was to document and to identify the diversity and distribution patterns of aquatic insect, a highly ignored aspect from the Qatar. Following the standard procedures, the samples were collected from aquatic habitats during the period October 2015 to May 2017 on monthly basis. A total of 11,287 individuals, belonging to 6 orders were captured. Dipterans were the abundant with the percentages of 71.01 (n=8,015), while the lowest percentage was observed for Coleoptera 0.04 (n=05). Twelve insects families were identified, among these five were reported under Diptera, followed by Hemiptera (03), while Coleoptera, Trichoptera, Odonata [exclusively: Orthetrum sabina], and Ephemeroptera were represented by single families. Among the selected localities, Dipterans were collected from 10 stations, followed by Hemiptera (9), Coleoptera (4), Odonata (4), Ephemeroptera (3) and Trichoptera (1) respectively. Among the water bodies samples, streams were the most preferred habitats (n=2,767), while drinking water pools were the least (27). Moreover, the highest Simpson diversity index of 1.48 and lowest of 0.47 was recorded for flooded sewage pool and plastic containers respectively, while the low evenness values were observed for ponds, and less than 1 Margalef's diversity values were seen for all habitats. This study documents the patterns of the diversity and distribution of aquatic insects, and provides a baseline for the future studies from Qatar." (Authors)] Address: Alkhayat, F.A., Universiti Sains Malaysia, School of Biological Sciences, Penang, Malaysia

20031. Alvarez-Alvarez, K.L.; Bota-Sierra, C.A.; Vásquez-Ramos, J.M. (2022): New species records in Acanthagrion, Nehalennia, and Perilestes (Odonata: Zygoptera) for Colombia - Nuevos registros de especies en Acanthagrion, Nehalennia y Perilestes (Odonata: Zygoptera) para Colombia. Biota Colombiana 23(2): 1-8. (in English, with Apanish summary) ["We record for the first time Acanthagrion jessei, Nehalennia minuta, and Perilestes solutus in Colombia, based on males and females taken at the campus Barcelona at the Universidad de Los Llanos, located in the foothills of the Colombian Eastern Andes in the Orinoco river basin." (Authors)] Address: Álvarez-Álvarez, Karen Lineke

20032. An, C.-H.; Cheon, K.-S.; Jang, J.-E.; Choi, J.-K.; Lee, H.-G. (2022): Complete mitochondrial genome of large dragonfly (Macromia amphigena). Mitochondrial DNA Part B, 7:2: 377-378. (in English) ["The complete mitochondrial genome of M. amphigena (Odonata; Macromiidae; Macromia) was sequenced and found to be 15,594 bp in length

including 37 genes (thirteen protein-coding genes (PCGs), 22 transfer RNAs (tRNAs) and two ribosomal RNAs (rRNAs) and a non-coding region). The overall GC content of the mitochondrial genome for M. amphigena was 28.4%. A phylogenetic analysis conducted for 13 species within the order Odonata suggested that Macromia daimoji is the most closely related to M. amphigena." (Authors)] Address: Lee, H.-G., Dept of Biological Science, Sangji University, Wonju, Korea. Email: morningdew@sangji.ac.kr

20033. Anand, K.; Dash, S.M.M.; Armanini, S. (2022): A numerical study on three-dimensional flapping dragonfly wings with optimized input kinematics for hovering and forward flight. Bulletin of the American Physical Society, 75th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 20–22, 2022; Indiana Convention Center, Indianapolis, Indiana. Session L04: Animal Flight: Flying Insects I. 8:00 AM–9:57 AM, Sunday, November 20, 2022. Room: 133: (in English) [Verbatim: Dragonflies are capable of hover, glide, forward flight, quick turning, etc., with substantial flight times. Previous studies found that dragonfly wings require distinctive input kinematics for different flight modes. For instance, in hovering/forward flight, the wings flap out-of-phase, whereas during quick maneuvers, the wings flap in-phase. In this study, we performed numerical simulation using a dynamic mesh to analyze the wake structure over a pair of tandem dragonfly wings and further optimized their aerodynamic performance with novel flapping kinematics. The wing geometries are based on structural studies. The input kinematics are selected as the mix of pure sinusoidal and periodic Eldredge functions. The design parameters are taken similar to those of Berman and Wang (2007) and Geherke et al. (2019). Our study found that both wings' combined vertical lift coefficient is 1.56 times more than their individual lift coefficients when summed up. Moreover, the hindwing experiences most of the enhancement in lift resulting from the vortex synergy interaction. It was found the downwash-upwash wake interactions are insignificant in the in-phase flapping, which agrees with the results of Lua et al. (2018). The detailed flow physics will be discussed in the presentation.] Address: Indian Institute of Technology Kharagpur, India

20034. Antol, A.; Labecka, A.M.; Larsson, R.; Sniegula, S. (2022): First record of Microsporidia infection in the damselfly Ischnura elegans larvae: Temperature and predator cue effects on the host's life. Diversity 2022, 14, 428. https://doi.org/10.3390/d14060428: 10 pp. (in English) ["Here, we report, for the first time, a microsporidian infection in laboratory-reared larvae of I. elegans. Infected larvae originated from field-collected adult females, which were caught in southern Poland in August 2020 (the second half of the flight season). Higher rearing temperatures and the presence of predator cues from the invasive alien signal crayfish (Pacifastacus leniusculus) increased the number of infected larvae. Infected larvae had distorted wing development, and all individuals died before emergence. Hence, microsporidian infection in I. elegans larvae impacted damselfly morphology and life history. We propose that warming temperature and stress caused by nonconsumptive effects triggered by invasive alien predators are possible factors that produce negative fitness consequences from microsporidian infection in a key amphibious ectotherm." (Authors)] Address: Antol, A., Institute of Nature Conservation, Polish Academy of Sciences, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: andrzejantol@gmail.com

20035. Arase, C. (2022): Design and Kinematics of a Dielectric Elastomer Actuated Micro Dragonfly Robot. BSc thesis, Mechanical Engineering, Massachusetts Institute of Technology: 32 pp. (in English) ["Dragonflies fly in a unique way compared to other hovering insects. Soft robotics are used to learn more about their flapping motion. An at-scale dragonfly robot is designed around Dielectric Elastomer Actuators that compress and expand 0.5mm. With this knowledge, MATLAB was used to predict the linkage sizes that control the wing stroke movement. Using the values calculated in MATLAB, Solidworks was used to design a soft robot that mimics a dragonfly's flight. Motion analysis was then used to map the movements of the robot. This analysis showed an angular wing displacement of 93° in the φ direction. The wing hinge (f direction) moves 90° on the upstroke and is stopped by a limiting piece to 40° on the downstroke." (Author)] Address: Cathleen Arase; not stated

20036. Archibald, S.B.; Cannings, R.A. (2022): The first Odonata from the early Eocene Allenby Formation of the Okanagan Highlands, British Columbia, Canada (Anisoptera, Aeshnidae and cf. Cephalozygoptera, Dysagrionidae). The Canadian Entomologist 154, e29: 1-8. (in English) ["Fossil insects have been collected and described from the early Eocene Allenby Formation of southern British Columbia, Canada for over a century, but these have never included Odonata. We describe the first members of that order from the formation: Allenbya holmesae, new genus and species, most likely belonging to the Dysagrionidae (suborder Cephalozygoptera), and a torn, folded, and incomplete wing assigned to the Aeshnidae (suborder Anisoptera) that cannot be identified below family level. In other regional deposits of the early Eocene Okanagan Highlands series of lacustrine shales, the Dysagrionidae is by far the most common odonate family, followed by the Aeshnidae." (Authors)] Address: Archibald, S.B., Beaty Biodiversity Museum, University of British Columbia, 2212 Main Mall, Vancouver, British Columbia, V6T 1Z4, Canada. Email: sba48@sfu.ca

20037. Arguel, L.; Denis, A.S.; Danflous, S.; Gouix, N.; Santoul, F.; Buisson, L.; Pelozuelo, L. (2022): Detection and monitoring of riverine dragonfly of community interest (Insecta: Odonata): Proposal for a standardised protocol based on exuviae collection. Diversity 2022, 14(9), 728; https://doi.org/10.3390/d14090728: 17 pp. (in English) ["Collecting quantitative data on insect species occurrence and abundance is a major concern to document population trends. This is especially the case to assess the conservation status of species listed in the European Habitats Directive and to assess the efficiency of mitigation measures with a view to achieve the “no net loss of biodiversity” goal for protected species. However, at present, populations of riverine dragonflies listed in the Habitats Directive and protected under French national law are poorly quantified and monitored. Exuviae collection could be used for such monitoring but a standardised protocol is lacking. We here proposed and tested such a protocol to monitor riverine dragonfly populations through exhaustive exuviae collection along river bank transects. To define the optimal transect size and number of visits, ninety-eight 100 m-long transects divided into 10 m-long plots were monitored on three rivers in southern France. Each transect was visited three times over the emergence period. In the course of each visit, all the exuviae along transects were collected and identified. From our results, we recommend collecting exuviae along 100 m of river bank in the course of two visits in order to both maximise the species detection and minimise the monitoring cost." (Authors)] Address: Pelozuelo, L., Laboratoire d’Ecologie Fonctionnelle

et Environnement, CNRS—INPT-UPS, Univ. Paul Sabatier, Bâtiment 4R1, 118 Route de Narbonne, CEDEX 09, 31062 Toulouse, France. Email: laurent.pelozuelo@univ-tlse3.fr

20038. Assandri, G.; Bazzi, G. (2022): Natural and anthropogenic determinants of peatland dragonfly assemblages: Implications for management and conservation. Biodiversity and Conservation 31: 703-722. (in English) ["Peatlands are unique ecosystems of global importance for biodiversity, though are severely threatened by human activities. Dragonflies are valuable ecological indicators, but comprehensive studies on the species inhabiting peatlands are limited. To fill this knowledge gap, we investigated the determinants of peatland odonate assemblages in the Italian Alps along the bog-poor fen-rich fen series, a vegetation gradient influenced by pH. The ultimate goal was to distil management recommendations to inform peatland dragonfly conservation. Species richness, bog specialist richness, and community composition were assessed at both pristine and human-impacted sites and then related to environmental and antrophogenic drivers. We showed that bog and poor fen assemblages were significantly distinct from those of intermediate and rich fens, which, in turn, displayed the highest species richness, but the lowest number of specialists, whilst being also the most degraded. Excavated sites, compared to non-excavated ones, harboured a higher number of species, although this effect was not significant for bog specialists. Drainage and abandonment of mowing/ grazing practices determined reed and shrub/tree invasion, negatively impacting fen species. Water availability and heterogeneous spatial arrangements of water pools within the peatland positively affected most species, with bog specialists only favoured by the latter. Peatland dragonfly conservation should primarily rely on the preservation of pristine sites, as they harbour unique dragonfly assemblages. Impacted sites could benefit from restoration actions; specifically, reed control, and the creation of pools of different sizes and depths within the more terrestrified peatlands are likely the most effective measures to support peatland Odonata communities." (Authors)] Address: Assandri, G., Area Per L'Avifauna Migratrice (BIO.AVM), Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Via Caf Fornacetta 9, 40064 Ozzano dell'Emilia Italy. Email: giacomo.assandri@gmail.com

20039. Astuti, A.; Nayasilana, I.N.; Sugiyarto; Budiharjo, A. (2022): Community structure of dragonflies (Odonata) in Gunung Bromo's Forest Area with Special Purpose (FASP), Karanganyar, Central Java, Indonesia. Biodiversitas 23(5): 2493-2501. (in English) ["Dragonflies are one component of biodiversity in Indonesia, which function both as predators and bioindicators of water quality. Dragonfly habitat is widespread ranging from highland forest areas, lowland forests, reservoirs, lakes, rivers, swamps, and rice fields to settlements. One location that becomes dragonfly habitat is in the Gunung Bromo's Forest Area with Special Purpose (FASP), Karanganyar, Central Java, Indonesia. This study aims to determine the community structure and habitat preferences of dragonflies in Gunung Bromo's FASP. Data resulting from this study is expected used as a database for Gunung Bromo's FASP managing. The study was conducted along the Bamban river which is located in the Gunung Bromofs FASP area, in June-July 2019. Dragonflies were collected in 14 observation stations. At each observation, station transects were 100 m in length and 10 m in width. Data collection included the dragonflies species, the individual numbers, and environmental factors both abiotic and biotic factors. Data analysis included the diversity, evenness, dominance and similarity of dragonfly species. Principal Component Analysis (PCA) was applied to determine the dragonfly abundance pattern and Canonical Correspondence Analysis (CCA) was applied to determine the relationship between dragonflies and their environmental factors. The results showed there were 23 species of dragonflies in the Gunung Bromo's FASP with a diversity index of 1.96. PCA results indicate the abundance of dragonflies is not much different in each species. Meanwhile, CCA results show almost of the dragonflies in the Gunung Bromofs FASP are influenced by abiotic and biotic factors, except on Orthetrum sabina and Copera marginipes. They are assumed have unspecific habitat preferences." (Authors)] Address: Astuti, A., Biodiversitas Study Club, Dept of Biology, Fac. of Mathematic and Natural Science, Universitas Sebelas Maret. Jl. Ir. Sutami No.36, Kentingan, Jebres, Surakarta 57126, Central Java, Indonesia. Email: ayuastuti1709@gmail.com

20040. Azmiera, N.; Krasilnikova, A.; Sahudin, S.; Al-Talib, H.; Heo, C.C. (2022): Antimicrobial peptides isolated from insects and their potential applications. Journal of Asia-Pacific Entomology 25(2), June 2022, 101892: (in English) ["Highlights: • The recent advances of antimicrobial peptides isolated from insects were reviewed. Characterization and mechanisms of AMPs from various insect Orders were summarized. The most studied insect Orders were Hymenoptera, followed by Diptera and Coleoptera. A list of AMPs, methods for characterization, and bacteria tested were catalogued. A pictorial summary of the procedures for AMPs extraction and isolation was provided. Abstract: Antimicrobial peptides (AMPs) in insects have the potential to be developed as chemotherapy agents against numerous microbial species. This article reviewed the existing knowledge of what have been focused so far on published materials related to AMPs isolated from insects. Previous studies were focused on peptide characterization and the mechanism pathways of different AMPs from a variety of insect Orders. Most studied insect Orders are as follows: Hymenoptera (50%), Diptera (17%), Coleoptera (13%), Lepidoptera (10%), Hemiptera (5%), Blattodea (3%) and Odonata (2%). Dozens of new AMPs have been extracted from insects recently. However, more studies in vivo and in vitro are necessary to fully understand their effect and the mechanisms of antimicrobial action to utilize their promising potential in cosmetic and pharmaceutical industries." (Authors)] Address: Heo, C.C., Dept of Medical Microbiology and Parasitology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, 47000 Sungai Buloh, Selangor, Malaysia. Email: chin@uitm.edu.my

20041. Basaula, R.; Prasad, H.; Sapkota, K. (2022): The invasion of Water Hyacinth and its impact on diversity of macro-invertebrates in the lake cluster of Pokhara valley, Nepal. Prithvi Academic Journal 5: 1-16. (in English) [oas 64a; "Invasion of Alien Invasive Plant species (IAPs) is one of the major drivers for the wetland ecosystem degradation and aquatic biodiversity loss. Among the wetland ecosystems, the freshwater habitats including lakes and streams are more susceptible to species extinction. In the Lake Cluster of Pokhara Valley (LCPV), many aquatic species have been threatened by an abundant occurrence of water hyacinth (Eichhornia crassipes). Thus, this study aims to identity an association of the water hyacinth with different water parameters, diversity and abundance of macro-invertebrates. Water hyacinth is not only correlated with depth, transparency, pH and dissolved oxygen negatively, it is also correlated with temperature and free carbon dioxide positively. A total of

29 species and 26 genera from 21 families and 15 orders of macro-invertebrates were recorded. Among the macro-invertebrates, haplotaxida and diptera were found to be less abundant in the water hyacinth presence (HP) habitat than the water hyacinth absence (HA) habitat. However, the macro-invertebrates were found more abundant and diverse in the HP habitat than the HA habitat (Ranged: HP: 177 to 666; HA: 46 to 483). The abundance of orders like ephemeroptera, odonata, coleoptera, sphaeriida and caenogastropoda was significantly higher in the HP habitats. The direct and indirect effect of water hyacinth on the occurrence of macro-invertebrates and abundance can change the faunal structure of LCPV. Therefore, it is recommended to develop a plan of LCPV to manage the water hyacinth." (Authors)] Address: Basaula, R., Department of Zoology, Prithvi Narayan Campus, Pokhara, Nepal; Central Department of Zoology, Tribhuvan University, Kirtipur, Nepal

20042. Bae, S.-W.; Hwang, T.-W.; Yoon, C.-S.; Hong, S.-J.; Cheong, S.-W. (2022): Distribution characteristics of and ecological information on benthic macroinvertebrates in the Hwapocheon stream. Journal of Environmental Science 31(2): 149-169. (in Korean, with English summary) ["Hwapocheon stream is located in Gimhae-si, Gyeongsangnam-do, and a part was declared a protected wetland area in 2017. In 2020 and 2021, we investigated the community structure of benthic macroinvertebrates of the Hwapocheon stream to provide ecological information for the management of the wetland. As a result, 4 phyla, 6 classes, 20 orders, 51 families, 83 species, and 2,621 individuals of benthic macroinvertebrates were identified. The average indices of diversity, richness, and evenness were the highest in the midstream area, whereas the highest average index of dominance was observed upstream. Seven biological water quality evaluations based on the distribution of benthic macroinvertebrates showed that the Biological Monitoring Working Party was an extremely suitable method for environmental evaluation of the Hwapocheon stream. Regarding functional feeding groups, the number of species of predators and gathering-collectors was the highest, and considering habitual dwelling groups, the number of species of clingers and sprawlers was the highest. The species number of Odonata, Hemiptera, and Coleoptera increased toward the downstream area, whereas the community loss index was the highest upstream. We also investigated relative resistance and resilience based on the distribution of aquatic insects and found that community stability was the highest downstream, whereas the lowest upstream." (Authors)] Address: Cheong, S.-W., Dept Biology & Chemistry, Changwon National University, Changwon 51140, Korea. E-mail: swcheong@changwon.ac.kr

20043. Barbosa Ribeiro, R.A.; Juen, L.; Brasil, L.S. (2022): Habitat conditions in streams influence Odonata larval assemblages in the eastern Amazon. International Journal of Odonatology 25: 22-30. (in English) ["The growth of agricultural and mining activities in the Amazon has impacted land-use and caused significant changes in the local environmental conditions of streams. In the face of these changes, our study aimed at assessing how environmental changes affect Odonata larval assemblages in streams in the eastern Amazon. We hypothesized that habitat conditions in streams are strong predictors of Odonata larval assemblages. We sampled 30 headwater streams (1st through 3rd order) in the eastern Amazon. We corroborated our hypothesis that regional- and local-scale environmental changes are important predictors of the Odonata larval assemblage structure. These results indicate that environmental conditions within the stream channel are important to maintain Odonata larval assemblages, as they provide important resources for larval development. For new studies, we recommend the assessment of temporal dynamics to evaluate whether these patterns are stable across time. Finally, evaluating various environmental scales of the original impact is extremely relevant for preventing the deterioration of or recuperating aquatic assemblages in Amazonian streams, considering the ongoing rapid environmental changes and deforestation in the region. Here we demonstrate that in-stream environmental conditions are important to assemblage structure and this must be considered in environmental restoration plans." (Authors)] Address: Barbosa Ribeiro, R.A., Programa de Pós Graduação em Ecologia Aquática e Pesca, Universidade Federal do Pará, Belém, Pará, Brazil. Email: rodrigoarison@hotmail.com

20044. Basaula, R.; Prasad, H.; Sapkota, K. (2022): The invasion of Water Hyacinth and its impact on diversity of macro-invertebrates in the lake cluster of Pokhara valley, Nepal. Prithvi Academic Journal 5: 1-16. (in English) ["Invasion of Alien Invasive Plant species (IAPs) is one of the major drivers for the wetland ecosystem degradation and aquatic biodiversity loss. Among the wetland ecosystems, the freshwater habitats including lakes and streams are more susceptible to species extinction. In the Lake Cluster of Pokhara Valley (LCPV), many aquatic species have been threatened by an abundant occurrence of water hyacinth (Eichhornia crassipes). Thus, this study aims to identity an association of the water hyacinth with different water parameters, diversity and abundance of macro-invertebrates. Water hyacinth is not only correlated with depth, transparency, pH and dissolved oxygen negatively, it is also correlated with temperature and free carbon dioxide positively. A total of 29 species and 26 genera from 21 families and 15 orders of macro-invertebrates were recorded. Among the macro-invertebrates, haplotaxida and diptera were found to be less abundant in the water hyacinth presence (HP) habitat than the water hyacinth absence (HA) habitat. However, the macro-invertebrates were found more abundant and diverse in the HP habitat than the HA habitat (Ranged: HP: 177 to 666; HA: 46 to 483). The abundance of orders like ephemeroptera, odonata, coleoptera, sphaeriida and caenogastropoda was significantly higher in the HP habitats. The direct and indirect effect of water hyacinth on the occurrence of macro-invertebrates and abundance can change the faunal structure of LCPV. Therefore, it is recommended to develop a plan of LCPV to manage the water hyacinth." (Authors)] Address: Basaula, R., Dept Zoology, Prithvi Narayan Campus, Pokhara, Nepal; Central Dept Zoology, Tribhuvan University, Kirtipur, Nepal

20045. Batty, P. (2022): The Status of Somatochlora metallica (Vander Linden) (Brilliant Emerald) in Scotland. Journal of the British Dragonfly Society 38(1): 1-26. (in English) ["The distribution of S. metallica in Scotland is restricted to two well separated areas where it breeds primarily in upland lochs and lochans. It was formerly considered to be present in three separate areas but, since 2012, the number of known sites for S. metallica in Scotland has doubled, resulting in an expansion of its known range in this country. A number of these sites link the former main breeding areas of Loch Bran and Loch Affric in Inverness-shire. The other cluster of sites is in Argyll. Also, as a result of increased recorder effort, further observations on habitat preferences and breeding behaviour are presented." (Author)] Address:

Batty, Pat, Kirnan Farm, Kilmichael Glen, Iochgilphead, Argyll, PA31 8QL, UK. E-mail: battypatm@hotmail.com

20046. Bedjanic, M. (2022): Odonata records from Perhentian Islands, Malaysia. Notulae odonatologicae 9(9): 404-413. (in English) ["A checklist of 19 Odonata species observed between 30.vi. and 04.vii.2019 on the hitherto odonatologically unexplored island Pulau Perhentian Besar, Terengganu State, Malaysia, is given. Most notable is the record of the recently described Leptogomphus tioman Choong, 2016, for which the currently known distribution is extended and the variability in coloration details based on photographs of adult males is briefly discussed. Orthetrum pruinosum schneideri Förster, 1903, is new to Terengganu, bringing the total recorded odonates from the state to 133 species." (Authors)] Address: Bedjanic, M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. E-mal: matjaz.bedjanic@nib.si

20047. Behr, H. (2022): Notizen zur Libellenfauna (2013-2021) einiger Seeufer im Stadtgebiet Schwerin (Mecklenburg-Vorpommern) (Odonata). Virgo 25: 3-10. (in German) ["In 726 records, a total of 5441 individuals were recorded from 2013 to 2021 at the lakes studied with their tributaries. On most of the lakeshores in the urban area, only relatively low numbers of species were observed, with 11 to 17 dragonfly species. At the more intensively studied, elongated and structurally rich Neumühler Lake 26 dragonfly species were recorded. In the small, structurally rich tributary waters studied, which are connected to the main waters (especially: Small lakes, bays were home to many other typical stillwater species. On all shores of the larger lakes, which were predominantly overgrown with reeds, these three large dragonfly species were found with high dominance values (eudominant and dominant) for their group: Anax parthenope, Orthetrum cancellatum, Libellula fulva. The damselfly reached the relatively highest dominance values within the above-mentioned group C "Anisoptera without Libellulidae" at almost all investigated lakeshore sections. Only at the southern outlet of the Schwerin Inner Lake into the Störkanal several records of the dominant Gomphus vulgatissimus have been found as visual evidence of imagines and exuviae on the largely reed-free shore. Among the damselfly species, these species with relatively high dominance values occurred more frequently on typical lake shores: Erythromma najas, Ischnura elegans) and Enallagma cyathigerum. Among the accompanying species, the hitherto unique finding of Epitheca bimaculata hatching on the Common Crucian Carp stands out in particular. Leucorrhinia caudalis and L. pectoralis, which are strictly protected in the urban area, occur at 3-4 smaller pond-like, near-natural sites.Sightings of the fire dragonfly (Crocothemis erythraea) have become increasingly frequent in the recent past at a wide variety of stillwater habitats." (Author) Translated with www.DeepL.com/Translator (free version)] Address: Behr, H., Herrengrabenweg 57, 19061 Schwerin, Gemany. EMail: hauke-behr@web.de

20048. Bernard, R.; Daraz, B. (2022): Rift valley-driven species richness, composition and phenology of Odonata in central Zambia. International Dragonfly Fund - Report 171: 1-71. (in English) ["One hundred and seven species of damselflies and dragonflies were recorded at 66 localities in central Zambia during three expeditions between 2013 and 2017, with 104 species at 62 localities in the main study area, in broad environs of Chingombe. The relatively great richness and composition of the odonate fauna in this small remote area was a consequence of the close proximity of three quite different geomorphological units - the flat bottom of the rift valley, the steep mountainous slopes bordering it, and undulating uplands, with a combination of their climatic and hydrological conditions. An odonatological 'river-continuum' sequence was studied, from the upper and lower reaches of the mountain stream, through submontane streams and rivers down to the large river draining the rift valley. This spatial sequence was characterised by large-scale interpenetration of the odonate assemblages, with more specific fauna of the mountain stream and large river, and rich, but less specific that of submontane watercourses. Fluent replacement of some species with their related counterparts was recorded, i.e. more upland species of closed habitats by species related to semi-open lower-elevated watercourses. The range of species well adapted to temporary waters was rich, but differed between the small waters of the tropical savannah bottom of the rift valley and larger and longer existing water bodies in seasonally inundated dambos in more subtropical uplands. The phenological pattern was generally well-structured due to two distinct peaks, the first in the first phase of the wet season, both in the large river and temporary waters, and the second at the end of the wet season, in the latter. Phenology of odonate assemblages in the temporary waters was based on two consecutive aspects dominated respectively by adults reproductively active in the early-mid season and tenerals emerging at the end of it. At the beginning of the wet season, the reaction of adult odonates to first heavier rains was extremely rapid and even preceded the formation of the seasonal water body. In the large river, the phenological shift towards the early wet season with a low-water phase and favourable habitat conditions was clearly discernible. In turn, the odonate fauna in another low-water phase, at the end of the wet season and before a cool phase of the dry season, was dramatically poor. In the smaller permanent watercourses, phenology of the odonate assemblages during the wet season was generally less patterned, without a dramatic change of generations and with the emergence more dispersed in time, though centred on the first half of the season. As an effect of replacing individuals and the prolonged occurrence of many species, the odonate assemblages, while richer in the first half of the rainy season, appeared more stable and continuous than those of the temporary waters and the large river." (Authors)] Address: Bernard, R., Lab.y of Nature Education & Conservation, Fac. Biology, Adam Mickiewicz University in Poznan, Uniwersytetu Poznanskiego 6, PL-61-614 Poznan, Poland. Email: rbernard@amu.edu.pl

20049. Bharathi, D.; Koparde, P. (2022): Records of Dragonflies & Damselflies (Insecta: Odonata) from Gondia district, Maharashtra, India. Journal of Insect Biodiversity and Systematics 8(3): 379-387. (in English) ["The Vidarbha region of India harbours a significant amount of biodiversity. However, the region still severely lacks data on lesser-known taxa such as odonates. To partially fill in the knowledge gap on odonates, opportunistic surveys were conducted across nine sites in the Gondia district of Vidarbha between 2019 and 2021. In this report, the presence of 35 species from the study area, representing around 1/4th of the total odonate diversity of Maharashtra is recorded. The results are indicative of the need for consistent sampling efforts in the region. Further systematic and long-term monitoring studies on odonates in Vidarbha Region are proposed." (Authors) Lestes cf malabaricus] Address: Koparde, P., School of Sustainable Development, Fac. of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Pune, Maharashtra, India. Email: pankaj.koparde@mitwpu.edu.in

20050. Biddy, A.R.; McIntyre, N.E. (2022): Parasitism of Enallagma civile Hagen in Selys, 1853 (Zygoptera: Coenagrionidae) by Arrenurus water mites. International Journal of Odonatology 25: 98-95. (in English) ["We compared the prevalence and intensity of Arrenurus sensu stricto water mite parasites on E. civile from 10 freshwater wetlands (playas) in two different land-cover contexts in western Texas from 2006-2007. Vulnerability to parasitism may be a consequence of disturbance, so we predicted that the more natural form of regional land cover (grasslands) surrounding playas should be associated with a lower water mite load than more disturbed land cover (tilled croplands). Additionally, we examined Arrenurus occurrence and intensity of infection by host sex. Overall prevalence was 38.46% of 130 damselflies sampled having mites; this varied by land-cover type but with opposite trends between years. Overall average parasite load was ~11 water mites per infected host (range: 1-40 mites); intensity was significantly higher in hosts from cropland playas in 2006, but there was no difference by surrounding land cover in 2007. Although there were consistent trends in both years of more males being parasitized than females, the highly uneven distribution of parasites on hosts and differences in average mite load between years generated variability that obscured any statistically significant patterns. Thus, land-cover context surrounding playas, but not host sex, had an impact on parasite load in one of the two years of our study. Future work is needed to identify the mechanisms by which land cover may affect water mite-odonate host-parasite relationships as well as the role of the odonate assemblage as a whole in dispersal of parasites in a temporally dynamic wetland network." (Authors)] Address: McIntyre, Nancy, Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131 USA. Email: nancy.mcintyre@ttu.edu

20051. Biddy, A.R. (2022): Using species distribution models to predict genomic isolation: A case study with a high-altitude, stream-specialist damselfly (Odonata, Calopterygidae: Hetaerina vulnerata Hagen in Selys, 1853) in Arizona, New Mexico, and Utah. M.Sc. thesis, Texas Tech University, Austin: VII + 46 pp. (in English) ["Aquatic animals in high-elevation streams of the arid southwestern U.S. are potentially isolated by distance (IBD) or environment (IBE). H. vulnerata is an insect that inhabits mountain streams in the American southwest. Spatial separation of streams and limited dispersal capacity of H. vulnerata may cause population isolation and genomic structuring, and projected climate change may exacerbate isolation by restricting distribution and movement. MaxEnt was used to construct a species distribution model (SDM) based on environmental variables and occurrences of H. vulnerata; this model indicated seven potential population clusters isolated by intervening unsuitable habitat. Projecting to future climate conditions, an overall gain of suitable habitat (0.8% increase) was identified, but current suitable habitat in southern Utah and northern New Mexico was lost. I collected 124 H. vulnerata from eight localities at six of the seven clusters; DNA was extracted from 78 individuals for ddRADseq genotyping. A suite of population and landscape genomic analyses were used: Admixture, IBD, FST, and a genotype-environment association (GEA). Admixture analyses determined six subpopulations, partially corroborating the SDM. IBD was not significant; IBE was only significant when considering two ecological variables. FST values were low (< 0.07). GEA determined that 20 SNPs were locally adapted to tree canopy coverage. These results indicate that H. vulnerata populations are likely recently separated but undergoing genomic isolation and local adaptation. Integrating SDMs with landscape genomics combines techniques to indicate populations that are separated by distance and unsuitable habitat, providing explanations for patterns in genomic structuring." (Author)] Address: not stated

20052. Borisov, S.N.; Kazenas, V.L.; Borisov, A.S. (2022): Dragonflies (Odonata) of the Syrdarya Karatau and the Arys River valley (southern Kazakhstan) with notes on seasonal latitudinal and altitudinal migrations. Euroasian Entomological Journal 22(1): 78-90. (in English, with Russian summary) ["45 dragonfly species are presented for Syrdarya Karatau Range and Arys River valley in Southern Kazakhstan, with 19 species newly registered, and Somatochlora arctica given on the basis of literature data. Doubtful registrations of Calopteryx samarcandica and S. arctica are discussed. Seasonal latitudinal migrations of the four species, Anax ephippiger, A. parthenope, Pantala flavescens and Sympetrum fonscolombii are determined from Chokpak Pass by means of ornithological traps. Seasonal altitudinal migrations are registered for seven species, Aeshna mixta, Sympetrum arenicolor, S. meridionale, S. striolatum pallidum Selys, 1887, Sympecma fusca, S. gobica and S. paedisca. In mountainous biocenoses the immigrant dragonfly species flight from plains for aestivation are represented in high numbers." (Authors)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091, Russia. E-mail: borisov-s-n@yandex.ru

20053. Borkenstein, A.; Jödicke; R. (2022): Färbungsvielfalt niedersächsischer Coenagrion lunulatum (Odonata: Coenagrionidae). Mitteilungen der AG Libellen in Niedersachsen und Bremen 4: 3-18. (in German, with English summary) ["Variety of coloration in C. lunulatum from Lower Saxony, NW Germany - We describe two female colour morphs of C. lunulatum in Lower Saxony, northwestern Germany. Morph I has brown postocular spots, a basic body coloration with brown and green, and some variable blue at the abdomen, mainly at its tip. Morph II is similar but has blue postocular spots and more blue at the base and tip of the abdomen. A possible morph III was represented by a single female only, which resembles morph II but has blue thorax sites and even more blue at the abdomen. Photographs of males and females with their teneral and juvenile stages are added. The shortcoming of the notion of androchromatism is discussed." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

20054. Borkenstein, A.; Jödicke, R. (2022): Thermoregulatory behaviour of Sympetrum striolatum at low temperatures with special reference to the role of direct sunlight (Odonata: Libellulidae). Odonatologica 51(1-2): 83-109. (in English) ["The thermoregulatory behaviour of the autumnal Sympetrum striolatum was studied and analysed at the end of its flying season in November from 2011 to 2021. Only on days with intense solar radiation did it leave its roosting sites in the treetops and became active at and around breeding ponds. We describe the perch site selection and body posture for basking, avoiding wind, feeding, and reproductive activities after warm-up. Ectothermic thermoregulation enabled flight largely independent of air temperature; we saw a male flying at 3.7°C and a tandem ovipositing at 6.0°C. In the afternoon all individuals returned to their roosting sites. If they were too cold for immediate take-off, they wing-whirred and flew after 2–3 minutes. Wing-whirring was performed at ambient temperatures between 3.8 and 13.6°C.

We suppose that this behaviour is obligatory when insolation is insufficient, especially when the sun is blocked by clouds. The combination of ecto- and endothermic thermoregulation is considered the main key factor for this species' exceptionally effective adaptation to cold." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

20055. Bota-Sierra, C.A.; Sandoval-H.; Perez-Gutierrez, L. (2022): Two new Telebasis Selys, 1865 species (Odonata: Zygoptera: Coenagrionidae) from Western Colombia. Zootaxa 5138(1): 54-66. (in English, with Spanish summary) ["Telebasis Selys, 1865 is a genus well represented in Colombia, with 18 species distributed throughout the territory, one of them being endemic to the country. One of the most underexplored biogeographic regions of the country is the Chocó, where we found the two new endemic species of Telebasis here described, Telebasis blasi sp. nov. and Telebasis noveloi sp. nov. In the description of both species, we provide detailed information about their distribution, diagnostic characteristics for males and females, pictures of living specimens and diagnostic characteristics, and a map showing the localities where each species was found. Finally, remarks on the conservation status of these species are presented; we consider that they are probably endangered, since they occupy small ranges and are threatened by several human activities." (Authors)] Address: Bota-Sierra, C.A., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: corneliobota@gmail.com

20056. Bowler, D.; Eichenberg, D.; Conze, K.-J.; Suhling, F.; Baumann, K.; Benken, T.; Bönsel, A.; Bittner, T.; Drews, A.; Günther, A.; Isaac, N.; Petzold, F.; Seyring, M.; Spengler, T.; Trockur, B.; Vedder, D.; Willigalla, C.; Bruelheide, H.; Jansen, F.; Bonn, A. (2022): Gewinner und Verlierer in der Libellenfauna: Veränderung der Verbreitung in Deutschland zwischen 1980 und 2016. Libellula 41(1/2): 25-45. (in German, with English summary) ["Recent studies suggest insect declines in parts of Europe; however, the generality of these trends across different taxa and regions remains unclear. Standardized data are not available to assess large-scale, long-term changes for most insect groups but opportunistic citizen science data is widespread for some. Here, we took advantage of 'citizen science' data to investigate distributional changes of Odonata. We compiled over 1 million occurrence records from different regional databases. We used occupancy detection models to account for imperfect detection and estimate annual distributions for each species during 1980–2016 within 5 x 5 km quadrants. We also compiled data on species attributes that were hypothesized to affect species' sensitivity to different drivers and related them to the changes in species' distributions. We further developed a novel approach to cluster groups of species with similar patterns of distributional change to represent multispecies indicators. More species increased (45%) than decreased (29%) or remained stable (26%) in their distribution (i.e., number of occupied quadrants). Species showing increases were generally warm-adapted species and/or running water species, while species showing decreases were cold-adapted species using standing water habitats such as bogs. Time-series clustering defined five main patterns of change – each associated with a specific combination of species attributes, and confirming the key roles of species' temperature and habitat preferences. Trends in Odonata provide mixed news – improved water quality, coupled with positive impacts of climate change, could explain the positive trends of many species. At the same time, declining species point to conservation challenges associated with habitat loss and degradation. Our study demonstrates the great value of 'citizen science' and the work of natural history societies for assessing large-scale distributional change." (Authors)] Address: Bowler, Diana, Deutsche Zentrum für integrative Biodiversitätsforschung Halle-Jena-Leipzig, Puschstr., 04103 Leipzig, Germany. Email: diana.bowler@idiv.de

20057. Bozóki, T.; Móra, A.; Berta J. B.; Pernecker B.; Deák, Cs.; Málnás, K.; Boda, P. (2022): Contribution to the knowledge of the aquatic macroinvertebrate fauna of Bükkösdivíz (Mecsek Mountain, SW Hungary).. Natura Somogyiensis 38: 29-42. (in English) ["In 2018 and 2019, quantitative aquatic macroinvertebrate samplings were carried out in the river network of the Bükkösdi-víz (Mecsek Mountain). The identification of 325,865 macroinvertebrate specimens originated from 40 sampling sites resulted in the occurrences of 125 different species belonging to 12 higher taxa (Gastropoda – 9, Bivalvia – 1, Hirudinea – 4, Malacostraca – 6, Ephemeroptera – 16, Odonata – 12, Plecoptera – 3, Heteroptera – 19, Coleoptera – 23, Megaloptera – 3, Neuroptera – 1, Trichoptera – 28), including 8 protected (Bivalvia: Unio crassus, Odonata: Calopteryx virgo, Coenagrion ornatum, Gomphus vulgatissimus, Onychogomphus forcipatus, Orthetrum brunneum, Heteroptera: Aquarius najas, Neuroptera: Osmylus fulvicephalus) and 1 strictly protected species (Odonata: Cordulegaster heros)." (Authors)] Address: Bozóki, T., Doctoral Program in Biology & Sport Biology, Faculty of Science, University of Pécs, Pécs, Hungary

20058. Brockhaus, T. (2022): The Palaearctic dragonfly (Insecta: Odonata) fauna of the lands north of the Arctic Circle — a critical synopsis. Eurasian entomological journal 21(3): 142-152. (in English, with Russian and German summaries) ["40 Odonata species have been found north of the Arctic Circle between the Lofoten archipelago in the West and the Chukchi peninsula in the Russian Far East. This analysis is based on a critical evaluation of the available literature, data bases as well as my own observations in northern Fennoscandia and in the Polar Urals. Aeshna caerulea, A. subarctica, A. juncea and Cordulia aenea were found in all regions. Somatochlora arctica and S. sahlbergi are also widespread throughout the northern Palearctic. Only observations from the East Siberian mountain region and the East Siberian lowlands are missing. Coenagrion johanssoni and Enallagma cyathigerum occur north of the Arctic Circle in both the western and the eastern Palearctic. The present analysis is a basis for the recording of potential changes in fauna because of climate change." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

20059. Brockhaus, T. (2022): Ausbreitungsmechanismus der Federlibelle Platycnemis pennipes (Pallas) am Beispiel des Chemnitzflusses (Sachsen) (Insecta: Odonata: Zygoptera: Platycnemididae) und weitere Ausbreitungsformen bei Libellen. Artenschutzreport 46: 63-72. (in German, with English summary) ["Mechanism of expansion in P. pennipes using the example of the Chemnitz river (Saxony) and other forms of expansion in Odonata. – The reasons of the expansion of P. pennipes along the Chemnitz river since the early 1990s has been studied. After evaluating determined morphometric data (head width, total length, wing dimensions, mass, wing loading) of 109 males and 41 females on six places along the river valley and population dynamic processes (abundance estimates in this places), the dispersal behavior can be described by individually different fitness

of specimens. In a reproductive population, large adults emerge first, originating from a two-year development cycle. Subsequently, smaller imagines emerge over a longer period of time, which originate from a one-year larval development. If the number of individuals is high, displacement occurs, with the smaller specimens with less wing loading leaving the habitat. In this way, new habitats are gradually being settled, with the specimens orienting themselves on terrain markings in the river valley. In addition to intraspecific displacement, further expansion strategies such as those based on habitat selection in metapopulations and those based on large-scale migration are briefly described. It has been proven for a few species that they have an extremely low potential for expansion. In the context of species protection, these species, as well as those species that are strongly bound to specific habitats, must be given special attention." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf/Erzgebirge, Germany. E-Mail: t.brockhaus@t-online.de

20060. Bruno, C.G.C.; Gonçalves, R.C.; dos Santos, A.; Facure, K.G.; Corbi, J.J.; Jacobucci, G.B. (2022): The relationship between sediment metal concentration and Odonata (Insecta) larvae assemblage structure in Cerrado streams. Limnetica 41(1): 27-41. (in English, with Portuguese summary) ["Metals can be incorporated into stream sediment affecting benthic invertebrate assemblages in different ways. Odonata larvae have variable tolerances to metals; sublethal levels accumulated in larval tissue can indirectly influence assemblage structure in environments with differences in types and concentrations of metals in the sediment. This research evaluated the relationship between Odonata larvae assemblages and sediment metal content in Cerrado streams. We evaluated genus composition, abun dance, richness, Shannon-Wiener (H') diversity index and Pielou's evenness index (J') of the assemblages from 12 streams. Cluster analysis was used to identify groups of streams according to sediment concentrations of Cu (copper), Zn (zinc), Ni (nickel), Fe (iron) and Mn (manganese). Canonical Redundancy Analysis (RDA) and Canonical Correspondence Analysis (CCA) were performed to determine how metals influence Odonata assemblage metrics. Cluster analysis revealed three distinct groups of streams according to metal concentration in the sediment. RDA showed a negative relation between Pielou evenness (J') and the concentration of Ni, Cu, Zn and Mn, while abundance, genus richness and Shannon-Wiener diversity were positive ly related with Fe. CCA indicated that some taxa showed an opposite relation with metal concentration, but others were more abundant in streams subjected to high metal concentrations. Although the increase in iron concentration in streams can lead to an increase in the abundance of Odonata larvae, high concentrations of coper, zinc and manganese can lead to a reduction in taxon evenness." (Authors)] Address: Jacobucci, G.B., Instituto de Biologia, Univde Federal de Uberlândia, Rua Ceará, 38400-902, Uberlândia, Minas Gerais, Brazil. E-mail: jacobucci@ufu.br

20061. Buczynski, P.; Walczyk, K.; Tanczuk, A.; Buczynska, E.; Bojar, P.; Góral, N. (2022): Structural and physical factors as predictors of the species distribution and diversity of dragonflies and damselflies (Odonata) in an upland storage reservoir. Folia Biologica (Kraków) 70(2): 67-78. (in English) ["The negative impact of storage reservoirs on the environment has been well documented, but it appears that under certain circumstances these reservoirs can also help to protect biodiversity. The distribution of adult dragonflies and damselflies was studied in relation to eight environmental variables, in an upland storage reservoir and its feeder rivers located in South-East Poland (East-Central Europe). A total of 25 species were recorded, including 22 in the reservoir. Submerged and floating plants, width of the shallow littoral zone and the water movement/current were found to be the key drivers of the species distribution (pCCA, NMDS). Five species (Ischnura elegans, Sympetrum sanguineum, Platycnemis pennipes, Calopteryx splendens and Erythromma viridulum) were responsible for over 70% of the dissimilarities between the riverine and reservoir sites (SIMPER). In addition, I. elegans, Orthetrum albistylum and Calopteryx virgo were distinguished as the indicator species (IndVal analysis) for the upland river-reservoir hydrological system. Our results highlight some design features of reservoirs that may help to maintain the diversity of odonates, as well as many other groups of aquatic organisms, as the former are well-known indicators of general biodiversity." (Authors)] Address: Tanczuk, Agnieszka, Dept of Zoology and Nature Protection, Institute of Biological Sciences, Maria Curie-Sk³odowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: atanczuk@gmail.com

20062. Casanueva, P.; Hernández, M.A.; Nunes, L.; Sánchez-Sastre, F.L.; Campos, F. (2022): Variation of larval size and adult emergence period of Boyeria.irene (Fonscolombe, 1838) (Odonata: Aeshnidae) in the Francia River of western Spain. Aquatic Insects 43(1): 41-50. (in English) ["B. irene is a large dragonfly common in rivers and streams in southern Europe, but it is little known about the biometrical variations of their populations. In this paper, we test whether the time of the emergence period of this species differs in the same river, whether the larval size varies during the emergence period, and whether the distinct size variations are associated with the different river sections. Results have revealed that 1) female exuviae are larger than those of males, 2) except for the paraproct length, the exuviae have similar size across the entire river length, 3) size of the exuviae is larger in the first period of emergence than in the second one. A difference in emergence duration across the three river sections has been recorded." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, 47012 Valladolid, Spain. Email: pcasanueva@uemc.es

20063. Cham, S. (2022): Observations of behaviour and activity patterns of Somatochlora metallica (Vander Linden) (Brilliant Emerald) at sites in England.. Journal of the British Dragonfly Society 38(1): 27-46. (in English) ["Observations of Somatochlora metallica (Vander Linden) (Brilliant Emerald) at sites in England show behaviour and activity patterns that differ from those described in UKfield guides and other publications. During periods of favourable weather, males start patrolling territories earlier in the day than previously reported. Digital photography provides a means to identify the species in flight and differentiate between different individual males. The durations of patrolling and hovering flight and the causes of changes in male territorial behaviour are discussed." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Bedfordshire, SG16 6LQ, UK. Email: stevecham1@aol.com

20064. Chandra, K.; Gupta, D. (2022): Biodiversity issues and challenges: Non-agricultural insects. Shalinder Kaur, D.R. Batish, H.P. Singh, Ravinder Kohli (Eds.): Biodiversity in India: Status, Issues and Challenges. Springer: 285-324. (in English) ["With more than one million named species, insects are the most diverse terrestrial creatures on the planet, representing around 75% of the global fauna. They

contribute to invaluable ecosystem functions such as nutrient cycling, pollination, and seed dispersals and serve as a significant food source, aid in biocontrol of other organisms (such as predators, parasites), and maintain soil structure and fertility. Meantime, they are profoundly beneficial as pollinators. They often compete with humans, as pests of agriculture and stored products and as vectors of life-threatening diseases. Owning four of the globally recognised biodiversity hotspots—Himalaya, Indo Burma, Western Ghats and Sri Lanka, and Sundaland—India is represented by 67,111 insect species in four classes of subphylum Hexapoda: Collembola (345 species), Protura (20 species), Diplura (18 species), and Insecta (66,728 species), 64.8% of the overall faunal diversity of the country. Eight insect orders — Coleoptera, Lepidoptera, Hymenoptera, Diptera, Hemiptera, Orthoptera, Thysanoptera, and Odonata — form the majority (94%) of the insects in the country. This chapter further updates India's known insect diversity, emphasising its diversity in ecosystems (such as aquatic, mangroves, soil, and forests) and biogeographic zones (Himalaya, Trans-Himalaya, Desert, and Islands). Additionally, information has been provided on the potential of insects in food security, pollination, forest pests, and their significance to medical and veterinary in context with Indian fauna. The chapter also includes a list of 27 insect species identified as invasive aliens in India and reports 22 species as threatened in the IUCN Red List from India." (Authors)] Address: Chandra, K., Zoological Survey of India, Kolkata, West Bengal, India

20065. Chandran, A.V. (2022): Observations of dragonflies and damselflies from an urban backyard in central Kerala. Zoo's Print 37(2): 9-15. (in English) ["A total of 131 individual odonates belonging to 22 species and three families were recorded from 78 observations. Odonate sightings showed a peak in the month of October. No odonate could be observed in the months of July, January, and February. While Pantala flavescens and Rhyothemis variegata were the most abundant species and could be observed in five months, 10 of the 22 species reported were seen only once during the study. Out of the 80 individuals that could be sexed, 50 were males and 30 females. Among the males, eight individuals could be identified as immature from their pigmentation. This included three individuals of Orthetrum chrysis and one individual each of Diplacodes trivialis, Aethriamanta brevipennis, Pseudagrion malabaricum, Urothemis signata, and Brachydiplax sobrina. Bradinopyga geminata was the only species that displayed sexual behaviour at the study site, a pair of which was seen mating and egg laying in one of the synthetic tanks during the month of April. Three exuviae and five nymphs were seen in the tank. The study recorded 12% of the total odonate species recorded from Kerala till date (Society for Odonate Studies 2020). It can be assumed that except for Bradinopyga geminata which was observed to complete its life cycle at the site, most other odonates visited the site in their pre-reproductive adult stage when their primary activity is foraging. Observations of males with incomplete adult pigmentation and absence of post-reproductive adults (old individuals with pruinescence/ broken wings) support to this assumption. Maximum number of individuals was detected in October. This is mostly due to the influx of large numbers of the migratory dragonfly, Pantala flavescens in this month. Number of species recorded was also maximum (10) in October, consistent with earlier studies that show detection of maximum number of odonate species in the post monsoon period (Kulkarni & Subramanian 2013). Since the behaviour of adult males and females differs greatly, it can be nearly impossible to obtain precise measures of sex ratio during the adult stage. The excess number of males detected (62.5% of the sexed individuals) in this study could be because of variability in dispersal of the sexes or their differential detectability, most female odonates being cryptic and males more colourful. Although urban sites host an abundance of generalist species of odonates, there are some specialist species that can also find refuge in urban habitats. Pseudagrion malabaricum is a species known to breed in small lakes in submontane and montane areas (Fraser 1933). Sighting of such species deserves special mention as it highlights the importance of the freshwater-woodland matrices in urban areas in the conservation of odonates." (Author)] Address: Chandran, A.V., Dept Geol. & Environmental Science, Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala, India. Email: avivekchandran2@gmail.com

20066. Cheng, S.; Lin, H.; Li, M.; Li Y. (2022): Study on the relationship between environmental changes and breeding sites of Larus relictus in Hongjiannao Lake. Quaternary Sciences 42(4): 1201-1212. (in Chinese, with English summary) ["Hongjiannao Lake(38°59'59''~39°10'01''N, 109°45'-16''~109°59'58''E) is located at the main route of migrant birds in China and is the main spot for resting and reproduction of many types of rare waterfowl, such as Larus relictus, at the junction of Shenmu City, Shaanxi Province and Ordos City, Inner Mongolia Autonomous Region. In this study, in order to further improve the protection of Larus relictus, using the Modified Normalized Differential Water Index (MNDWI), 20 Landsat remote sensing images during the breeding period between 1987 and 2006 were used to extract Hongjiannao Lake island area and water area. Secondly, in 2015, 2016, and 2020, we came to Shenmu City, Shaanxi Province Nature Reserve for field research and data collection, and we sampled the water quality and benthic animals in the lake center and lakeside, which the water quality monitoring indicators is including pH, total nitrogen, total phosphorus, permanganate index, total alkalinity, salinity, etc. This research analyzes the changes of the ecological environment of Hongjiannao Lake, breeding conditions, and the change of Larus relictus breeding sites in the past 30 years, and explores why Larus relictus choose Hongjiannao Lake as a breeding site since 2001. The results show that: (1) Since the 1980s, with the shrinkage of water surface area, the pH, salinity, total nitrogen and total phosphorus of Hongjiannao Lake have increased, continuously salinized and eutrophicated. The fish in the lake disappeared after 2003 and improved slightly with the increase of water surface area after 2016; (2) Since 2001, Larus relictus has taken Hongjiannao Lake as a new breeding ground, which is closely related to the sharp decline and gradual disappearance of fish production in Hongjiannao Lake, which has liberated the Larus relictus food such as Ischnura heterosticta larvae and Chironomidae larvae from the grazing pressure; (3) Hongjiannao Lake is located in the distribution area of Larus relictus in Ordos. The parent birds of Larus relictus first moved out and scattered in the distribution area of Larus relictus in late July, which is qualified for the discovery of Hongjiannao Lake; (4) Since 2001, Hongjiannao Lake has had the conditions for the reproduction and survival of Larus relictus, which can provide suitable lake-center island and main food source for the whole breeding season, so it has been selected as a breeding site. These studies can better explain the reasons why Larus relictus inhabits in desert saline-alkaline lakes, which can provide technical support for its habitat management, and are of great significance to further protect Larus relictus." (Authors)] Address: Cheng, S., School of Earth Science and Resources, Chang'an University, Xi'an 710054, Shaanxi, China

20067. Chovanec, A, (2022): Populationsdynamische Prozesse bei der Großen Heidelibelle Sympetrum striolatum (CHARPENTIER, 1840) an einem kleinen, schnell zuwachsenden Feuchtgebiet in Niederösterreich (Odonata: Libellulidae). Naturkundliche Mitteilungen aus den Landessammlungen Niederösterreich 32: 21-40. (in German, with English summary) ["Population dynamics in S. striolatum at a small, quickly becoming overgrown wetland in Lower Austria): A small permanent wetland, unintentionally created in 2014, was subject of a study on the succession of the Odonata fauna carried out from 2016 to 2021. In 2016, with approximately 150 individuals, S. striolatum was the most abundant anisopteran species within the odonate community. Tenerals and/or exuviae of this species were detected from 2016 to 2020. The rapid development of dense helophyte stands led to the complete loss of open water areas and to a decline of the numbers of individuals of the Common Darter (maximum yearly numbers: 2017 – 25; 2018 – 25; 2019 – 20; 2020 – 13; 2021 – 6). Although occurring in signifi cantly lower numbers of individuals, also in 2017–2020, Sympetrum striolatum was the most abundant anisopteran species. In the years 2020 and 2021, S. striolatum was present at the wetland during a shorter time compared to the years before and to the species-specific flight period: 2016 – 24 weeks; 2017 – 19.5 weeks.; 2018 – 19 weeks; 2019 – 17.5 weeks, 2020 – 10 weeks; 2021 – 4 weeks. In 2019 and 2020, a decline in the frequency of egg deposition behaviour following preceding copulation was obvious. In 2021, only pairing behaviour, but no egg deposition behaviour was observed. Key stimuli inducing and factors limiting egg deposition behaviour in S. striolatum are discussed." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bmlrt.gv.at

20068. Crabot, J.; Mauchamp, A.; Bergerot, B.; Bonis, A.; Gore, O.; Rossignol, N.; Paillisson, J.-M. (2022): How hydrology and landscape shape Odonata assemblages in marshlands crossed by ditches. Freshwater Biology 67(7): 1228-1241. (in English) ["1. One of the major current ecological challenges is to understand how to reconcile human activities with biodiversity conservation concerns. This issue is particularly relevant in freshwater ecosystems where biodiversity is globally under severe threat. Artificial waterbodies, such as ditch networks, are part of the few remaining wetlands in agricultural landscapes and hence play a crucial role in maintaining aquatic biodiversity in these landscapes. 2. We investigated the responses of adult Odonata assemblages at different spatial scales in a marshland crossed by ditches to two factors expected to be pivotal influences on assemblages. At the local scale, this was mainly the water regime in ditches and, at a broader scale, the composition of the landscape. Both taxonomic alpha and beta diversity, and functional trait composition were considered as response variables. 3. Significant differences were found between the responses of the two Odonata suborders. We showed that Zygoptera species richness decreased and species turnover increased with the duration of drying episodes in ditches. Geographical distances between local assemblages as well as landscape characteristics, notably woodland cover, meadow cover and ditch network length, also significantly shaped the distribution of Zygoptera. For Anisoptera, species richness was not explained by environmental variables and beta diversity was associated only with local conditions; it increased with increasing dissimilarity in water quality and riparian vegetation. We also found evidence of functional trait syndromes (combinations of correlated traits) in Odonata assemblages, but without clear relationships to environmental gradients. 4. This study reveals the structuring role of water regime for Odonata in ditch networks and demonstrates the need to jointly consider environmental variables at different spatial scales to properly understand the distribution of Odonata. 5. Our findings have important conservation implications as the water regime is heavily managed in such ecosystems. Even though the relationship between functional composition and environmental gradients was found to be of limited extent in this study, we discuss how it might provide new insights for Odonata assemblage structure and be useful, locally, for stakeholders and managers. Lastly, we call for further multiscale investigations considering both the taxonomic and functional responses of Odonata assemblages (functional analyses with multiple traits and several species being scarce in this taxonomic group) in other anthropogenic freshwater ecosystems to gather more lessons for their conservation." (Authors)] Address: Crabot, Julie, Univ. Clermont Auvergne, CNRS, UMR GEOLAB, 63000 Clermont-Ferrand, France. Email: julie.crabot@gmx.fr

20069. Craves, J.A.; Cognato, A.I.; O'Brien, D.; Mahoney, M.J. (2022): A new locality and unexpected haplotypes of the federally-endangered Hine's Emerald dragonfly, Somatochlora hineana (Odonata: Corduliidae). Bulletin of American Odonatology 13(2): 7-17. (in English, with Spanish summary) ["In June 2021, two female S. hineana (Hines Emerald) were collected in Oceana County, Michigan, a location >100 km from the nearest known populations. This is a region apparently lacking sizable areas of characteristic S. hineana habitat: fens or similar calcareous wetlands with shallow soils over dolomite or limestone bedrock. Phylogenetic analyses of mitochondrial haplotypes confirmed species identity and revealed that each individual represented a different haplotype. Neither haplotype had been previously represented in Michigan, northern Wisconsin, or Ontario populations, and one was new. Our finding of these two haplotypes suggests a S. hineana population occurs in west-central Michigan which may genetically link southern and northern Great Lakes populations. Continued surveys for S. hineana are needed to confirm the presence of an established population in this region. If discovered, it will provide valuable data that will further our understanding of the genetic diversity and population dynamics of this species." (Authors)] Address: Craves, Julie, 2200 Centennial Ln., Ann Arbor, MI, 48103 USA. Email: jcraves@umich.edu

20070. da Silva-Méndez, G.; Riso, S.; Lorenzo-Carballa, M.O.; Cordero-Rivera, A. (2022): Sampling larvae, exuviae or adults of Odonata for ecological studies: a test of methods in permanent rivers in the Iberian Peninsula. Odonatologica 51(1-2): 63-81. (in English) ["To assess the suitability of a habitat for breeding by odonates, the best strategy is to search for exuviae or final instar larvae. However, due to their low detectability and the difficulty of sampling these stages, most studies in applied ecological research have targeted adult odonates, even though adults may be found in places unsuitable for successful breeding. Here, we tested odonate sampling methods in permanent rivers in the north-western Iberian Peninsula, focusing on three main objectives: (i) to study the degree of concordance of species lists obtained from sampling larvae, exuviae and adults; (ii) to estimate how long exuviae are available for sampling and how this time affects the results; and (iii) to analyse potential observer biases, due to the different ability of researchers to detect exuviae. We found that the time exuviae remain in place varies with taxon but is generally short (7–8 days), which could lead to under-detection. We also found that adult odonates may be found in parts of the river that have

no suitable habitat for their larvae. Furthermore, we were able to find more species as exuviae than by sampling adults or larvae and some taxa, such as gomphids, were difficult to find as adults but exuviae were very commonly observed. We did not find significant differences between observers in their ability to detect and identify exuviae. Altogether, our results suggest that in some systems, recording only adults could lead to inaccurate survey results, making it essential to include exuviae to avoid sampling bias." (Authors) Supplement: https://www.odonatologica.com/wp-content/uploads/2022/06/10.5281_odon.v51i1-2.s1-Silva-Mendez_et_al.pdf] Address: Cordero Rivera, A., Depto de Ecoloxia e Bioloxia Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

20071. Dalvi, A.; Koli, Y. (2022): New records of odonates (Insecta: Odonata), Archibasis oscillans Selys, 1877 and Merogomphus tamaracherriensis Fraser, 1931 from Maharashtra, India. Journal of Threatened Taxa 14(2): 20648-20653. (in English) ["Archibasis oscillans Selys, 1877 is reported for the first time from Maharashtra, India; and first record of Merogomphus tamaracherriensis Fraser, 1931, based on photographic evidence taken from Sindhudurg, Maharashtra. We report the range extension of both the species in the northern Western Ghats." (Authors)] Address: Dalvi, A., Dept of Zoology, Sant Rawool Maharaj College Kudal, Sindhudurg, Maharashtra 416520, India. Email: asdalvi25@gmail.com

20072. Das, S.M.; Gogoi, T.; Phukon, M. (2022): A checklist of Odonata (Insecta) of Dibrugarh district of Assam, India. Journal of Entomology and Zoology Studies 10(4): 155-164. (in English) ["Dibrugarh district of Assam is situated to proximity to the junction of Eastern Himalayas and Indo-Burma Biodiversity Hotspots. Climatic conditions of the district support a very rich biodiversity, where Odonata are an important component. The present study was carried out in Dibrugarh district to document the status and distribution of odonates from April, 2019 to May, 2022. A total number of 81 species of odonates representing 54 genera and 11 families have been recorded in this study. Conservation status of the recorded species indicates that 69 species were under the category of Least Concern (LC), 7 species were Data Deficient (DD) and 1 species was Not Evaluated (NE). However, habitat destruction due to lack of awareness among the local people is the potential threat to the conservation of odonates in the district." (Authors)] Address: Das, S.M., Dept of Biology, Guru Teg Bahadur Academy, Tinsukia, Assam, India

20073. Datto-Liberato, F.H.; Guillermo-Ferreira, R. (2022): A new species of Gomphoides Selys, 1854 (Odonata: Gomphidae) from the Environmental Protection Area of the Uberaba River, Brazil. Zootaxa 5165(2): 287 -293. (in English) ["A new species of the Neotropical dragonfly genus Gomphoides Selys, 1854 (Odonata: Gomphidae) is erected from the Cerrado of central Brazil, distinguished by epiproct morphology, body coloration and wing venation. Gomphoides davi Datto-Liberato & Guillermo-Ferreira sp. nov. resembles G. perdita (Förster, 1914), but is distinguished from it by the S10 black, while it is yellow in G. perdita; four cells in the subtriangle of Fw while there are three cells in G. perdita and epiproct shorter than half of the length of cerci while epiproct is more than half the length of the cerci in G. perdita. We also provide additional information for other Gomphoides species. The discovery of a new species in the Environmental Protection Area of the Uberaba River, Minas Gerais, raises concern for the conservation of the biodiversity of the area, mainly because of recent threats due to cattle herding and agriculture." (Authors)] Address: Datto-Liberato, F.H., Graduate Program in Entomology, Dept Biol., Univ. São Paulo (USP), Ribeirão Preto, Brazil. Lestes Lab., Federal Univ. of Triângulo Mineiro, Uberaba, MG, Brazil

20074. Datto–Liberato, F.; Cezário, R.; Guillermo–Ferreira, R. (2022): Final instar larva of Neocordulia volxemi (Selys, 1874) (Odonata, Libelluloidea) from southeastern Brazil. Animal Biodiversity and Conservation 45.2: 281-285. (in English, with Spanish summary) ["Only seven larvae of this genus have been described. Here we describe the final instar larva of N. volxemi, collected in the Environmental Protection Area of the Uberaba River Basin in the State of Minas Gerais, Brazil. The metallic–green adults were found flying in a forested area in a Conservation Unit, while the larvae were found in a waterfall and surrounding rocky walls. The Cerrado remnant area is currently threatened by degraded pastures and increasing areas of monoculture agriculture." (Authors)] Address: Guillermo–Ferreira, R., Graduate Program in Entomology, Dept of Biology, University of São Paulo–USP, Ribeirão Preto, Brazil Email: rhainer.ferreira@uftm.edu.rbr

20075. De Knijf, G.; Lambrechts, J.; Maes, D. (2022): A new Red List of the dragonflies and damselflies in Flanders. A dramatic decline of Odonata species of bogs and heathland ponds. Natuurfocus 21(2): 52-61. (in Dutch, with English summary) ["The IUCN Red List criteria are intended to be an easily and widely understood system for classifying species the extinction risk of species in a given region. Because many new data of Odonata in Flanders have become available and the status of several species has changed since the previous Red List from 2006, we assessed the current state of dragonflies according to the IUCN Red List criteria. Of the 59 evaluated species, 15 species are Threatened and 1 is Near Threatened in Flanders, 5 species are Regionally Extinct and 43 species are of Least Concern. Overall dragonflies and damselflies in Flanders are doing better than in previous decades. This is mainly due to species of nutrient-rich waterbodies that are doing markedly better as a result of habitat restoration, creation of new ponds (e.g. garden ponds) and waters in an urban or industrial context, and to southerly species that benefit from climate warming. However, species from nutrient-poor waterbodies (fens, peatbogs and other oligotrophic waters) continue to perform poorly and deserve special attention in nature policy and nature management. Populations of several species decreased dramatically in the last five years. They are negatively affected by very high nitrogen depositions, the presence of invasive fish species, increased warm weather and extreme drought events leading to (partial) desiccation of these kinds of waters, and in many cases from too intensive management of their terrestrial habitat, resulting in the cutting of shrubs and trees near their reproductive biotopes. The drawing up of one or more Species Action Plans is therefore more than urgently needed to prevent the extinction of these species in Flanders." (Authors)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

20076. De Lisle, S.P.; Mäenpää, M.I.; Svensson, E.I. (2022): Phenotypic plasticity is aligned with phenological adaptation on both micro-and macroevolutionary timescales. Ecology

Letters 25(4): 790-801. (in English) ["In seasonally variable environments, phenotypic plasticity in phenology may be critical for adaptation to fluctuating environmental conditions. Using an 18-generation longitudinal dataset from natural damselfly populations, we show that phenology has strongly advanced. Individual fitness data suggest this is likely an adaptive response towards a temperature-dependent optimum. A laboratory experiment revealed that developmental plasticity qualitatively matches the temperature dependence of selection, partially explaining observed advance in phenology. Expanding our analysis to the macroevolutionary level, we use a database of over 1-million occurrence records and spatiotemporally matched temperature data from 49 Swedish Odonate species to infer macroevolutionary dynamics of phenology. Phenological plasticity was more closely aligned with adaptation for species that have recently colonised northern latitudes, but with higher phenological mismatch at lower latitudes. Our results show that phenological plasticity plays a key role in microevolutionary dynamics within a single species, and such plasticity may have facilitated post-Pleistocene range expansion in this insect clade." (Authors)] Address: De Lisle, S.P., Evolutionary Ecology Unit, Dept of Biology, Lund University, Lund, Sweden. Email: stephen.de_lisle@biol.lu.se

20077. de Souza, M.M.; de Gouvêa, T.P.; de Deus, G.L.; de Ávila Júnior, W.F. (2022): Depredación de Allopodagrion contortum (Hagen en Selys, 1862) por Heliocharis amazona Selys 1853 (Odonata) en un ambiente de Cerrado, Minas Gerais, Brasil. Hetaerina. Boletín de la Sociedad de Odonatología Latinoamericana 4(2): 12-15. (in Spanish, with Portuguese summary) ["Dragonflies are predatory insects in both juvenile and adult stages of their life cycle. However, records of predation among adults of different species are hampered by their flight mobility, which makes such records relevant. The aim of this paper is to report the predation behaviour of Heliocharis amazona Selys, 1853 on the adult stage of the species A. contortun in a Cerrado area in the State of Minas Gerais, being the first record for these species, presenting similarity with a previously reported pattern." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: de Souza, M.M., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas Gerais, Campus Inconfidentes, Inconfidentes, Brasil

20078. Deitsch, J.; O'Grady, P. (2022): A catalog of Odonata material in the Cornell University Insect Collection. Technical report. Datum: 2022-09-27: 265 pp. (in English) ["Museum collections are important to document historical and present-day species distributions and abundance. Tracking insect declines and asssessing ecosystem health using insect biomonitoring requires accurate species identifications, up-to-date species catalogs, and digitization and georeferencing of label data. We present a comprehensive, updated catalog of Odonata species present in the Cornell University Insect Collection. We also provide digitized and georeferenced records for seven widespread odonate species to demonstrate the value of historical museum collections." (Authors) https://ecommons.cornell.edu/bitstream/handle/-1813/111854/Deitsch%26OGrady_CeCom.pdf?sequence-=4&is Allowed=y] Address: not stated

20079. del Palacio, A.; Lozano, F.; Ramos, L.S.; Navarro, M.; Muzón, J. (2022): Odonata from Iberá wetland system (Corrientes, Argentina) are regional biogeographic schemes useful to assess Odonata biodiversity and its conservation? Diversity 2022, 14(10), 842; https://doi.org/10.3390/-d141-00842: 15 pp. (in English) ["Regionalization schemes reflect different macroscale distribution patterns and show large areas characterized by a common natural history, resulting in similar associations of biotic and abiotic features. Freshwater biota and terrestrial biota do not respond in the same way to environmental variables. The Iberá Depression, one of the largest wetlands in South America, is recognized in many schemes either as a functional unit or as an area with an ecotonal character. We used the distributional data of 128 species of Odonata, from a total of 103 collection sites from Corrientes and Misiones provinces, to test if Iberá functions as an ecological and functional unit, based on the Odonata distribution patterns. In addition, we tested if their distribution patterns fit into the most widespread regionalization schemes (hydrological basins, biogeographical provinces and ecoregions) used in Argentina. The Iberá Depression was not recovered as a functional unit; its sub-basins are more related to external basins than to each other. Neither the ecoregion nor the biogeographical schemes are suitable to explain the distribution patterns of the Odonata. The Odonata seem to respond to the availability of particular wetlands (e.g., ponds, streams, rivers, swamps, etc.), or to specific physical characteristics, such as the type of sediment, the availability of oxygen, etc., instead of to biogeographical or ecoregional schemes." (Authors)] Address: Muzón, J., Laboratorio de Biodiversidad y Genética Ambiental—BioGeA, Universidad Nacional de Avellaneda, Avellaneda B1870, Argentina. Email: jmuzon@undav.edu.ar

20080. Deliry, C. (2022): Odonates en France. Histoires Naturelles 65: 388 pp. (in French) [https://deliry.net/pdf/HN-65.pdf] Address: Deliry, C.; Email cyrille.deliry@orange.fr

20081. Dey, A.; Dey, D. (2022): Odonata richness in RAMSAR site, Deepor Beel, Assam, India. Bione 20: 17 pp. (in English) ["The study was conducted in the Deepor beel wetland for 18 months from January 2015 to mid june 2016. The Deepor beel is a RAMSAR site located (longitude 910 38 35 E and latitude 260 07 30 N) in the Kamrup district of Assam and is owned by the State Fisheries Dept. Odonates are boon for the environment. They act as a biological indicator of a healthy aquatic ecosystem and also act as a biocontrol agent, as adult odonates prey on flies and mosquitoes which are parasites and pests of men and animals. During the present study, eight Anisopteran (Family: Libellulidae) and three Zygopteran (Family: Coenagrionidae) species could be found in and around the Deepor beel wetland site. Shurb land found to be the most favourable habitat for the odonates. The present findings showed that the study area is biologically active to contain divergent species of odonate fauna. However, a detailed environmental study is necessary so that the habitat of the odonates could be protected and conserved in situ against the increasing level of pollution, as less number of divergent species were recorded in the present study compared to previous surveys." (Authors) Anisoptera: Trithermis pallidinervis, Orthetrum sabina, Diplacodes trivialis, Brachydiplax chalybea, Brachythemis contaminata, Rhodothemis rufa, Neurothemis fulvia, Brachydiplax sobrina. Zygoptera: Agriocnemis lacteola, Ceriagrion cerinorubellum, Onychargia atrocyana] Address: Dey, A., Dept of Microbiology, Assam University, Silchar - 788011 Assam, India. Email: dey_ankita@outlook.com

20082. Dijkstra, K.-D.; Cohen, C. (2022): Dragonflies and damselflies of Madagascar and the western Indian Ocean islands. Association Vahatra in Antananarivo: 194 pp. (in Bilingual in French and English) ["A highly illustrated guide to the spectacular dragonflies and damselflies of the Malagasy Region. This is the first book on the spectacular dragonflies

and damselflies of the Malagasy Region, covering over 190 species known from Madagascar, as well as thirty-six additional species found in the archipelagos of the Comoros, Mascarenes, and Seychelles. About 180 species, four of every five present, live nowhere else on Earth. Over 205 photographs illustrate 138 species, many in print for the first time." (Publisher) Contents: Table of contents; Acknowledgements; Part 1. An overview of the regional Odonata fauna; Introduction; Diversity and endemism; History; Conservation; Finding Odonata; Collecting adults; Collecting larvae and their skins; Identification; Glossary of terms; Part 2. The Odonata of the Malagasy Region; Introduction; Damselflies - Zygoptera; True dragonflies – Anisoptera; References; Index.] Address: Orders: Natur in Buch und Kunst, Verlag und Versand, Dieter Prestel, Beiert 11a, 53809 Ruppichteroth, Germany. Email: Prestel-Dieter@web.de

20083. Dijkstra, K.-D.B.; Tate, R.B.; Papazian, M. (2022): Chapter 14 Dragonflies and Damselflies (Odonata) of Príncipe, São Tomé, and Annobón. In: L.M. Pires Ceríaco et al. (eds.), Biodiversity of the Gulf of Guinea Oceanic Islands, https://doi.org/10.1007/978-3-031-06153-0_14. 371-381. (in English) ["The Odonata fauna of the oceanic islands of the Gulf of Guinea is impoverished, even compared to other Afrotropical archipelagoes, with a combined total of 22 species recorded with certainty on São Tomé, Príncipe, and Annobón. Trithemis nigra Longfield, 1936 from Príncipe is the only known endemic, although two reported but unidentified species may still prove to be endemic too. Most recorded species occur widely across and beyond Africa, and 27 equally widespread species are listed as potential additions. Several hypotheses for the fauna's impoverishment are briefly discussed." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: kd.dijkstra@naturalis.nl

20084. Dinning, J.; Stockan, J.A.; Fielding, D.A.; Young, M.R. (2022): Habitat suitability for Coenagrion hastulatum (Charpentier) (Northern Damselfly) in North-east Scotland. J. Br. Dragonfly Society 38(1): 47-64. (in English) ["C. hastulatum is a widespread and abundant species in northern Eurasia but in Great Britain it is classed as Endangered with a distribution restricted to north-east Scotland. Even within north-east Scotland, populations remain small and scattered. There has been no long-term monitoring for C. hastulatum but there are concerns that it may have been lost from some historic locations. Similarly, there have been no quantitative studies into the habitat preferences of C. hastulatum in Great Britain. An extensive survey was made of ponds in Aberdeenshire in 2016 and the presence or absence of C. hastulatum was analysed in relation to a wide range of habitat variables. The results showed that C. hastulatum was associated with eight habitat variables: positively correlated with water and silt depth, Juncus acutiflorus, Carex rostrata and Sphagnum, and negatively correlated with J. bulbosus and floating and emergent vegetation cover. These results provide a preliminary indication of C. hastulatum's preferences in north-east Scotland which will aid further investigations, including the current British Dragonfly Society project on C. hastulatum (British Dragonfly Society, 2019)." (Authors)] Address: Dinning, Juliette, 143 Gairn Terrace, Aberdeen AB10 6AY, 2 Ecological Sciences, James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, 3 Meiklepark, Oldmeldrum, Aberdeenshire AB51 0DL

20085. Devi, M.; Walia, G.K. (2022): DNA barcoding based on mitochondrial COI gene on some species of family Platycnemididae (Odonata: Zygoptera) from India. International Journal of Multidisciplinary and Current Research 10: 19-28. (in English) ["Taxonomically, family Platycnemididae comprises 455 species referable to 43 genera all over the world, while 52 species of 14 genera are present in India. COI gene analysis of 11 species under 6 genera of family Platycnemididae from the states of Himachal Pradesh, Jammu and Kashmir, Kerala, Maharashtra and Meghalaya (India) has been done. The overall data has been used to calculate the sequence divergence at different taxonomic levels in the family Platycnemididae, which shows the hierarchial increase in the K2P values. In the present study, maximum intraspecific distance has been observed as 1.7% in C. marginipes, while the only exception is Coeliccia didyma, which shows intraspecific distance of 5.2%. Minimum interspecific distance has been observed as 3.4% in Coeliccia cyaneothorax and Coeliccia nemoricola, while maximum average interspecific distance has been recorded as 18.6±0% in Calicnemia chaseni and Calicnemia eximia, the only exception with very less distance (0.4±0.1%) in Coeliccia chromothorax and Coeliccia renifera. Intergeneric divergence has been calculated for all the 6 genera based on K2P distances. The most distant genera have been found to be Calicnemia and Disparoneura with average K2P distance of 24.2±1.2%, while Calicnemia and Coeliccia are the closest genera with K2P distance of 17.5±3.5%." (Authors) Calicnemia eximia, Coeliccia chromothorax, C. didyma, C. fraseri, C. renifera, Copera marginipes, C. vittata, Disparoneura quadrimaculata, Esme cyaneovittata, E. longistyla, Prodasineura verticalis} Address: Devi, Monika, Assistant Professor, Trinity College Jalandhar, Punjab-144009, India

20086. Dissanayaka, H.M.S. (2022): Geo-spatial Analysis about Habitat Preferences of Odonata within the Diyasaru Wetland Park, Sri Jayewardenepura Kotte, Sri Lanka. Proceedings of the 26th International Forestry and Environment Symposium / Biodiversity Conservation and Management 26: 33- (in English) [Verbatim: "The Odonata (dragonflies and damselflies) have both aquatic and terrestrial life cycle and are considered good bio indicators. Diyasaru Wetland Park was selected as the study site is located in Sri Jayewardenepura Kotte and the main objective of this study was to identify the distribution of Odonata habitats in the Diyasaru Wetland Park. It was determined to identify the best suitable parts of urbanized area to increase their habitats using the developed distribution map. Line transect surveys were used to encounter species within the sampling areas. All Odonata species observed directly were recorded. The data collection was carried out from 0600 h to 1200 h, 1500 h to 1800 h. Field work was conducted from 11th February 2020 to 20th January 2021. Endeavor ED binoculars (10.5×45), DSLR cameras (Canon EOS 155D/EFS 18-55 mm F/3.5-5.6), Garmin GPS etrex 10 machine were used for closure observations, spotting locations and obtaining photographs. Odonata habitats have been identified, analyzed to identify their distributions within the park premises from using Geographic Information system (ArcGIS 10.8), and Odonata checklist was developed. Hotspot analysis was used to determine the clustering of Odonata, Kernel Density was calculated to identify the density of Odonata's distribution, and Inverse Distance Weighted (IDW) was used to measure values surrounding the prediction locations maps within the park. According to the developed maps, high level distribution or favorable areas were near the bank sides and channels, but some individual species distributed in another areas within the premises as they prefer the most suitable habitat for their living activities. A total

of 33 Odonata species were recorded belong in to five (5) families. This number includes one (1) endemic species, two (2) endemic sub species, also one migratory species. The threatened are Endangered (EN) one (1) species, Vulnerable (VU) two (2) species and Near Threatened (NT) nine (9) species were observed in the area. The wandering glider (Pantala flavescens) which has both migratory and resident population has been recorded throughout the year. Indicating the presents of resident population. The findings of this study could be used as preliminary information for further developments and maintenance of the Diyasaru wetland park by Sri Lanka Land Development Corporation." (Author)] Address: Dissanayaka H.M.S., Dept of Geography, Univ. of Sri Jayewardenepura, Nugegoda, Sri Lanka

20087. Doucet, G.; Jacquot, P.; Gayet, P. (2022): Lestes barbarus en Bourgogne-Franche-Comté: dynamique spatio-temporelle de l'espèce entre 2001 et 2020 et premières mentions d'émergence. Martinia 36(3): 22-33. (in French, with English summary) ["L. barbarus in Bourgogne-Franche-Comté: spatio-temporal dynamics of the species between 2001 and 2020 and first records of emergence. Observations of L. barbarus are more and more numerous in Bourgogne-Franche-Comté with, on some stations, data recorded for several consecutive years which suggests that the species has settled down in the region. The observation of emergences and the collection of exuviae in two Depts (Saône-et-Loire and Côte-d'Or) reinforce the impression of a perennial installation of the species in this area." (Authors)] Address: Gayet, P., 3 route de Perrigny, 71620 Guerfand, France. Email: gayet-philippe@orange.fr

20088. Duffus, N.E.; Morimoto, J. (2022): Current conservation policies in the UK and Ireland overlook endangered insects and are taxonomically biased towards Lepidoptera. Biological Conservation 266: 11 pp. (in Emglish) ["Highlights: • UK policies show biases toward Lepidoptera over other large insect orders. Policy protection of mammals shows greater uniformity between orders than insects. Policies in Ireland lack protection for any insect species. UK priority lists do not prioritise all insects assessed as at risk of extinction. Abstract: Insects provide key ecosystem services for our sustainable future, which rely upon effective conservation policies to protect insect biodiversity. To date, however, we still do not know how effective current conservation policies are for protecting insect biodiversity, opening up the possibility that policies are unfit-for-purpose. Given the considerable debate and public awareness on the potential global decline of insect species, it is important to understand whether or not current policies can protect insect biodiversity. Here, we used IUCN listing of species status and developed a quantitative framework to analyse the potential effectiveness and coverage of current conservation policies pertaining to insect biodiversity in the UK and Ireland. We contrasted this against coverage for a well-known group – mammals – as a benchmark, to find that while the vast majority of the UK mammalian species in the European IUCN red list are directly protected by current policies, insects remain largely unprotected. Moreover, for those insect species that are explicitly protected by current policies, there is a taxonomic bias whereby the majority (>50%) of insect species are Lepidopterans (moths and butterflies), while a minority are Coleopterans (beetles), and none are Hymenopterans (bees, ants, wasps). Similar trends were observed in the UK priority biodiversity lists. Based on our data, we conclude that current biodiversity policies in the UK and Ireland have significant gaps in their protection of insect biodiversity and, there is a taxonomic bias that may skew some conservation efforts toward butterflies and moths. We anticipate that our findings are likely to occur worldwide, highlighting the need for more directive policies to manage and protect insect biodiversity for the sustainability of ecosystem services." (Authors)] Address: Morimoto, J., School of Biological Sciences, University of Aberdeen, Zoology Building, Tillydrone Ave, Aberdeen AB24 2TZ, United Kingdom. Email: juliano.morimoto@abdn.ac.uk

20089. Dwita, U.R.; Ansori, I.; Rahman, A.; Jumiarni, D.; Ruyani, A. (2022): Pengembangan LKPD Berdasarkan Keragaman Capung Di Kawasan Danau Dendam Tak Sudah. Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi 6(1): 1-6. (in Indonesian) ["This study aims to develop a valid LKPD for high school students based on the diversity of dragonflies in the Danau Dendam Tak Sudah area. This type of research is Reseach and Devolopment which refers to the steps of research and development according to Sugiyono. The research steps are adjusted to the needs of researchers, namely potential and problems, data collection, product design, design validation, and design revision. Data collection techniques in this study were observation, questionnaire, and documentation. Data analysis techniques for dragonfly species diversity were analysed descriptively. LKPD validation test includes aspects of material, language, presentation and graphics. The results of the LKPD validation test by material experts 83.4%, media experts 90.6% and expert practitioners (biology teachers) 92.6%. Overall the average percentage of the three validators was 88.8% with the criteria "very valid". It is concluded that the design of the LKPD developed based on the diversity of dragonflies in the Dendam Tak Sudah Lake area, Bengkulu City is valid to be used as a learning resource." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: Dwita, Uci Rahma, Program Studi S-1 Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Bengkulu, Indonesia. Email: ucirahmadwitaurhd@gmail.com

20090. El Bouhissi, M.; Chaib, S.; Houhamdi, M.; Khelifa, R. (2022): Checklist of Odonata of Sidi Bel Abbes, Northwest Algeria. Hydrobiology 1(4): 433-439. (in English) ["The odonates of Algeria have been studied for more than a century and a half, but the Northwestern part of the country has historically received little attention. A recent study in central North Algeria reported a species new to the country, suggesting that new investigations in unexplored areas are necessary to fully understand the local odonatofauna. We studied assemblages of odonates in 23 sites in Sidi Bel Abbes (Northwest Algeria) by bimonthly recording adults across a 200 m-transect from May to August of 2019–2022. Our sampling yielded 29 species (13 damselflies and 16 dragonflies) belonging to 19 genera and seven families. We recorded a new locality for the regionally endangered Coenagrion mercuriale, expanding the western range limit of the species in Algeria. We documented the occurrence of Selysiothemis nigra, a species that has recently become more frequent in North Africa. Ischnura pumilio and Onychogomphus forcipatus unguiculatus, which are relatively rare in the region, were also recorded. The arid-dwelling Trithemis kirbyi and the Mediterranean endemic Orthetrum nitidinerve were quite common in the study area. This study fills an important gap of knowledge in our understanding of odonate geographic distribution in North Africa." (Authors)] Address: Khelifa, R., Biodiversity Research Center, University of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

20091. Elafri, A. (2022): New records of the endangered Calopteryx exul in a semi-arid territory of north-eastern Algeria (Odonata: Calopterygidae). Notulae odonatologicae 9(9): 451-454. (in English) ["A new locality for the endangered C. exul is reported from the Aurès mountains, Khenchela province, an eastern prolongation of the Sahara Atlas range. A total of 138 individuals of C. exul were recorded along a 20 km stretch of the Wadi Elhamma river from April to June 2021, suggesting that this species might penetrate deeper into semi-arid parts of the Atlas mountain system than currently known." (Authors)] Address: Elafri, A., Faculty of Natural and Life Sciences, Abbes Laghror University, Khenchela, Alageria. Email: alielafri@gmail.com

20092. Elmelech, L. (2022): On the role of the ventilatory wave in dragonfly larvae. Bulletin of the American Physical Society, 75th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 20–22, 2022; Indiana Convention Center, Indianapolis, Indiana. Session J05: Biological Fluid Dynamics: General. 4:35 PM–7:11 PM, Sunday, November 20, 2022. Room: 132: [Verbatim: Aquatic dragonfly larvae have various methods of ventilation in their modified hindgut chamber. One of these ventilations is chewing ventilation, which is a wavelike motion of the chamber wall. While this mode has been reported by multiple studies, its role remains unclear. In this study, we correlate the chamber wall motion with the internal and external flow to understand the role of the anteriorly propagating chamber wave in the larvae of Libellula sp. The transparency of the species allowed optical access to the internal flow and chamber kinematics. The particulates in the pond water visualized the flow inside the breathing chamber. We observed that soon after the wave motion ends, particles deep within the hindgut rapidly accelerates. This suggests that the function of the anteriorly propagating wave might be to pressurize the back end of the chamber in order to create pressure gradient within. In conjunction with the transmural pressure generated by compression of the abdomen, the axial pressure gradient deep within the chamber might assist in cleaning particulates lodged deep within the breathing chamber.]

20093. Engelhardt, E.K.; Biber, M.F.; Dolek, M.; Fartmann, T.; Hochkirch, A.; Leidinger, J.; Löffler, F.; Pinkert, S.; Poniatowski, D.; Voith, J.; Winterholler, M.; Zeuss, D.; Bowler, D.E.; Hof, C. (2022): Consistent signals of a warming climate in occupancy changes of three insect taxa over 40 years in central Europe. Gobal Change Biology 28: 3998-4012. (in English, with German summary) ["Recent climate and land-use changes are having substantial impacts on biodiversity, including population declines, range shifts, and changes in community composition. However, few studies have compared these impacts among multiple taxa, particularly because of a lack of standardized time series data over long periods. Existing data sets are typically of low resolution or poor coverage, both spatially and temporally, thereby limiting the inferences that can be drawn from such studies. Here, we compare climate and land-use driven occupancy changes in butterflies, grasshoppers, and dragonflies using an extensive data set of highly heterogeneous observation data collected in the central European region of Bavaria (Germany) over a 40-year period. Using occupancy models, we find occupancies (the proportion of sites occupied by a species in each year) of 37% of species have decreased, 30% have increased and 33% showed no significant trend. Butterflies and grasshoppers show strongest declines with 41% of species each. By contrast, 52% of dragonfly species increased. Temperature preference and habitat specificity appear as significant drivers of species trends. We show that cold-adapted species across all taxa have declined, whereas warm-adapted species have increased. In butterflies, habitat specialists have decreased, while generalists increased or remained stable. The trends of habitat generalists and specialists both in grasshoppers and semi-aquatic dragonflies, however did not differ. Our findings indicate strong and consistent effects of climate warming across insect taxa. The decrease of butterfly specialists could hint towards a threat from land-use change, as especially butterfly specialists' occurrence depends mostly on habitat quality and area. Our study not only illustrates how these taxa showed differing trends in the past but also provides hints on how we might mitigate the detrimental effects of human development on their diversity in the future." (Authors)] Address: Engelhardt, Eva Katharina, Terrestrial Ecology Research Group, Dept Life Science Systems, School Life Sciences, Tech.l Univ. of Munich, Freising, Germany

20094. Fabian, J.; Siwanowicz, I.; Uhrhan, M.; Maeda, M.; Bomphrey, R.J.; Lin, H.-T. (2022): Systematic characterization of wing mechanosensors that monitor airflow and wing deformations. iScience 25, 104150: 23 pp. (in English) ["Highlights: • Dragonfly wings are innervated by an extensive collection of sensory neurons. Mechanosensors are spread across the whole span of the wing with consistent patterns. The axons of wing sensory neurons are scaled to compensate for transmission latencies. Anatomically accurate models reveal wing strain fields that inform sensor distribution. Summary: Animal wings deform during flight in ways that can enhance lift, facilitate flight control, and mitigate damage. Monitoring the structural and aerodynamic state of the wing is challenging because deformations are passive, and the flow fields are unsteady; it requires distributed mechanosensors that respond to local airflow and strain on the wing. Without a complete map of the sensor arrays, it is impossible to model control strategies underpinned by them. Here, we present the first systematic characterization of mechanosensors on the dragonfly's wings: morphology, distribution, and wiring. By combining a cross-species survey of sensor distribution with quantitative neuroanatomy and a high-fidelity finite element analysis, we show that the mechanosensors are well placed to perceive features of the wing dynamics relevant to flight. This work describes the wing sensory apparatus in its entirety and advances our understanding of the sensorimotor loop that facilitates exquisite flight control in animals with highly deformable wings." (Authors) H. brevistylus, A. sieboldii, P. gigantea, A. junius, M. indica, P. fíavescens, C. atkinsoni, S. plagiatus, H. tau, I. stevensi, S. striolatum, P. tenera, C. maculata, A. apicalis, I. verticalis] Address: Lin, H.-T., Imperial College London, London, SW7 2AZ, UK. Email: h.lin@imperial.ac.uk

20095. Fahrenholz, A. (2022): Von einer Kanutour mit besonderem Highlight - Somatochlora metallica bei der Eiablage in Sand erwischt. Mitteilungen der AG Libellen in Niedersachsen und Bremen 4: 47-50. (in German, with English summary) ["S. metallica was observed laying eggs in sand at the bank of the Hunte river in northwestern Germany. A brief description of the observed beha-viour and possible implications for lar-val mortality are discussed." (Author)] Address: Fahrenholz, A., Am Stadtrand 39b, 26127 Oldenburg, Germany. Email: arnefahrenholz@posteo.de

20096. Farka, G.; Scharrer, S. (2022): Die Libellen des Landkreises Miltenberg. Herausgeber: BUND Naturschutz in Bayern e.V., Kreisgruppe Miltenberg, Römerstr. 41, 63785 Obernburg, Germany: 132 pp. (in German) [53 drag-

onfly species are known from the district (Landkreis) of Miltenberg. In this volume, the species are presented with short portraits and distribution maps. For each species, the most important habitats in the district as well as possible measures for their protection are mentioned. https://www.researchgate.net/publication/361283638_Die_Libellen_des_Landkreises_Miltenberg] Address: BUND Naturschutz in Bayern e.V., Kreisgruppe Miltenberg, Römerstr. 41, 63785 Obernburg, Germany

20097. Fattorini, S. (2022): Odonate diversity patterns in Italy disclose intricate colonization pathways. Biology 2022, 11(6), 886; https://doi.org/10.3390/biology11060886: 17 pp. (in English) ["Simple Summary: During the last Ice Age, most European animals retreated into southern refuges (mainly the Iberian, Italian, and Balkan peninsulas) from which they recolonized central and northern countries after deglaciation. These medio-European territories may have subsequently acted as secondary centers of southward dispersion for many species. Acting both as a refuge and as an area of colonization from adjacent territories, Italy was the theater of complex biogeographical histories, as illustrated by current distributional patterns of odonates. These patterns are a result of historical factors and current ecological conditions. Odonates need freshwater for their development, and their richness in Italy decreases southwards, both because of a decrease in precipitation and because of increasing distance from the mainland (peninsula effect). Biogeographical composition of Italian regions is influenced by climate, geographical distances and historical factors. In particular, biogeographical similarities between Italian regions and adjacent areas revealed multiple colonization patterns. After serving as a glacial refuge from which odonates may have colonized medio-European areas, Italy was in turn subject to complex colonization processes, that made its fauna biogeographically very complex, albeit not particularly rich. Abstract: As a natural bridge between Europe and Africa, Italy occupies a prominent position to understand the biogeography of Europe. The influence of climatic, spatial, and historical factors on current patterns of species richness and turnover (i.e., inter-regional biogeographical differences) has been analyzed for 88 species occurring in 17 Italian natural regions. Use of multimodel inference showed that odonate richness decreased southwards in response to decreasing rainfall, as expected for animals that depend on freshwater for their development. Use of Mantel tests indicated that patterns of inter-regional similarities were influenced by both climate and geographical distances. These patterns, as highlighted using Non-Metric Multidimensional Scaling, indicate a role for historical factors. Biogeographical similarities between Italian regions and adjacent areas revealed multiple colonization pathways. These results, coupled with the overall southward decrease in species richness, suggest that, after serving as a Pleistocene refuge from which odonates may have colonized medio-European areas, Italy was in turn subject to colonization from north to south. This resulted in Italian odonate fauna being less species rich compared to faunas in the medio-European territories, but also being biogeographically very complex." (Author)] Address: Fattorini, Simone, Dept of Life, Health & Environ. Sciences, Univ. of L'Aquila, 67100 L'Aquila, Italy. Email: simone.fattorini@univaq.it

20098. Feindt, W.; Hardys, H. (2022): The damselfly genus Megaloprepus (Odonata: Pseudostigmatidae): Revalidation and delimitation of species-level taxa including the description of one new species. Zootaxa 5115(4): 487-510. (in English, with Spanish summary) ["As the longest-winged odonate species of the extant world, Megaloprepus caerulatus (Drury, 1782) has received attention by many entomologists. While the behavior and ecology of this species has been subject of intense studies, biogeography and species status throughout its distributional range in old-growth Neotropical forests are less well known. For tropical forests, this information is a sine qua non when estimating the impact of degradation and climate change. Recent population genetic analyses, quantitative morphometric, and traditional taxonomic studies rediscovered a complex composed of cryptic species within the genus Megaloprepus Rambur, 1842—up until now still regarded as a monotypic genus. Here we introduce one new species Megaloprepus diaboli sp. nov. from the southern Pacific coast of Costa Rica and from the central Caribbean coast of Honduras and Guatemala. The holotype is from the Corcovado National Park, Costa Rica (N 8°28'55.62" W 83°35'13.92"), and was deposited at the National Museum of Costa Rica. Aside from M. caerulatus, two formerly described and later refused species within the genus were reevaluated and consequently raised to species status: Megaloprepus latipennis Selys, 1860 is found in the northeastern regions of Mesoamerica and Megaloprepus brevistigma Selys, 1860 in South America east of the Andes. Morphological descriptions of selected specimens (holotype of M. diaboli, lectotype of M. latipennis, and the mature males of M. brevistigma and M. caerulatus) are provided. Diagnostic features of the four species are illustrated, discussed, and summarized in a key to adult males." (Authors)] Address: Feindt, Wiebke, Univ. Veterinary Medicine Hannover, ITZ, Division Ecol. & Evol., Bünteweg 17d, 30559 Hannover, Germany. Email: wiebke.feindt@ecolevol.de

20099. Felker, A.S. (2022): Damselflies of the Family Kennedyidae (Odonata: Archizygoptera) from the Middle–Upper Triassic of Kyrgyzstan. Paleontological Journal 56: 75-84. (in English) ["Two new species of Kennedyidae: Kennedya madygensis sp. nov and K. ferganensis sp. nov. are described from the Middle-Upper Triassic deposits of the Dzhaloucho (Madygen) locality in Kyrgyzstan based on new material collected in 2007 and 2009. K. carpenteri Pritykina, 1981 is redescribed and variation in its discoidal area and other vein structures is demonstrated. The structure and transformation of the nodus in Kennedyidae are discussed." (Author)] Address: Felker, A.S., Borissiak Paleontological Inst., Russian Academy of Sciences, 117647, Moscow, Russia

20100. Ferreira Aleixo, M.H.; Quirino, B.A.; Yofukujia, K.Y.; Cardozo, A.L.P.; Fugi, R. (2022): Macrophyte biomass mediates trophic relationships between congeneric fishes and invertebrate communities. Limnologica 93, March 2022, 125957: 12 pp. (in English) ["This study aimed to verify whether habitat complexity, assessed through macrophyte biomass, can mediate interactions between fish and invertebrate communities and help to explain the coexistence of congeneric fish species. Fish and invertebrates [including "Odonata"] were sampled in ten macrophyte stands of different biomass in the Upper Paraná River floodplain. The abundance and richness of invertebrates and the diet and trophic niche breadth of Moenkhausia bonita and Moenkhausia forestii, as well as the diet overlap between these two species, were evaluated. Invertebrate abundance increased with increased macrophyte biomass but richness was not significantly affected. The diet of both fish species differed between low and high biomass stands, with the main difference being a decrease in aquatic invertebrate consumption and an increase in plant consumption with increased macrophyte biomass. In addition, the consumption

of items relied on their profitability and accessibility in the environment. The trophic niche breadth of both fish species increased with increased macrophyte biomass, but there was no niche overlap. Our results indicate that even with an abundance of invertebrates, there was a decrease in the consumption of this resource, suggesting that more complex stands can be more effective refuges for aquatic invertebrates. These results highlight the role of habitat complexity in mediating interactions between fish and invertebrates and promoting their coexistence, which also helps to explain the coexistence of congeneric fish species." (Authors)] Address: Ferreira Aleixo, M.H., Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Centro de Ciências Biológicas, Universidade Estadual de Maringá, Maringá, Brazil

20101. Fleck, G.; Haber, W.A. (2022): Paracordulia calcarulata, new species from Ecuador and notes on the genus Paracordulia Martin, 1907 (Odonata: Anisoptera: Corduliidae s. str.). Zootaxa 5124(5): 551-564. (in English) ["Based on two males from Ecuador (Sucumbíos Province), Paracordulia calcarulata sp. nov. is the second described species of the genus. This new species is compared to P. sericea (Selys, 1871). The different shape of the anal appendages easily allows separation of the two. Generic diagnosis based on adults and larvae is amended. Paracordulia Martin, 1907 is a poorly known genus of the Amazonian biome, and its apparent rarity or absence of records is probably due to its secretive habits; considering the different forms of known females, its specific diversity has likely been significantly underestimated. Some structures of the vesica spermalis are briefly discussed." (Authors)] Address: Haber, W.A., Research Associate, Instituto Nacional de Biodiversidad, Quito, Ecuador, Correos de Costa Rica 5655, Monteverde, Costa Rica. Email: bill.haber01@gmail.com

20102. Galbiati, M.; Manenti, R.; Forlani, M.; Barzaghi, B.; Melotto, A.; Ficetola, F.G.; Lapadula, S. (2022): The roles of landscape of fear and light in allowing the exploitation of spring habitats by subterranean amphipods: an experimental and field approach. ARPHA Conference Abstracts 5: e87144. https://doi.org/10.3897/aca.5.e87144: 2 pp. (in English) ["Verbatim: Border habitats such as interfaces and ecotones promise research targets from an evolutionary and zoological point of view. Springs are typical ecotones that border two strongly distinct environments: surface and underground. They are exploited by both subterranean and surface species for which they may provide specific environmental pressures promoting phenotypic plasticity and local adaptations. The aim of this study is to understand how the landscape of fear (LOF) and physical constraints, like light occurrence, affect springs' exploitation by both a subterranean (Niphargus thuringius) and a surface crustacean amphipod species (Echinogammarus stammeri). From March to May 2021, we surveyed 15 springs, divided into 25 plots according to their distance to the border, and both day and night, we recorded amphipods activity and LOF levels for them. In a subterranean laboratory, we also reared 80 N. thuringius and 80 E. stammeri in safe and risky conditions with constant darkness and diel light variation assessing their activity and survival for 30 days. Risky conditions were represented by meso-predators (four fire salamander larvae) alone or with a top-predator (Cordulegaster boltonii). While in field conditions, the activity of N. thuringius seemed negatively affected by the number of active predators, in laboratory experiments, the main role was played by the light treatment; activity was significantly higher in constant darkness conditions. E. stammeri activity in the field was higher in surface plots, while in laboratory conditions was affected by LOF. Predation risk negatively affected the survival of both amphipods. Our findings reveal that while light conditions seem to shape activity patterns of stygobionts strongly, predators have a lower effect on activity, even though predators have negative effects on survival. Moreover, physical constraints, such as light exposure, can affect antipredator responses of subterranean organisms, thus representing selective pressures for the exploitation of surface environments.] Address: Galbiati, M., Dipartimento di Scienze e Politiche ambientali, Università degli Studi di Milano, Via Celoria, 10 20133, Milano, Italy

20103. Garcia Junior, M.D.N.; Damasceno, M.T. dos S.; Vilela, D.S.; Souto, R.N.P. (2022): The Brazilian Legal Amazon Odonatofauna: a perspective of diversity and knowledge gaps. EntomoBrasilis. 15, (Feb. 2022), e977: 18 pp. (in English) ["The Brazilian legal Amazon occupies approximately 61% of its territory, covering a large part of Brazil's biodiversity. This large territorial dimension generates huge gaps in the animal diversity understanding, for example, the poor knowledge regarding the Odonata order. Worldwide, Odonata has almost 6,500 described species, with approximately 1,800 being recorded for the Neotropical region. Data on the Odonata order in the legal Amazon is still scarce, mainly due to its particularities, and little is known about the diversity of dragonflies in some of Brazilian states. Thus, the objective of this study is to present a list of species occurring in the states that make up the Brazilian legal Amazon. The list was made from the analysis of approximately 165 scientific papers, in addition to occurrence records contained in the SiBBr and GBIF databases. 641 species were found, which is equivalent to approximately 69% of the odonatofauna in Brazil. The states with the greatest diversity were Amazonas (n=364), Pará (n=310) and Mato Grosso (n=285). The study also indicated a low level of knowledge of the Odonata order in the states of Tocantins and Maranhão, in addition to the area of the Guianas shields, especially in the states of Amapá and Roraima. Carrying out new inventories and building catalogs is essential for understanding the biodiversity in this region, especially in areas with greater need." (Authors)] Address: Garcia Junior, M., Univde Federal do Amapá-UNIFAP, Macapá, Amapá, Brazil. Email: m.d.juniorbio@gmail.com

20104. Gassmann, D. (2022): Redescription of the male of Tanymecosticta filiformis (Ris, 1898) from New Britain, Papua New Guinea, including the first description of the female (Odonata: Isostictidae). International Dragonfly Fund Report 170: 1-14. (in English) ["The male of Tanymecosticta filiformis (Ris, 1898) from New Britain island, Papua New Guinea, previously known only from the incomplete male holotype specimen, is redescribed based on specimens collected during recent odonatological surveys, and the female is described for the first time. Comparative notes on T. fissicollis (Lieftinck, 1932) from mainland New Guinea are added." (Author)] Address: Gassmann, D., Arachnida Section, Zoological Research Museum Alexander Koenig, Bonn, Germany. Email: d.gassmann@leibniz-zfmk.de

20105. Gaur, P.; Pandey, P.; Kori, P.; Gaherwal, S. (2022): Study on diel variation and effect of anthropogenic activities on birds. GSC Biological and Pharmaceutical Sciences 11(1): 21-30. (in English) [Nehru Park, Indore city, India. The total of 24 insect species includes the following Odonata: Tholymis tillarga, Lathrecista asiatica, Ictinogomphus rapax, Paragomphus lineatus, Brachythemis contaminata and Gynacantha bayadera.] Address: Gaur, P., Institute of

Biological Science Sage University Indore (M.P.) India

20106. Geiger, M.; Koblmüller, S.; Assandri, G.; Chovanec, A.; Ekrem, T.; Fischer, I.; Galimberti, A.; Grabowski, M.; Haring, E.; Hausmann, A.; Hendrich, L.; Koch, S.; Mamos, T.; Rothe, U.; Rulik, B.; Rewicz, T.; Sittenthaler, M.; Stur, E.; Tonczyk, G.; Zangl, L.; Moriniere, J. (2022): Coverage and quality of DNA barcode references for Central and Northern European Odonata. PeerJ 9:e11192 DOI 10.7717/-peerj.111922021: 31 pp. (in English) ["Background: Odonata are important components in biomonitoring due to their amphibiotic lifecycle and specific habitat requirements. They are charismatic and popular insects, but can be challenging to identify despite large size and often distinct coloration, especially the immature stages. DNA-based assessment tools rely on validated DNA barcode reference libraries evaluated in a supraregional context to minimize taxonomic incongruence and identification mismatches. Methods: This study reports on findings from the analysis of the most comprehensive DNA barcode dataset for Central European Odonata to date, with 103 out of 145 recorded European species included and publicly deposited in the Barcode of Life Data System (BOLD). The complete dataset includes 697 specimens (548 adults, 108 larvae) from 274 localities in 16 countries with a geographic emphasis on Central Europe. We used BOLD to generate sequence divergence metrics and to examine the taxonomic composition of the DNA barcode clusters within the dataset and in comparison with all data on BOLD. Results: Over 88% of the species included can be readily identified using their DNA barcodes and the reference dataset provided. Considering the complete European dataset, unambiguous identification is hampered in 12 species due to weak mitochondrial differentiation and partial haplotype sharing. However, considering the known species distributions only two groups of five species possibly co-occur, leading to an unambiguous identification of more than 95% of the analysed Odonata via DNA barcoding in real applications. The cases of small interspecific genetic distances and the observed deep intraspecific variation in Cordulia aenea (Linnaeus, 1758) are discussed in detail and the corresponding taxa in the public reference database are highlighted. They should be considered in future applications of DNA barcoding and metabarcoding and represent interesting evolutionary biological questions, which call for in depth analyses of the involved taxa throughout their distribution ranges." (Authors)] Address: Geiger, M., Zoologisches Forschungsmuseum Alexander Koenig (ZFMK) - Leibniz Institute for Animal Biodiversity, Bonn, Germany. Email: m.geiger@leibniz-zfmk.de

20107. Gerull, S.; Apel, J. (2022): Stabilisierung der Helm-Azurjungferbestände Coenagrion mercuriale im Landkreis Sömmerda. Landschaftspflege und Naturshcutz in Thüringen 58(2): 79-83. (in German) ["In the course of the project, it became apparent that the habitat and population data on the Helmeted damselfly for the water bodies outside the FFH management planning and the state and federal monitoring are outdated, especially in view of the precipitation deficit in recent years. In order to update this data, a total of 69 km of designated habitat stretches were examined for vegetation, structure and habitat suitability in 2018 as part of a project extension and the expansion of the project area to include the districts of Unstrut-Hainich-Kreis and Gotha. At water bodies without current population figures, the populations were recorded at the same time. These data were used to draw up habitat maps with proposals for management measures. The water bodies or water body sections were divided into four categories: 1. habitat = currently colonised area with relatively good quality, 2. potential habitat = not colonised, but of good quality, 3. with effort potential habitat = not colonised, intensive management measures necessary, 4. no habitat = not suitable for colonisation. The proportions of the corresponding categories can be found in Figure 6. These data formed the basis for another ENL project "Measures to secure and stabilise the populations of the Helm's Azure Damselfly in the Thuringian Basin", which runs from 2019 to 2022. In order to obtain further information on the Helm's Azure Damselfly habitats, 209 water samples were taken and analysed at 26 sites over a period of seven months. Relevant parameters for the analysis were water temperature, oxygen content, conductivity, pH-value as well as nitrate, phosphate and ammonium content. Figure 7 shows the positive influence of buffer strips and riparian strips on the chemical water quality classification (based on the LAWA quality classes, Länderarbeitsgemeinschaft Wasser 1998) and thus on the population of Helmeted damselflies. The buffer strips were divided into three classes for this purpose. A buffer was rated as good if it was present on both sides of the watercourse, e.g. in the form of a green strip, copse border or path. A moderate buffer was only present on one side, or on both sides, but very narrow. The category "poor buffer" was assigned to water bodies where there was no buffer strip or only a narrow one on one side. As a result of the inventory carried out in 2018, it can be assumed that the measures implemented in the project in 2017 were successful. More individuals were recorded at all water bodies than in the reference year 2016 (PETZOLD 2018). As can be seen in Table 1, many times as many individuals were recorded after the measures were implemented. However, some stretches of water, especially in the FFH area "Gräben im Großen Ried", partially dried out in the late summer months of 2018 and 2019. However, the species remained in other stretches of water and can migrate into these stretches again when conditions are more favourable. The goal of permanently maintaining the water bodies could not be achieved at all water body sections. Only one of the six water bodies continues to be maintained by a farm. In general, the farms have shown interest in continued maintenance and have also willingly established 1.5 km of riparian strips, but were unable to offer gentle maintenance either technically or in terms of personnel. The municipalities also see the maintenance of water bodies as relevant for the conservation of the species, but here too the financial and personnel effort is not affordable." (Authors/DeepL)] Address: Gerull, Stephanie, Am Stausee 36E, 99439 Am Etterberg, Thüringen, Germany. Email: gerulllpv-mittelthuerin.de

20108. Getnet, H.; Mengistou, S.; Warkineh, B. (2022): Macroinvertebrate community structure and diversity in relation to environmental factors in wetlands of the lower Gilgel Abay River catchment, Ethiopia. African Journal of Aquatic Science 47(1): 23 -35. (in English) ["The influence of environmental factors on the diversity of macroinvertebrates was studied in the wetlands of the Gilgel Abay River (GAR) catchment in Ethiopia. The study was done between September 2017 and March 2018, encompassing both wet and dry seasons. Six study wetlands from the GAR catchment were selected in a targeted manner based on the surrounding land use, exposure to anthropogenic disturbances and accessibility to conduct a quantitative study. The relationships between biological and environmental variables were evaluated by using multivariate analyses. Altogether, 36 families of macroinvertebrates were identified. Macroinvertebrate diversity indices were significantly higher at less

impaired sites, compared with more impaired sites. Several families of Ephemeroptera, Odonata and Trichoptera taxa, including Corduliidae, Calopterygidae, Baetidae, Aeshnidae, Polymitarcyidae, Hydropsychidae, Heptageniidae, Polycentrapodidae, Hydroptilidae and Philopotamidae were negatively correlated with organic and inorganic pollutants and human disturbances and might be considered as potential indicators of less impaired sites. Conversely, the families Chironomidae, Hirudinidae and Libellulidae were positively correlated with biological oxygen demand, ammonium and human disturbance score and negatively correlated with dissolved oxygen. Generally, results of macroinvertebrate diversity and composition in this study indicate poor ecological condition of the wetlands, particularly those adjacent to agricultural and urban areas." (Authors)] Address: Getnet, H., Dept of Biology, Assosa University, Assosa, Ethiopia. Email: habtamugetnet@gmail.com

20109. Ghosh, K. (2022): Odonata diversity in the Gangetic plain of West Bengal. Indian Journal of Entomology Online published Ref. No. e21180: 5 pp. (in English) ["The diversity and abundance of the Odonata documented from the Gangetic plain of West Bengal covering two types of habitats revealed its primarily aquatic nature (Oxbow Lake, Purbasthali). The other sites were predominantly grasslands, with smaller water bodies around (RRS, Chinsurah and DVC canal, Baidyabati). A total of 40 species were documented belonging to 31 genera and 5 families, with dominant families under the suborders Anisoptera and Zygoptera being Libellulidae and Coenagrionidae, respectively. Shannon-Wiener diversity index indicates that Oxbow Lake, Purbasthali has the most diverse fauna, with a higher relative abundance for Anisoptera compared to the Zygoptera." (Author)] Address: Ghosh, K., Dept of Zoology, Bejoy Narayan Mahavidyalaya, Itachuna, Hooghly 712147, West Bengal, India. Email: tokausik@gmail.com

20110. Glännman, J.; Töttrup, K.S. (2022): En inventering av bottenfauna i Trönningeån med tvåbiflöden. Examensarbete, Naturvård och artmångfald, Halmstad 2022-05-25: 29 pp. (in Swedish, with English summary) ["Benthic macroinvertebrates are usually small animals living in our lentic and lotic ecosystems, they have been used as indicators of water quality and biodiversity for a long time. Dam removals have become one of the “go-to” conservation methods for restoring connectivity in lotic ecosystems and thereby enabling passage upstream for migrating species. In Sweden, a large part of rivers and streams have dams present which act as migration barriers. Hushållningssällskapet Halland runs a project, LIFE-Goodstream in which a dam considered a migration barrier was removed in the stream Trönningeån. This report has three focus areas 1) the ecological effects of the dam removal while 2) considering the effect on the species composition of the orders Ephemeroptera, Plecoptera, Trichoptera and Odonata [Cordulegaster boltonii] in the stream Trönningeån with two tributaries and finally 3) suggest appropriate conservation methods for the future. By examining the benthic macroinvertebrate community our study showed that a small dam removal can have a clear positive effect on water quality, changing the water status classification from low water quality to high. Although there was no effect on the species diversity by the dam removal, a turnover in species composition became obvious after the examination. Moreover, we learned that Trichoptera was the most present order in two out of the three streams while Odonata was the least represented order. Also, bottom substrate, velocity and riparian zone have larger impact on species composition than adjacent environments. Re-meandering streams to further increase biodiversity while also ensuring water quality, is an essential method for a thriving conservation work in the future." (Authors)] Address: not stated

20111. Glushenkov, O.V. (2022): Proposals to include some dragonfly species to the new edition of the Red Book of the Chuvash Republic. Natural science research in Chuvashia and individual regions: materials of reports of the interregional scientific and practical conference (Cheboksary, February 28-April 2022). – Cheboksary: advertising and printing bureau "Plakat", 2022. - Issue 8. - 196 p: 103-111. (in the Red Book of the Chuvash Republic, dragonflies, Odonata, Anax imperator Ophiogomphus cecilia, Aeshna serrata, Calopteryx virgo, Leucorrhinia albifrons) ["The Chuvash Republic is updating the List of rare and endangered species of animals in order to include (or exclude) them in the new edition of the Red Book of the Chuvash Republic (animals).The article provides information on reliable encounters of extremely rare dragonfly species (Odonata) – Anax imperator, Ophiogomphus cecilia – in some protected areas of the republic and in Chuvashia. The necessity of including rare dragonflies in the new edition of the regional Red Book is substantiated. Proposals from other specialists are being considered to include Aeshna serrata, Calopteryx virgo, Leucorrhinia albifrons in the new edition of the Red Book of the Chuvash Republic." (Author)] Address: Glushenkov, O.V., head of the scientific Dept, National Park Chavash Varmane, p. Shemursha, Leading Researcher, Go-state nature reserve "Prisursky", Cheboksry, Chuvashia, Russia. Email: totem–ardea63@yandex.ru

20112. Golab, M.J.; Sniegula, S.; Brodin, T. (2022): Cross-latitude behavioural axis in an adult damselfly Calopteryx splendens (Harris, 1780). Insects 2022, 13(4), 342; https://doi.org/10.3390/insects13040342: 11pp. (in English) ["Simple Summary: Animals adapt to the environment they live in. If the environment changes, animals usually adapt behaviourally as a first response. By studying behavioural profiles across long distances, we can detect environmental change reflected in shifts in behavioural profiles. This study examined variation in three behavioural axes: activity, courtship and boldness, and the association between these behaviours, i.e., behavioural syndromes, across three damselfly populations along a latitudinal gradient (i.e., climatic gradient). Our study organism was the temperate damselfly Calopteryx splendens. We predicted that behavioural expressions would gradually increase from southern to northern regions. This is because northern animals should compensate behaviourally for a brief and cold breeding season (i.e., time constraint). Activity was the only behaviour feature positively associated with latitudinal gradient. Courtship effort was highest in the central region, whereas boldness values were highest in the north but did not differ between central and south. In the southern region, an activity–boldness and a courtship—boldness syndrome were present, and in the northern region, only an activity–boldness syndrome was found. Our results confirm that environmental variability in biotic and abiotic factors across studied latitudes generates regional differences in behavioural profiles, which do not always follow latitudinal gradient. Abstract: Behavioural variation is important for evolutionary and ecological processes, but can also be useful when predicting consequences of climate change and effects on species ranges. Latitudinal differences in behaviour have received relatively limited research interest when compared to morphological,

life history and physiological traits. This study examined differences in expression of three behavioural axes: activity, courtship and boldness, and their correlations, along a European latitudinal gradient spanning ca. 1500 km. The study organism was the temperate damselfly Calopteryx splendens (Harris). We predicted that the expression of both behavioural traits and behavioural syndromes would be positively correlated to latitude, with the lowest values in the southern populations, followed by central and the highest in the north, because animals usually compensate behaviourally for increasing time constraints and declining environmental conditions. We found that behavioural expression varied along the latitudinal cline, although not always in the predicted direction. Activity was the only behaviour that followed our prediction and gradually increased northward. Whereas no south-to-north gradient was seen in any of the behavioural syndromes. The results, particularly for activity, suggest that climatic differences across latitudes change behavioural profiles. However, for other traits such as courtship and boldness, local factors might invoke stronger selection pressures, disrupting the predicted latitudinal pattern." (Authors)] Address: Golab, Maria J., Institute of Nature Conservation, Polish Academy of Sciences, 31-120 Krakow, Poland. Email: marysiagolab@gmail.com

20113. Gómez-Tolosa, M.; González-Soriano, E.; Mendoza-Cuenca, L.F.; Pérez-Munguía, R.M.; Rioja-Paradela, T.M.; Espinoza-Medinilla, E.E.; Ortega-Salas, H.; Rivera-Velázquez, G.; Penagos-García, F.E.; López, S. (2022): The use of highly diverse clades as a surrogate for habitat integrity analysis: Argia damselflies as a practical tool for rapid assessments. Environmental Science and Pollution Research 29(16): 24334-24347. (in English) ["Human activities have impacted many environments on earth, and thus several species are facing an increased risk of extinction. The environmental crisis requires rapid tools to assess the ecosystem health accurately. Studies have been conducted with visual indices that quantify habitat integrity by predicting species richness and diversity. However, whether a diverse clade can predict habitat integrity has not been used. The genus Argia (Rambur, 1842) is one of the most locally diverse groups in southeastern Mexico. In this context, we hypothesized that the occurrence, species richness, and diversity of adults Argia spp. could be a better predictor of the Visual-Based Habitat Assessment Score (VBHAS) than the other taxonomic levels or less diverse clades. We found that the richness and diversity of Argia spp. are positively correlated with VBHA scores, as same as taxonomic ratios. Simultaneously, VBHA scores increase to 23.51 times when Argia spp. diversity increases. We discuss the possible use of a diverse Odonata clade, as Argia spp. could surrogate habitat integrity for local long-term biomonitoring programs. This approach requires testing with other indices and verifying a reliable and consistent relationship between diverse clades and environmental assessment scores." (Authors)] Address: López, S., Ciudad Universitaria, Libramiento Norte Poniente 1150, Colonia Lajas Maciel C.P., 29039, Tuxtla Gutiérrez, Chiapas, México. Email: sergio.lopez@unicach.mx.

20114. Gopalan, S.V.; Sherif, M.; Chandran, V. (2022): A checklist of dragonflies & damselflies (Insecta: Odonata) of Kerala, India. Journal of Threatened Taxa 14(2): 20654-20665. (in English) ["A checklist of odonates of Kerala State is presented in this paper. Scientific binomen, vernacular names in Malayalam, IUCN Red List status, and endemism are also given. A total of 174 species of odonates have been recorded from Kerala till date, 65 of which are endemic to the Western Ghats, and 10 to India. Five species fall under various threatened categories of IUCN. None of the odonates occurring in Kerala is listed in the schedules of the Indian Wildlife (Protection) Act or the appendices of CITES." (Authors)] Address: Chandran, V., Dept of Geology & Environmental Science, Christ College, Irinjalakuda, Thrissur, Kerala 680125, India. Email: avivekchandran2@gmail.com

20115. Guadalquiver, D.M.E.; Nuneza, O.M.; Tabugo, S.R.R.; Villanueva, R.J.T. (2022): Description of the larva of Vestalis melania (Selys, 1873) (Odonata: Calopterygidae) identified through DNA barcoding. Journal of Threatened Taxa 14(8): 21612-21618. (in English) ["The larva of Vestalis melania is described and illustrated for the first time, based on specimens collected from Malaybalay, Bukidnon, Philippines. The identity of the larva was confirmed by matching its mitochondrial COI sequence with the adult. The larva can be distinguished by the shape of the prementum and its median cleft, lateral gills, and posterolateral abdominal spines. Comparison with other known larvae in the genus is also provided. The significance of using DNA barcoding for identifying larvae of Philippine Odonata is emphasized." (Authors)] Address: Guadalquiver, D.M.E., Dept of Biological Sciences, College of Science & Mathematics, MSU-Iligan Institute of Technology, Andres Bonifacio Avenue, Tibanga, Iligan City, Philippines.

20116. Guadalquiver, D.M.E.; Nuneza, O.M.; Villanueva, R.J.T. (2022): Odonatofauna in the freshwater system of Kibalabag, Malaybalay City, Bukidnon, Philippines. Biodiversitas 23: 1857-1863. (in English) ["Despite the critical importance of freshwater ecosystems to human populations and biodiversity, many anthropogenic practices continue to imperil such habitats. An excellent way to monitor the integrity of these ecosystems is through bioindicator organisms like insects of order Odonata, which are highly sensitive to environmental changes. In Malaybalay City, Philippines, the freshwater system in barangay Kibalabag is the primary source of potable water. Thus, to gain insight into its integrity and health, the present study seeks to determine adult Odonata species composition and diversity in the area. Opportunistic sampling using sweep netting and handpicking was conducted in four sampling sites. Twenty-five species were identified, comprising 230 individuals under nine families and 21 genera. Endemism of 65% (17 species) was recorded, with five species exclusive to Mindanao Island and three species classified as threatened. A high ratio of Zygopterans to Anisopterans, indicative of pristine conditions, was observed. Computation of biodiversity indices revealed that Site 2 (Wetland) is the most diverse (H_i: 2.582) due to habitat variability. Cluster analysis also showed that Sites 1 (Kibalabag falls) and 2 were most similar. Species assemblage in these sites and high richness in Site 1 demonstrated high habitat integrity and good water quality, whereas the species assemblage in Sites 3 and 4 connotes habitat disturbance. The high endemicity and moderate diversity showed that the area is a healthy and suitable habitat for Odonata, emphasizing the need for its conservation and proper management." (Authors)] Address: Guadalquiver, D.M.E., Dept of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology. Iligan City 9200, Philippines. Email: donmark.guadalquiver@g.msuiit.edu.ph

20117. Gurung, M.M.; Dorji, C.; Sinchuri, A.M.; Rai, S.K.; Dendup, K.C.; Kalkman, V.J. (2022): New records of odonates from Trongsa and Zhemgang, central Bhutan with a checklist of Jigme Singye Wangchuck National Park. Journal of Threatened Taxa 14(9): 21836-21844. (in English)

["New records of 43 species of dragonflies and damselflies from Trongsa and Zhemgang districts in central Bhutan are provided. Two of these, Watanabeopetalia atkinsoni (Selys, 1878) and Tetrathemis platyptera (Selys, 1878), are new to Bhutan bringing the number of species known from Bhutan to 125. A checklist of the 60 species known from Trongsa district, Zhemgang district and the Jigme Singye Wangchuck National Park is provided." (Authors)] Address: Gurung, M.M., Dept of Forest Science, College of Natural Resources, Royal University of Bhutan, Punakha, P.O: 13003, Bhutan. Email: merman.gurung93@gmail.com

20118. Gutiérrez Uranga, I. (2022): Primera cita de Aeshna isoceles (Müller, 1767) (Odonata: Aeshnidae) para la provincia de Gipuzkoa. - First record of Aeshna isoceles (Müller, 1767) (Odonata: Aeshnidae) for the province of Gipuzkoa. Munibe, Cienc. nat. 70, 2022: 6 pp. (in Spanish, with English and Basque summaries) ["An adult male observed on June 18, 2019 at Parque Ecológico de Plaiaundi. With this record, the number of odonates described for the province reaches 49 species." (Author)] Address: Itziar Gutiérrez Uranga. itziguti@hotmail.com

20119. Gwos, N.S.R.; Foto, M.S.; Nyame, M.D.-O.; Biram, A.N.E.B.; Balzani, L. (2022): Physicochemical characterization of the waters of the Lep'oo river in Mbanda (Bot-Makak) and structuring of the benthic macroinvertebrate community. World Journal of Advanced Research and Reviews 13(3): 1-12. (in English) ["A study on the characterisation of the Lep'oo stream waters in Mbanda (BotMakak) by physicochemical parameters and benthic macroinvertebrates community was conducted from February to July 2016. Physicochemical parameters were measured according to Rodier's recommendations, while benthic macroinvertebrates were collected using the multihabitat approach. The physicochemical analysis showed that the waters of the Lep'oo stream were well oxygenated (71.16%), slightly acidic (6.36 UC), with low values of nitrogen and orthophosphates reflecting litter decomposition. A total of 2019 benthic macroinvertebrates were collected, divided into 4 phyla, 7 classes, 15 orders, 40 families and over 60 genera. The phylum Arthropoda was the most abundant with 98.61% relative abundance, followed by Molluscs (0.99%) and Annelids (0.29%). The greatest number of organisms collected belonged to the class Hexapoda, which represented 56.76% of relative abundance, followed by Malacostraca (41.75%). Within the Hexapoda class, the order Hemiptera predominated with 18.22% relative abundance and in the Malacostraca class, the order Decapoda predominated with 41.75% relative abundance. These two orders were dominated by the families Atyidae, Libellulidae, Gerridae, Leptophlebidae and Hydroptilidea. In the upper part of the Lep'oo stream, the families Libellulidae and Belostomatidae were dominant. The station Lep2 was most colonised by the families Atyidae, Libellulidae, Belostomatidae, Hydrometridae, and Gerridae, while station Lep3 was dominated by the families Atyidae, Hydroptilidae and Leptophlebidae. The Shannon and Weaver (H') and Piélou equitability (J) index showed a greater diversity of taxa downstream of the stream at station Lep3, where conditions seem more favourable to the development of benthic macroinvertebrates as indicated by the physicochemical results. The NGBI index characterized water quality from mediocre to excellent. Finaly, the Lep'oo watercourse had a poor and diversified population of benthic macroinvertebrates, showing a relative good ecological quality of water." (Authors)] Address: Gwos, N.S.R., Lab. of Hydrobiol. & Environment (LHE), Fac. Sciences, Univ. of Yaounde I, P. O. Box: 812 Yaounde – Cameroon

20120. Hämäläinen, M.; Fliedner, H. (2022): Etymology of the scientific names of the extant demoiselle damselflies (Odonata: Calopterygidae). International Dragonfly Fund - Report 174: 1-175. (in English) ["This publication presents the etymology and other information of all available scientific names given to the extant members of the odonate family Calopterygidae. Of the 33 available genus-group and 329 available species-group names, 21 and 181 names are considered to represent valid genera and species, respectively. The historical development of knowledge of calopterygid diversity is discussed. A synonymic checklist of Calopterygidae is presented, with an annotated list of the author names. A grouping of taxon names according to the meaning of their roots is presented." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

20121. Harahap, R.R.; Kurnia, I.; Widodo, G. (2022): Keanekaragaman Jenis Capung (Ordo Odonata) Pada Berbagai Tipe Habitat Di Kecamatan Leuwiliang Kabupaten Bogor. Quagga: Jurnal Pendidikan dan Biologi 14(2): 141-150. (in English) ["Dragonflies and damselflies (Odonata) are insects with an important role for biological control and environmental quality indicators. Odonata are scattered in various types of habitats, especially those associated with freshwater ecosystems. The aim of this research is to study the diversity of odonata in various habitat types in Leuwiliang District, Bogor Regency. The study was conducted on 10 habitat types with a total of 1289 observation lines. In total found 23 species of odonatan from eight families and two sub-orders. The highest species richness was found in stream water habitats (22 species) and the lowest in field habitats (five species). The chi-square test for the number of species and the number of individuals differed significantly between habitat types. The species diversity index ranged from 1.23-2.24 and the similarity index ranged from 0.39-0.71. The highest community similarity index was between lakes habitats and field habitats. The results of the MDS analysis resulted in three groups of odonata communities according to their habitat type." (Authors)] Address: Harahap, R.R.; Alumni, Program Studi Ekowisata Sekolah Vokasi IPB University, Indonesia. Email: rhamdany262@gmail.com

20122. Hartung, M. (2022): Description of the larva of Micrathyria venezuelae De Marmels, 1989 (Odonata: Libellulidae). Odonatologica 51(1-2): 147-156. (in English) ["M. venezuelae is a species of medium to high elevations in the Northern Cordilleras in Venezuela. The larva of M. venezuelae was hitherto unknown. Based on exuviae of reared specimens, the final instar larva of M. venezuelae is described. Exuviae of M. venezuelae have two parallel rows of dark spots on the dorsum of the abdomen, lack mid-dorsal hooks, and the lateral spines on S9 are short; the thorax, tibiae, and femora have three dark bands each; the prementum has 9–13 setae and the labial palps 8–11 setae. A modified differentiation to known larvae of M. aequalis from M. venezuelae is provided." (Author)] Address: Hartung, M., 16866 Kyritz, Germany

20123. Hastomo, S.O.E.; Muttaqin, Z.; Cita, K.D. (2022): Inventory and diversity of dragonflies (Odonata) at Kuningan Resort of Mount Ciremai National Park, West Java Province. IOP Conference Series: Earth and Environmental Science 959 (2022) 012019: 11 pp. (in English) ["The presence of dragonflies regarding the sensitivity of nymphs towards environmental changes is considered a bioindicator

that can indicate changes in water quality and the environment. The purpose of this study is to take inventory of the species and the diversity of dragonflies at the Kuningan Resort, Mount Ciremai National Park in several representative aquatic habitats. The dragonfly inventory technique used a modified line transect method with observation plots that are not limited by a certain distance or area but by a set time of 15 minutes for each plot observation. The results of the inventory obtained 24 species of dragonflies from 8 families, as many as 591 dragonflies consisting of 58.2% of common dragonflies including of suborder Anisoptera consists of Aeshnidae, Gomphidae, Libellulidae and 41.8% of needle dragonflies including of suborder Zygoptera consist of Platystictidae, Calopterygidae, Chlorocyphidae, Euphaeidae, Coenagrionidae. The dragonfly diversity index (H' = 1.94 – 2.32) (medium), the species richness index, or the values of Margalef 's diversity index (Dmg) ranged from 1.99 to 2.87 (low), the species evenness index ranges from 0.39 – 0.6)(low – medium)." (Authors)] Address: Muttaqin, Z., Faculty of Forestry, Universitas Nusa Bangsa, Jl. KH Sholeh Iskandar Km 04, Bogor 16161, Indonesia. Email: muttaqinznl@gmail.com

20124. Hernandez, M.A.; Casanueva, P.; Nunes, L.; Santamaría, T.; Sánchez-Sastre, L.F.; Ferreras-Romero, M.; Campos, F. (2022): Geographical variation of prementum size in Iberian Cordulegaster boltonii (Odonata: Cordulegastridae) populations. International Journal of Odonatology 25: 56-61. (in English) ["Within wide geographical areas, Odonata populations can show biometric differences as a consequence of both biotic (e.g., predation, competition) and abiotic factors (mainly temperature). These differences can occur in the larval stage, although reliable characters are needed to detect differences. We analyzed whether C. boltonii larvae from 18 Iberian populations differ regarding head width and prementum size (maximum width, minimum width, and maximum length), using measurements taken on final stage exuviae. Prementum length was greater in southern populations than in northern ones. Geographic latitude and temperature were the variables that best explained this variation in females, whereas latitude and altitude above sea level offered the best explanation among males." (Authors)] Address: Hernández, M.A., Depto Biología Ambiental, Facultad de Ciencias, Univd de Navarra, 31080 Pamplona, Spain. Email: mahermin@unav.es

20125. Hogreve, J.; Suhling , F. (2022): Development of two common dragonfly species with diverging occupancy trends. Journal of Insect Conservation 26: 571-581. (in English) ["The two sibling and syntopic odonate species Sympetrum striolatum and S. vulgatum are common and widespread in Central Europe. While S. striolatum has strong positive population trends, declines of S. vulgatum are observed. The aim of this study was to identify possible drivers of these diverging trends. We presumed that differences in egg development may lead to differences in survival until hatching. First, eggs laid in non-permanent or shrinking waterbodies may suffer of increasing drought periods. Second, differences in developement may cause increased size-mediated intraguild predation, a common cause of reduced survival in odonate larvae. Egg development time and hatching rates were recorded of eleven egg clutches of S. vulgatum and ten clutches of S. striolatum under simulated drought vs. water and direct vs. delayed development treatments. Hatching rates were reduced under drought conditions, and particularly so in S. vulgatum. We did not observe obligate winter diapause in any of the egg clutches. But, S. vulgatum varied widely in development between clutches, while the eggs of S. striolatum developed much faster and hatched highly synchronously. This would provide S. striolatum with a temporal advantage that may lead to a size-advantage over most S. vulgatum. We also found that S. vulgatum grew faster. Faster larval growth would only compensate for those S. vulgatum with fast egg development. The current population trends may be partly attributed to lowered survival of S. vulgatum under drought and by phenological and, thus, size benefits of S. striolatum. Implications for insect conservation: Our results show that population dynamics of two closely related dragonfly species can be explained by climatically induced changes in their interactions. Understanding the causes and processes of behavioural changes resulting in differing population trends is fundamental for the protection of species." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

20126. Holusa, O. (2022): Description of the last instar larva of Cordulegaster vanbrinkae and emergence place from northern Iran (Odonata: Cordulegastridae). International Journal of Odonatology 25: 72-79. (in English) ["The larva of C. vanbrinkae is described and illustrated based on fourteen final instar larvae and 49 exuviae that were collected in Gilan, Mazandaran and Golestan provinces, in northern Iran in July 2014, July 2017 and August 2018. Larvae of Cordulegaster vanbrinkae show signs of lateral spine on 8th segment missing, ratio of lateral spine on 9th segment/9th segment is 0.03–0.15 and 5 (rarely 6) long premental setae. The characters have a clear variability and there is a noticeable overlap of character values with related species—Cordulegaste picta and Cordulegaster heros. Emergence habitat are described and analysed." (Author)] Address: Holuša, O., Mendel University in Brno, Faculty of Regional Development and International Studies, Tr. Generála Píky 7, CZ-613 00 Brno, Czech Republic

20127. Holuša, O.; Holušová, K. (2022): Population density and abundance of the northernmost population of Cordulegaster heros (Anisoptera: Cordulegastridae) in Europe (Czech Republic) with notes on Its biogeographical range. Diversity 2022, 14, 854. https://doi.org/10.3390/d14100854: 16 pp. (in English) ["C. heros is a Balkan species with a disjunctive area extending into Central Europe. The population in the Ch¡riby Mts. in the southeastern Czech Republic is the northernmost population, and this population was intensively studied from 2010 to 2021 to establish basic data on its abundance. In the territory, the geomorphological characteristics of streams, characteristics of sediment in streams, habitat, emergence time, and period of flight were recorded, and population viability was evaluated. Larvae were recorded in 10 small forest streams (altitude of 235–426 m a.s.l.), with an average minimum width of 51.9 cm, an average maximum width of 177.7 cm, an average minimum depth of 6.5 cm, an average maximum depth (in pools) of 21 cm, and an average stream gradient of 1.9 grades. The sediments in each stream exhibited a grain size distribution with an average fraction less than 0.05 mm represented by 6.3%, a fraction of 0.05–0.1 mm represented by 21.1%, a fraction of 0.1–2 mm represented by 52.1%, a fraction of 2–5 mm represented by 12.1%, a fraction of 5–20 mm represented by 8%, and a fraction of 20+ mm represented by 0.3%. The larval abundance was 0.1–6.7 larvae per 1 m2 of suitable sediment. The emergence period was recorded from 28 May to 1 July. The emergence site was categorized as larvae-dominated plant leave (57% of cases), plant stalks (21%), and tree trunks (17%). Exuviae occurred at an average of 154 cm at horizontal distance from the shore and

an average vertical height of 77 cm above the ground. The average total distance of larval movement was 205 cm. The flight period in 2021 was recorded from 15 June to 11 August with peak flight activity noted in the third week of June. The northernmost population of C. heros was evaluated as viable and stable." (Authors)] Address: Holuša, O., Mendel University in Brno, Fac. Regional Development & Intern. Studies, Tr. Generála Píky 7, 613 00 Brno, Czech Republic

20128. Holzmann, K.L. (2022): Challenges in a changing climate: The effect of temperature variation on growth and competition in damselflies. MSc thesis, Uppsala University, Disciplinary Domain of Science and Technology, Biology, Biology Education Centre. (Animal Ecology): 30 pp. (in English) ["Climate change is affecting biodiversity on multiple levels all over the world. Concomitant with a higher mean temperature, an increased amplitude of temperature variation is predicted. These fluctuations might be even more challenging for organisms than average temperature increases, as they have been demonstrated to decrease survival and physiological performance. However, little attention has been paid to the effects of thermal variation on species interactions. Temperature-dependence of interacting species might affect abundance and population dynamics of species and should be better understood to apply effective conservation measures. I experimentally investigated the influence of thermal variation on growth, cannibalism, and intraguild predation in larvae of two damselfly species: Enallagma cyathigerum, which is a common species in Northern Europe, and Ischnura elegans, which is expanding to the north in Europe. The temperature treatment in the experiment included three different levels of amplitude between 20–26°C (average 23°C) and a constant temperature at 23°C. There was no difference between the temperature variation treatments and also no difference between the constant and the variation treatments in growth, cannibalism and intraguild predation. Hence, at the temperature variation used in this experiment, plastic mechanisms may allow individuals to adjust to temperature fluctuations, or short-term effects in the cold and warm-exposure periods cancel each other out. There was a significant positive correlation between cannibalism/predation and body size variation at the start of the experiment. E. cyathigerum had higher growth rates than I. elegans, but the latter showed higher survival in interspecific treatments. Interestingly, cannibalism was higher than intraguild predation. This study is an important contribution to our understanding of climate change impacts on biotic dynamics, and thus, our ability of making predictions on biodiversity changes in the future." (Authors)] Address: Holzmann, Kim Lea, Uppsala University, Disciplinary Domain of Science & Technology, Biology, Biology Education Centre. (Animal Ecology)

20129. Holzmann, K.L.; Charrier, C.; Johansson, F. (2022): Weak effects on growth and cannibalism under fluctuating temperatures in damselfly larvae. Scientific Reports volume 12, Article number: 12910: 10 pp. (in English) ["The Earth's climate is changing with a trend towards higher mean temperatures and increased temperature fluctuations. Little attention has been paid to the effects of thermal variation on competition within species. Understanding the temperature-dependence of competition is important since it might affect dynamics within and between populations. In a laboratory experiment we investigated the effects of thermal variation on growth and cannibalism in larvae of a damselfly. The temperature treatments included three amplitudes between 20 and 26 °C with an average of 23 °C, and a constant control at 23 °C. Larvae were also raised at five constant temperatures for an estimation of the thermal performance curve, which showed that the thermal optimum for growth was 26.9 °C. Cannibalism was significantly positively correlated with initial body size variance. There was neither a difference among the temperature variation treatments, nor between the constant and the variation treatments in growth and cannibalism. Hence, positive and negative effects of temperature variation within the linear range of a species thermal performance curve might cancel each other out. Since our study mimicked natural temperature conditions, we suggest that the increase in temperature variation predicted by climate models will not necessarily differ from the effects without an increase in variation." (Authors)] Address: Holzmann, Kim Lea, Dept of Ecology & Genetics, Uppsala University, 75236 Uppsala, Sweden. Email: kim.holzmann-@evobio.eu

20130. Huang, D.-Y.; Liu, Q.; Lian, X.-H.; Fu, Y.-Z.; Nel, A. (2022): A new calopterygid damselfly (Odonata, Zygoptera) from the Oligocene Ningming Basin, Guangxi, South China. Palaeoentomology.5.2.3 : 113-119. (in English) ["A new calopterygid genus and species, Guangxicalopteryx huashanensis gen. et sp. nov., is described from the Oligocene of the Ningming Formation in Guangxi Zhuang Autonomous Region, South China. It probably belongs to the subfamily Calopteryginae, 'in-between' Caliphaea + Noguchiphaea and the other Calopteryginae. This new fossil strongly supports the current hypothesis of a humid subtropical climate for the area at this time." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

20131. Huber, E.; Aurenhammer, S.; Bauer, H.; Borovsky, R.; Christof, K.; Degasperi, G.; Eckelt, A.; Friess, T.; Fröhlich, D.; Gartler, L.; Glatzhofer, E.; Gorfer, B.; Gunczy, J.; Gunczy, L.W.; Heimburg, H.; Kirchmair, G.; Koblmüller, S.; Komposch, C.; Kunz, G.; Messner, S.; Milek, C.; Oswald, T.; Paill, W.; Papenberg, E.; Rauch, A.; Schattanek, P.; Staudinger, V.; Strohriegl, K.; Tarog, A.; Trattnik, E.; Volkmer, J.; Weihs, A.; Wiesmair, B.; Witzmann, M.; Zweidick, O. (2022): Bericht über das siebte ÖEG-Insektencamp: Die bunte Biodiversität des Nationalparks Thayatal (Niederösterreich). Entomologica Austriaca 29: 87-181. (in German) ["Report on the seventh "Insect Camp" of the Austrian Entomological Society: colourful biodiversity of the National Park Thayatal (Lower Austria, Austria). The seventh Insect Camp of the Austrian Entomological Society took place in the National Park Thayatal from 18 to 21 June 2021. 24 specialists of entomology, malacology and arachnology and 21 students attended the Insect Camp and/or supported the post-processing of specimens. During the camp time, the participants gained hands-on experience in field research, different trapping, identification and preparation methods. The Insect Camp also provided opportunities to network with specialist entomologists and gather knowledge on scientific work. The study area included 16 different localities in the National Park with different habitats, from water bodies to dry grassland. In total, 1429 species of 19 orders were recorded: 3 species of Dermaptera, 4 of Blattodea, 6 of Odonata, 96 of Heteroptera, 99 of Auchenorrhyncha, 11 of Neuroptera, 3 of Rhaphidioptera, 1 of Megaloptera 3 of Mecoptera, 67 of Diptera, 26 of Trichoptera, 412 of Lepidoptera, 133 of Hymenoptera, 489 of Coleoptera, 40 of Araneae, 6 of Opiliones, 8 of Pseudoscorpiones, 21 of Pulmonata and 1 of Venerida. In addition, 147 plant species were documented. Worth mentioning are nine new records of different

orders for Lower Austria, like Mallota cimbiciformis and Stenus oscillator, and one new carabid record for Austria, Parophonus hirsutulus." (Authors)] Huber, Elisabeth, Ökoteam-Institut für Tierökologie und Naturraumplanung, Bergmanngasse 22, A-8010 Graz, Austria.

20132. Iorio, E.; Dusoulier, F.; Soldati, F.; Noël, F.; Guilloton, J.A.; Doucet, G.; Ponel, P.; Dupont, P.; Krieg-Jacquier, R.; Chemin, S.; Tillier, P., Touroult, J. (2022): Terrestrial arthropods in impact studies: current limitations and proposals for better consideration of conservation issues. Naturae, Publications scientifiques du Muséum, 2022.10.5852/naturae2022a4: 58 pp. (in French, with English summary) ["Environmental impact studies are a regulatory process to assess projects that may have significant environmental impacts. It includes a "natural environments" section, where an ecological diagnosis gives an initial status of the site to be assessed, including its wildlife, botanical and habitat concerns, based on bibliographical references and dedicated surveys. The result is the proposal for "ERC" measures (avoid, reduce, compensate) to preserve the environmental issues identified prior to the project.Arthropods are by far the most diverse phylum of the animal kingdom, and should therefore have an important place in an environmental impact study. However, only four orders have species listed in the current regulations, and the phylum of arthropods is poorly represented compared to vertebrates. The review of 50 impact studies shows that only three main groups are studied, relatively related to existing protections: butterflies (Zygaena included), dragonflies and Orthoptera, and some protected saprophagous wood-boring beetles. A 'closed-loop' effect occurs, likely inherent in the regulations and many of the associated actions, as these groups are the ones on which knowledge is most advanced and which are the subject of most Red List assessments. This imbalance between the groups covered in the impact studies and the actual diversity of continental arthropods, their specialisations and ecological functions, and their particular distributional characteristics, means that the issues at stake are assessed unequally depending on the habitats and geographical sectors concerned. Thus, butterflies and Orthoptera primarily highlight species and conservation issues for grassland environments, followed secondarily by moors, thickets and scrubland; dragonflies for freshwater environments. Butterflies and dragonflies also include a significant number of species of concern that are associated with peat bogs and marshes. These groups are generally good indicators of the issues affecting these habitats. The beetles that appear most regularly in impact studies highlight isolated trees, hedgerows, tree lines and forest edges. On the other hand, these groups are very few valuable to highlight conservation issues for arthropods of the coastal and closed forest environments. Butterflies and dragonflies are among the arthropods with the lowest rates of endemism in metropolitan France, which means that this conservation issue is under-represented in the impact studies. Functional guilds such as coprophagous, necrophagous or litter predators and decomposers are virtually almost forgotten in impact studies. This article proposes six groups for which knowledge has progressed well over the last 10 to 20 years and which would provide an ecological and taxonomic complement to the species currently used in regulatory studies: centipedes (Chilopoda), woodlice (Isopoda, Oniscidea), long-horned beetles (Cerambycidae and Vesperidae), Scarabaeoidea and Tenebrionidae, and shield-bugs (Heteroptera, Pentatomoidea). Most of the species of high concern in these six groups are found on beaches or dunes, forests or environments such as caves, cliffs or screes. Centipedes, woodlice and Tenebrionidae beetles have a large number of endemics and a high national responsibility. Beaches and coastal environments, from the shore to the dunes, are the most striking example of under-representation in protected species and current impact studies, with dozens of specialised species at risk and no umbrella species to protect them. To a lesser extent, the same applies to closed forests. Caves appear to be of less concern. However, the often narrow distribution of the endemic arthropods they house means that the stakes are not to be underestimated. The protection lists therefore need to be completed with groups other than those taken into account so far, but in a manner appropriate to continental arthropods. Protection should prioritise habitats and not specimens, in correlation with the particularities of their study and their biology. For butterflies, dragonflies and Orthoptera, although a large number of regulated species remain relevant, the lists need to be revised.This study proposes a list of 135 species with high conservation concerns in nine arthropod groups. If this list was taken into account by environmental agencies, landscape planners and environmental authorities, it would reflect the challenges for continental arthropods in impact studies and thus enable measures to be taken that are better suited to their conservation." (Authors)] Address: Iorio, É., ECOTER (Écologie & Territoires), 44 route de Montélimar, F-26110 Nyons, France

20133. Jakubiak, M.; Bojarski, B.; Bien, M.; Stonawski, B.; Oglecki, P. (2022): Influence of fish ponds on the benthic invertebrate composition in hydrological networks of selected fish farms in Southern Poland. Folia Biologica (Kraków) 70: 11-18. (in English) ["Fish production can generate high amounts of wastewater containing compounds such as suspended solids, nitrogen and phosphorus. On the other hand, fish ponds provide a range of ecological functions including biocenotic, physiocenotic, hydrological and microclimatic functions as well as landscape shaping. The aim of this study was to determine the taxonomic composition of the bottom invertebrate fauna in selected watercourses on chosen carp fish farms and to assess the influence of fish farming on the taxonomic composition of the zoobenthos of the watercourses associated with such ponds. The research was conducted in four channels on two semi-intensive aquaculture fish farms located in Zaborze and Kraków (Poland). Sampling of the benthic fauna was carried out once a month between May and September 2018. The results showed that the mean monthly number of zoobenthos families in the inflow canal in Zaborze was higher than those in the outflow canal. Moreover, a decrease of the BMWP-PL index in the aforementioned farm may indicate a deterioration of the water quality resulting from its flow through the ponds. It can therefore be concluded that semi-intensive carp farming may affect the diversity of benthic invertebrate fauna in the watercourses connected to these ponds." (Authors)] Address: Jakubiak, M., Dept of Environmental Management and Protection, Faculty of Mining Surveying and Environmental Engineering, AGH University of Science and Technology, Mickiewicza 30, 30-059 Kraków, Poland. Email: jakubiak@agh.edu.pl

20134. Jana, P.K.; Mallick, P.H.; Bhattacharya, T. (2022): Aspects of the reproductive behaviour of Onychargia atrocyana (Odonata: Platycnemididae). Notulae odonatologicae 9(9): 429-440. (in English) ["Reproductive behaviour of Onychargia atrocyana was investigated from tandem formation to post-ovipositional resting. No male territoriality, aggression or courtship display was observed at the mating

site. The species preferred to mate and oviposit on Alternanthera philoxeroides stems or Colocasia esculenta petioles. The duration of copulation was 212–568 sec. Copulation was accomplished in three stages involving abdominal flexions and wing flapping. The female oviposited while in tandem on submerged stems and petioles of macrophytes. Oviposition was endophytic in rows forming a zigzag pattern. There were distinct post-copulatory (8–92 sec.) and post-ovipositional resting phases (up to 225 sec.)." (Authors)] Address: Jana, P.K., Dept of Zoology, Vidyasagar University, Midnapore, Paschim Medinipur, West Bengal, 721102, India. Email: priyanka@mail.vidyasagar.ac.in

20135. Jana, P.K.; Mallick, P.H.; Bhattacharya, T. (2022): Triple connection and female takeover in Copera marginipes (Odonata: Platycnemididae). Notulae odonatologicae 9(9): 461-468. (in English) ["A territorial male of C. marginipes established a triple connection with an intruding male and his female partner in tandem. Both the males exhibited intense prolonged agonistic interactions including biting various parts of the body. The fight lasted for 46 minutes. Eventually the territorial male was able to break the tandem linkage and took over the female from the intruding male, but he lost the tarsus of his right mid leg in the interaction." (Authors)] Address: Jana, P.K., Dept Zoology, Vidyasagar Univ., Midnapore, Paschim Medinipur, West Bengal, 721102, India. Email: priyanka@mail.vidyasagar.ac.in

20136. Jocque, M.; Garrison, R.W. (2022): Dragonflies of Cusuco National Park, Honduras; checklist, new country records and the description of a new species of Palaemnema Selys, 1860 (Odonata: Platystictidae). Zootaxa 5188(5): 453-476. (in English) ["The odonate fauna of Honduras is poorly documented. Based on 10 years of observations and collections we present an overview of dragonflies from cloud forests in Cusuco National Park, northwestern Honduras. A total of 44 species were reported including at least seven new country records for Honduras we include ecological observations for most species. A new species of Platystictidae (Palaemnema lorae Jocque & Garrison, n. sp. Holotype male: HONDURAS: Cortés Dept., CNP, Cantiles, Trail 5, small river close to camp, N15.513457 W88.241681; 1846m, 23 June 2012 collected by Merlijn Jocque, field code: BINCO_HON_12_047, in RBINS) is described and illustrated." (Authors)] Address: Jocque, M., Aquatic and Terrestrial Ecology (ATECO), Royal Belgian Institute of Natural Sciences (RBINS) Vautierstraat 29, 1000 Brussels, Belgium. Email: merlijnjocque@gmail.com;

20137. Jödicke, R. (2022): On the validity of Vander Linden's name Agrion viridis (Odonata: Lestidae). Notulae odonatologicae 9(9): 398-403. (in English) ["A few papers have questioned the validity of the name Agrion viridis Vander Linden, 1825 [= Chalcolestes viridis], arguing that it is preoccupied by a senior homonym A. viridis Vander Linden, 1820, itself a junior synonym of A. barbara Fabricius, 1798 [= Lestes barbarus]. I have designated a neotype of A. viridis Vander Linden, 1820, in line with L. barbarus. The prevailing usage of the specific name viridis Vander Linden, 1825, can be maintained by a reversal of precedence: The junior homonym should be considered a nomen protectum over its senior homonym A. viridis Vander Linden, 1820, now a nomen oblitum." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

20138. Jödicke, R.; Borkenstein, A. (2022): Sympetrum fonscolombii in Niedersachsen: ein Modell zu Immigration und Reproduktion am Nordrand des transalpinen Invasionsraums (Odonata: Libellulidae). Libellula 41(1/2): 1-24. ["S. fonscolombii in Lower Saxony, northwestern Germany: a model of immigration and reproduction at the northern edge of the transalpine invasion – Since the 1990s S. fonscolombii increasingly became a regular immigrant. It was annually present at many different places in Lower Saxony from 2005 onwards. A separation of the data into immigrants or their progeny was problematic because most observers did not report their data on imagines with a sufficient age specification. However, by means of special requests the following picture arose: Immigrants were on the wing from early May until August. They arrived in almost or completely mature colouration and oviposited from mid-May until mid-July. At one lake, in 2019, the immigrants stayed for at least 68 days. At many places the migrants' offspring emerged in the same year. The long emergence period started presumably in mid-July and continued until early November, demonstrating a short development cycle, even in the North. Emerged individuals left their breeding site in an immature stage. Six cases of spring emergence were documented. We therefore conclude that, in a proportion of the eggs laid, larvae were unable to develop and reach emergence within the same year. Those individuals hibernated in the larval stage and emerged between mid-May and early July in the subsequent year, thus representing a univoltine life cycle. Nothing is known about their destiny. The model presented here is based on the evidence-based assumption that immigrants establish only one subsequent generation, which predominantly emerges within the same year, but does not mature in the invasion area. Larvae which do not reach the ultimate stage until the autumn hibernate and emerge in the following spring, just in the period when the next immigrants appear. This model is broadly supported by further data from northwestern Europe, but there are controversial interpretations which are discussed. The contradictory issue could be solved if in future more observers pay attention to the age of imagines seen." (Authors)] Address: Jödicke, R.,.Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

20139. Jöhnk, B.; Jödicke, R. (2022): Über ein immatures Weibchen von Leucorrhinia rubicunda mit keulenförmigem Abdomenende (Odonata: Libellulidae). Mitteilungen der AG Libellen in Niedersachsen und Bremen 4: 39-40. (in German) [Diepholzer Moor, Niedersachsen, Germany, 10-V-2022] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

20140. Joshi, S. (2022): Platygomphus benritarum sp. nov. and rediscovery of Anormogomphus heteropterus Selys, 1854 (Odonata: Anisoptera: Gomphidae) from Tezpur, Assam, India. International Journal of Odonatology 25: 62-71. (in English) ["A. heteropterus is redescribed based upon a single male specimen. Discrepancies and inaccuracies in previous illustrations of this species that could cause confusion are pointed out. Platygomphus benritarum sp. nov. is described on the basis of a single male specimen collected at Tezpur, Sonitpur District, Assam, India. Platygomphus benritarum differs from its congeners and other, similar species such as Asahinagomphus insolitus (Asahina, 1986) by its thoracic markings and shape of the abdomen and cerci." (Authors)] Address: Joshi, A., Research Collections, National Centre for Biological Sciences, Bangalore, India; Southern Regional Centre, Zoological Survey of India,

Chennai 600028, India

20141. Joshi, S., Sawant, D.; Ogale, H., Kunte, K. (2022): Burmagomphus chaukulensis, a new species of dragonfly (Odonata: Anisoptera: Gomphidae) from the Western Ghats, Maharashtra, India. Zootaxa 5133(3): 413-430. (in English) ["We describe a new species of dragonfly, Burmagomphus chaukulensis sp. nov., based on four males and two females from Chaukul, Sindhudurg, Maharashtra located in the Western Ghats biodiversity hotspot of India. The newly described species is diagnosed from its congeners by a combination of following characters: the shape of male caudal appendages (prominent lateral spines on cerci) and the lateral thoracic markings (stripe on mesepisternum reduced and pointed anteriorly). Additionally, B. chaukulensis is unique in terms of the shape of hamuli, strongly angulated with spines at both sides. An updated identification key to Indian Burmagomphus spp. is also provided." (Authors)] Address: Joshi, S., Zoological Survey of India, Southern Regional Centre, Santhome High Road, Chennai 600028, Tamil Nadu, India. Email: shantanu@ifoundbutterflies.org

20142. Jouault, C.; Tischlinger, H.; Henrotay, M.; Nel, A. (2022): Wing coloration patterns in the Early Jurassic dragonflies as potential indicator of increasing predation pressure from insectivorous reptiles. Palaeoentomology 5(4): 305-318. (in English) ["Wing coloration is a very ancient feature among insects. Even the wings of the oldest known Pterygota showed transverse colored bands involved in a putative disruptive function. However, no evidence of wing coloration in the representatives of the superorder Odonatoptera is recorded before the latest Triassic. These were the only insect flying- predators until the pterosaurs began their diversification. Here we argue that the situation dramatically changed in the Early Jurassic, with the simultaneous appearance of Odonata with patterns of coloration in phylogenetically distant clades. It is especially the case in the Heterophlebiidae, a small family closely related to the Anisoptera, in which we could record no less than five different patterns of coloration in the same rather small area of North-Western Europe. At the same time and in the same area, small potentially insectivorous pterosaurs greatly diversified. The increase of the predation pressure on the Odonata is the most probable cause of the appearance of patterns of colored spots and bands on the dragonfly wings at that time. In the period between the Middle Jurassic to Early Cretaceous, the number of Odonata with spots and bands of color on wings dramatically increased, we assume in relation to the predation pressure due to an increasing diversification of insectivorous pterosaurs, but also small feathered dinosaurs and birds." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

20143. Kalejta, M.; Buczynski, P. (2022): New locality of Golden-ringed Dragonfly Cordulegaster boltonii (DONOVAN, 1807) (Odonata: Cordulegastridae) in its disjunct range in the Romincka Forest. Odonatrix 187: 3 pp. (in Polish, with English summary) ["C. boltonii was recorded on 11th August 2022 on the River Bludzia near the Bludzie forester's lodge (N 54.323489; E 22.575684) in north-eastern Poland. This is the fifth locality of the species in the Romincka Forest. These five localities (one in Russia and four in Poland), together with two other localities in the Suwalski Landscape Park, form a disjunct area of the species' distribution situated ca. 300 km east of its contiguous range. It is very likely that there are more localities inhabited by this species in north-eastern Poland." (Authors)] Address: Kalejta, Miroslawa, ul. Alfreda Wierusza-Kowalskiego 13/38, 16-400 Suwalki, Poland. Email: mira0512@onet.eu

20144. Kalkman, V.J. (2022): On the synonymy of Cordulegaster orientalis Van Pelt, 1994, with Cordulegaster boltonii (Donovan, 1807) (Odonata: Cordulegastridae). Notulae odonatologicae 9(9): 414-418. (in English) ["C. orientalis, which was described from a single male from Shandong Province, China, is concluded to be a mislabelled specimen of the European C. boltonii." (Author)] Address: Kalkman, V.J., Natural Biodiversity Center, naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

20145. Kalkman, V.J.; Gurung, M.M.; Zhang, H.-m. (2022): On the Asian species of Perissogomphus Laidlaw, 1922, and Ophiogomphus Selys, 1854 (Odonata: Gomphidae). Notulae odonatologicae 9(9): 389-397. (in English) ["Based on larval and adult morphology Perissogomphus Laidlaw, 1922, is shown to be close to Ophiogomphus but is not synonymised due to conflicting molecular COI-data. Perissogomphus asahinai Zhu, Yang & Wu, 2007, is shown to be a synonym of Perissogomphus stevensi. Ophiogomphus longihamulus Karube, 2014, O. minimus Karube, 2014, O. phantoani Phu Ngo & Ty Nguyen, 2021, and O. sinicus (Chao, 1954), clearly do not belong to the genus Ophiogomphus and are placed in Melligomphus. By this analysis the number of species of Ophiogomphus is reduced to 25, of which four occur in the Palaearctic and 21 occur in the Nearctic." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

20146. Karunarathna, D.S.; Gauder, S.I.; Rathnayake, R.R.M.U.N.B.; Dammini Premachandra, W.T.S. (2022): Diversity and abundance of odonates (Order: Odonata) in Gurudeniya, Kandy District, Sri Lanka. Vingnanam Research Conference, 21st of July 2022, Faculty of Science, University of Jaffna, Sri Lanka: 37- (in English) [Verbatim: The previously unexplored Gurudeniya region in Kandy district was surveyed for adult odonate diversity and abundance. Three habitats, i.e., along the "Thalathuoya" tributary, adjacent forest cover and a home garden, were selected for the study. Sampling was conducted twice a week, during 8 am - 9 am and 4 pm - 5 pm for three months from October to December 2021, along a 200 m × 4 m belt transect. Altogether, 1933 odonate individuals belonging to eight families and fourteen species were recorded and they represented 43 % of the suborder Anisoptera and 57 % of Zygoptera, respectively. We detected eight endemic, three endangered and four vulnerable species. The Libellulidae was found to be the most diverse family, comprised of four species inhabiting only the tributary area. Calopterygidae, Gomphidae and Platycnemididae had two species in each. Vestalis apicalis nigrescens, Euphaea splendens and Ceylonosticta bine, were recorded as common inhabitants at all the study sites. Vestalis apicalis nigrescens and Trithemis festiva were the dominant Zygopteran and Anisopteran species with 37 % and 30 % relative abundance, respectively. The tributary had the most diverse and abundant odonate community, comprising fourteen species and 70 % relative abundance with a Shannon-Wiener diversity index of 1.94. At all of the study sites, the family Calopterygidae was abundant in terms of tributary 44 %, woodland 78 % and residential garden 89 %, respectively. In the majority of the odonate species, males outnumbered females. The findings of this study elucidated the odonates at Gurudeniya within a short

period of time. An extensive study is underway to determine the larval and adult assemblages.] Address: Premachandra, Dammini, Dept of Zoology, Faculty of Science, University of Ruhuna, Sri Lanka. Email: dammini@zoo.ruh.ac.lk

20147. Keetapithchayakul, T.S.; Makbun, N.; Phan, Q.T.; Danaisawadi, P.; Wongkamhaeng, K. (2022): Description of the larva of Indocnemis orang (Förster in Laidlaw, 1907) (Odonata: Platycnemididae: Calicnemiinae) from Thailand, with larval key to the known genera of the family Platycnemididae in Asia. Zootaxa 5134(4): 504 -520. (in English) ["The larval characters of the genus Indocnemis Laidlaw, 1917 are described based on larval specimens of I. orang (Förster in Laidlaw, 1907) from Thailand. The larvae are characterized by 5–6 pairs of premental setae, 8–9 palpal setae of the same length, and vertical lamella caudal gills. The habitats and new provincial records of I. orang in Thailand are also provided in addition to a key to the genera of the family Platycnemididae in Asia." (Authors)] Address: Keetapithchayakul, T.S., Dept Zool., Fac. Science, Kasetsart Univ., 50 Ngam Wong Wan Rd, Lat Yao Chatuchak Bangkok, Thailand. Email: Keetapithchayakul.TS@gmail.com

20148. Keith D.P. Wilson, K.D.P.; Reels, G.T. (eds.) (2022): New books. Agrion 26(2): 54-56. (in English) [A Photographic Field Guide to the Dragonflies & Damselflies of Singapore 54; Dragonflies and Damselflies of Madagascar and the Western Indian Ocean Islands/Libellules et Demoiselles de Madagascar et des Iles de l'Ouest de l'Océan Indien 55; Dragonflies of Russia: Illustrated Photo Guide 56.] Address: Wilson, K.D.P.; 18 Chatsworth Road, Brighton, BN1 5DB, UK. Email: kdpwilson@gmail.com

20149. Koneri, R.; Nangoy, M.J.; Elfidasari, D. (2022): Odonata diversity in the Laine Waterfall Area, Sangihe Islands, North Sulawesi, Indonesia. AACL Bioflux 15(3): 1083-1095. (in English) ["In the ecosystem, Odonata functions as a biological control agent and an indicator of the freshwater environment. Therefore, this research aims to analyze Odonata diversity in the Laine Waterfall Area, Sangihe Islands, North Sulawesi, Indonesia. The sampling was carried out in 3 types of aquatic habitats, namely waterfalls, secondary forests, and agricultural land. In each habitat, 3 line transects with a length of 100 m were constructed around the river flow and the sampling was conducted along the transect using a sweep net. The results obtained a total of 5 families, which onsists of 25 species and 928 individuals of dragonflies. Among the families, Libellulidae was dominant, while the species with the highest abundance was Nosoticta flavipennis. Furthermore, the highest abundance, richness, and species diversity index were discovered in waterfall habitats. This showed that the research location is suitable for dragonfly activity due to several factors, namely temperature, humidity, and light intensity, which were normal for the species' activity." (Authors)] Address: Koneri, R., Dept Biol., Fac. Mathematics & Natural Sciences, Sam Ratulangi University, Manado, North Sulawesi, Indonesia. Email: ronicaniago@unsrat.ac.id

20150. Koneri, R.; Nangoy, M.J.; Siahaan, P. (2022): Species diversity of dragonflies on the Sangihe Islands, North Sulawesi, Indonesia. Applied Ecology and Environmental Research 20(2): 1763-1780. (in English) ["The diversity of dragonflies on an island is strongly influenced by habitat degradation, as well as the size and distance from the mainland. Therefore, this study aims to analyze the species diversity of dragonflies in the Sangihe Islands, North Sulawesi, Indonesia. It was carried out in five types of habitats namely forests, waterfalls, dams, agricultural land, and settlements. In each habitat, four-line transects with a length of 100 m each were made and placed around the river. The results showed 6 families which included 32 species and 3020 individuals. Libellulidae is the family with the highest number of species. Furthermore, the dominant species in the suborders Anisoptera and Zygoptera were Orthetrum pruinosum and Rhinocypha frontalis, respectively. Forests, waterfalls, and dams tend to have the highest species richness and diversity index compared to other habitats. Based on the results, the diversity of dragonflies at the observation site is strongly influenced by the complexity of the vegetation and environmental factors, including temperature and humidity. The presence of the families Chlorocyphidae, Calopterygidae, and Platycnemididae in each of the studied habitats indicates that the water quality is still very good and supports the life of dragonflies." (Authors)] Address: Koneri, R., Dept Biol., Fac. Mathematics & Natural Sciences, Sam Ratulangi University, Manado, North Sulawesi, Indonesia. Email: ronicaniago@unsrat.ac.id

20151. Kownacki, A.; Szarek-Gwiazda, E. (2022): The impact of pollution on diversity and density of benthic macroinvertebrates in mountain and upland rivers. Water 2022, 14(9), 1349; https://doi.org/10.3390/w14091349: 14 pp. (in English) ["This article summarizes the studies concerning the impact of pollutants on benthic macroinvertebrate communities in the mountain and upland rivers of southern Poland. The Carpathian Raba River, which in the 1960s retained its natural character and had good water quality, was considered as a reference in terms of benthic macroinvertebrate communities. The other two analyzed rivers were polluted to different degrees. The Carpathian Dunajec River was contaminated mainly by sewage from small towns and treatment plant, while the upland Vistula River mainly by sewage from the Upper Silesian Industrial Region and saline waters from coal mines. In studied ecosystems in response to pollutions, a rapid increase in density of fauna caused mainly by the massive development of Oligochaeta was found. In the mountain river, the impact of contamination on macroinvertebrate diversity was negligible. There, taxa considered as indicators of clean water (Ephemeroptera, Plecoptera, and Trichoptera) were abundant and their diversity was similar to that of an uncontaminated river. In the heavily polluted upland Vistula River, the sites with a muddy bottom were dominated by Oligochaeta (99.4–99.9%), while at sites with stony bottoms, apart from Oligochaeta, there were also Chironomidae, Gastropoda, and Hirudinea. In comparison to the 1950s, all Ephemeroptera, Plecoptera, Odonata, Trichoptera, and Megaloptera were extinct." (Authors)] Address: Szarek-Gwiazda, Ewa, Institute of Nature Conservation PAS, av. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: szarek@iop.krakow.pl

20152. Kumar, C.S.; George, B.S.; Anooj, S.S. (2022): Range extension and high altitudinal record of Sympetrum meridionale (Selys) (Odonata: Libellulidae). Indian Journal of Entomology, Online published Ref. No. e20353; https://doi.org/10.55446/IJE.2021.301: 4 pp. (in English) ["S. meridionale (Selys, 1841) occurs throughout Asia Minor to Persia and Kashmir. The earlier Indian records of S. meridionale are from Yusimarg, 2286 m, and from below Gulmarg, 2438 m, Kashmir valley. Herein, the range extension and high altitudinal record of this species is reported from the Indus riverine, Leh, Ladakh Union territory of India at an elevation of 3500 m. A note on the habitat, which is entirely different from that of Kashmir valley, its originally known habitat, is provided. Study of museum specimens reveals

the eastern most record of the species, from Sikkim and an additional new record from Srinagar. The species diagnosis including comparison of male genitalia, along with the need to validate the previous records from Rajasthan and further surveys along Himalaya and lower latitudes are discussed." (Authors)] Address: Anooj, S.S., Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India. Email: anooj227@gmail.com

20153. Kumar, K.; Singh, A.P., Singh, R. (2022): The diversity of Odonata (Insecta) in selected localities of Jammu and Kashmir. Indian Forester 148(5): 547-551. (in English) ["A total of 32 species of odonates were recorded from three different regions of Jammu during June 2019 to August 2020 (Table 2). All species were photographed and presented here in the study (Plate 1 and 2). Twenty two species of Anisoptera and ten species of Zygoptera consists of 7 families and 25 genera. Libellulidae was the dominant family (n=18), followed by Coenagrionidae with 4 species, Aeshnidae, Gomphidae, Calopterygoidae, Platycnemididae with 2 species each and least Chlorocyphidae with 1 species (Fig. 1). In our knowledge 15 species of Anisoptera and 10 species of Zygoptera are addition to the fauna of Jammu and Kashmir. High diversity was recorded from the Kathua region followed by Rajouri and Poonch (Fig. 2)." (Authors) A Gynacantha dravida B. Polycanthagyna erythromelas C. Ictinogomphus rapax D. Ophiogomphus reductus E. Orthetrum pruinosum F. Trithemis festiva G. Orthetrum sabina H. Diplacodes trivialis I. Rhyothemis variegate J. Zyxomma petiolatum K. Trithemis aurora L. Acisoma panorpoides M. Brachythemis contaminate N. Orthetrum triangulare O. Crocothemis servilia P. Orthetrum glaucum Q. Trithemis festiva R. Neurothemis tullia S. Bradinopyga geminate. Sympetrum commixtum B. Tholymis tillarga C. Neurothemis fulvia D. Neurobasis chinensis E. Aristocypha quadrimaculata F. Libellago lineata G. Pseudagrion rubriceps H. Ceriagrion coromandelianum I. Enallagma cyathigerum J. Paracercion calamorum K. Copera marginipes L. Copera vittate M. Coeliccia renifera] Address: Singh, A.P., Wildlife Institute of India, Post Box # 18, Chandrabani, Dehradun - 248001, India. Email: amarpaulsingh4@gmail.com

20154. Kumari, B.; Priya, A. (2022): Seasonal variation in insect biodiversity in a transitioning sub-urban area. International Journal of Zoological and Entomological Letters 2(1): 42-49. (in English) ["A survey was carried out on the species diversity of insects in the suburban transition area of Patna. The study was conducted over a one-year period of 2021 (January to December). A total of 41 species of insects have been identified in a small area (10 acre), with Lepidopteran order (20) are dominance over the Hemiptera (5), Hymenoptera (5), Coleoptera (4), Odonata (3), and Polydesmida, Mantodea, Diptera, and Orthoptera one species each. All of these species are found based on seasonal variation and vegetation as well as the presence of built-up areas. The highest number of insect species was in September, and the lowest were in May and December. Species of Syntomoides imaon and Mylabris flexuosa were captured during the mating conditions in the months of August and September (rainy season), respectively. These variation indicates the abundance of insect biodiversity and also provides evidence of the abundant food chain of ecosystems." (Authors) Potamarcha congener, Diplacodes trivalis and Ceriagrion cerinorubellum are listed.] Address: Kumari, Bibha, Dept of Zoology, Magadh Mahila College, Patna University Patna, Bihar, India

20155. Kusumaningrum, A.T.; Henri, H.; Saputra, H.M. (2022): Odonata diversity at the Mount Permisan Natural Tourism Park South Bangka regency, Bangka Belitung. BioLink: Jurnal Biologi Lingkungan, Industri dan Kesehatan 9(1): 66-75. (in English) ["Mount Permisan Natural Tourism Park, South Bangka regency is a conservation area that contains flora and fauna. The diversity of fauna in conservation areas is important to note because fauna can maintain the balance of natural ecosystems. This study aims to analyze the diversity of species and the effect of habitat characteristics on the Odonata population. Odonata sampling was carried out using an insect net randomly at a predetermined point in the left and right directions of the 100 m transect line. Identification was carried out at the Entomology Laboratory, Agricultural Quarantine Center Pangkalpinang, and compared with a comparison sample at the Zoology Laboratory, Biology Dept, Universitas Bangka Belitung. Based on the research that has been done, found 14 species of Odonata from the sub-order Anisoptera and 11 species of damselfishes from the sub-order Zygoptera. The species diversity at that location was classified as moderate because H' was 1.56 to 2.05. The evenness value is high with a value of 0.62 to 0.90. The species of wealth (Margalef) is in the range of values from 2.55 to 2.75 which indicates the species richness of dragonflies in the Mount Permisan Natural Tourism Park index is classified as moderate." (Authors)] Address: Henri, H., Biology Dept, Faculty of Agriculture, Fisheries and Biology, Universitas Bangka Belitung, Indonesia. E-mail: biology.henry@gmail.com

20156. Kuziora, P. (2022): Confirmation of the occurrence of Golden-ringed Dragonfly Cordulegaster boltonii (DONOVAN, 1807) (Odonata: Cordulegastridae) in the Janowskie Forests. Odonatrix 186: 2 pp. (in Polish, with English summary) ["C. boltonii was recorded on June 5th (1 exuvia) and 12 th June 2022 (at least 3 imagines) on the River Dêbowiec near Lipowiec (eastern part of the Janowskie Forests) (SE Poland). This is a new locality of this species in the Janowskie Forests." (Author)] Address: Kuziora, P.; Email: pawelkuziora1@gmail.com

20157. Lancer, B.H.; Evans, B.J.E.; Fabian, J.M.; O'Carroll, D.C.; Wiederman, S.D. (2022): Preattentive facilitation of target trajectories in a dragonfly visual neuron. Communications Biology 5(829): 13 pp. (in English) ["The ability to pursue targets in visually cluttered and distraction-rich environments is critical for predators such as dragonflies. Previously, we identified Centrifugal Small-Target Motion Detector 1 (CSTMD1), a dragonfly visual neuron likely involved in such target-tracking behaviour. CSTMD1 exhibits facilitated responses to targets moving along a continuous trajectory. Moreover, CSTMD1 competitively selects a single target out of a pair. Here, we conducted in vivo, intracellular recordings from CSTMD1 to examine the interplay between facilitation and selection, in response to the presentation of paired targets. We find that neuronal responses to both individual trajectories of simultaneous, paired targets are facilitated, rather than being constrained to the single, selected target. Additionally, switches in selection elicit suppression which is likely an important attribute underlying target pursuit. However, binocular experiments reveal these results are constrained to paired targets within the same visual hemifield, while selection of a target in one visual hemifield establishes ocular dominance that prevents facilitation or response to contralaterally presented targets. These results reveal that the dragonfly brain preattentively represents more than one target trajectory, to balance between attentional flexibility and resistance against distraction." (Authors)] Address: Lancer, B.H., School of Biomedicine, The

University of Adelaide, Adelaide, Australia. Email: benjamin.lancer@adelaide.edu.au

20158. Lechner, K. (2022): Erstnachweis von Gomphus pulchellus Selys, 1840 (Odonata: Gomphidae) in Tirol (Österreich) – Ein Vorstoß in den Alpennordrand. Entomologica Austriaca 29: 29-37. (in German, with English summary) ["First record of Gomphus pulchellus Selys, 1840 (Odonata: Gomphidae) in Tyrol (Austria) – an advance into the northern edge of the Alps. Gomphus pulchellus Selys, 1840, the Western Clubtail, is a Western European endemic dragonfly and has expanded its range over the last decades rapidly to the North and East. In Austria, the first specimens were discovered in 1985/1986 in Vorarlberg. In 2006, this dragonfly was found in Salzburg, and very recently, it reached the Upper Austrian-Bavarian border resp. Lower Austria. In 2020, the author observed a female of the Western Clubtail for the first time in Tyrol, which is reported in this article. This record represents probably the most extensive advance in the Alps until now. Its occurrence in the Tyrolean Lechtal is discussed in light of the species' recent spread and its known ecological demands in Central Europe." (Author)] Address: Lechner, M., Wiesenhofweg 22, 6133 Weerberg, Austria. Email: lechner.weerberg@gmail.com

20159. Lemke, M.; Hryniuk, P. (2022): First record of the dragonfly biting midge Forcipomyia paludis (Diptera: Ceratopogonidae) in Ukraine. Ukrainska Entomofaunistyka 13(1): 7-10. (in English, with Ukrainian summary) ["Based on unnoticed photograph of immature adult male Cordulia aenea with three females of the dragonfly biting midge Forcipomyia (Pterobosca) paludis (Macfie, 1936) parasitizing on it in the National Nature Park "Northern Podillya", Lviv Region, western Ukraine, the latter species is recorded from Ukraine for the first time. The photo was uploaded in the open natural history online database of the Ukrainian Biodiversity Information Network (UkrBIN) and was later discovered there. This record extends the known range of F. paludis to Eastern Europe." (Authors)] Address: Lemke, M., Am Grüneberg 37, 66557 Illingen, Germany. Email: malemke@gmx.de

20160. Li, Z.; Sun, L.; Wang, Z.; Zhao, S.; Duo, L. (2022): The Critically Endangered dragonfly Libellula angelina is losing its habitat to urbanization in East Asia. Oryx 56(2): 172- (in English) ["The Critically Endangered dragonfly Libellula angelina, known as the bekko tombo, of central and northern China, Japan, western South Korea, and North Korea, was common before 1970 but has declined dramatically as a result of habitat loss caused by urbanization. In China, natural ponds and wetland parks have facilitated the survival of this species in megacities such as Beijing and Tianjin, but habitat degeneration in some cities appears to be resulting in further decline of the species. The natural ponds around the Chentai Bridge in Beichen district, Tianjin, one of the historical habitats of the bekko tombo, suffered a severe drought from excessive pumping for irrigation in spring 2020, followed by excessive water supplementation that increased the original water level in autumn 2020. In Tianjin Water Park, another habitat of the bekko tombo, sediment was dredged and reeds mowed, destroying habitat for the species' nymphs and imagoes, respectively, in 2020. During 15 April–15 May 2021, we surveyed for the bekko tombo in these two habitats on 18 occasions, concentrating on their preferred microhabitats in reeds and open grassland, but failed to find the species. Prior to this, the bekko tombo was commonly seen in these two areas in spring. The prime habitat for the bekko tombo is unmodified, stable and organic-rich ponds with open water and moderate growth of emergent plants. Urbanization and habitat degradation, accompanied by reclamation, drought, contamination, sediment dredging, mowing of reeds and shrinkage of wetlands, are driving the collapse of the remaining populations of the bekko tombo. Measures are required to maintain the integrity of the species' habitat by protecting wetlands from urbanization and anthropogenic modification, with a halt to inappropriate dredging and mowing." (Authors)] Address: Li, Z., College of Life Sciences, Tianjin Normal University, Tianjin, China, and Tianjin Key Laboratory of Animal and Plant Resistance, Tianjin, China duolian_tjnu@163.com

20161. Liao, J.; Wang, H.; Xiao, S.; Guan, Z.; Zhang, H.; Dumont, H.J.; Han, B.-P. (2022): Modeling and prediction of the species' range of Neurobasis chinensis (Linnaeus, 1758) under climate change. Biology 2022, 11(6), 868; https://doi.org/10.3390/biology11060868: 14 pp. (in English) ["Simple Summary: Global climate change is accelerating and modifying the distribution of many extant species. Dragonflies, as a group, inhabit aquatic as well as terrestrial environments and are considered sensitive climate change indicators. In this study, we model and predict the range of a large, tropical damselfly Neurobasis chinensis L. under the last glacial maximum (LGM), the current, and four future warming scenarios. The models show that the species mainly occupies forest ecosystems below 1200 m (preferring 500 to 1200 m) and had two historic core distribution areas in LGM, one of which survived, namely south-central Vietnam. The future scenarios show that the core distribution, high suitable habitats, and even the whole species range of N. chinensis will extend northwards. Abstract: Neurobasis chinensis is widely distributed in eastern tropical Asia. Its only congener in China, the N. anderssoni, has not been observed for decades. To protect N. chinensis, it is necessary to understand the ecological properties of its habitats and specie's range shift under climate change. In the present study, we modeled its potential distribution under one historical, current, and four future scenarios. We evaluated the importance of the factors that shape its distribution and habitats and predicted the historical and current core spatial distributions and their shifting in the future. Two historical core distribution areas were identified: the inland region of the Bay of Bengal and south-central Vietnam. The current potential distribution includes south China, Vietnam, Laos, Thailand, Myanmar, Luzon of Philippines, Malaysia, southwest and northeast India, Sri Lanka, Indonesia (Java, Sumatera), Bangladesh, Nepal, Bhutan, and foothills of the Himalayas, in total, ca. 3.59 × 106 km2. Only one core distribution remained, concentrated in south-central Vietnam. In a warming future, the core distribution, high suitable habitats, and even the whole range of N. chinensis will expand and shift northwards. Currently, N. chinensis mainly resides in forest ecosystems below 1200 m above sea level (preferred 500 m to 1200 m a.s.l.). Annual precipitation, mean temperature of driest quarter, and seasonality of precipitation are important factors shaping the species distribution. Our study provides systematic information on habitats and geographical distribution, which is useful for the conservation of N. chinensis." (Authors)] Address: Liao, J., Dept of Ecology, Institute of Hydrobiology, Jinan University, Guangzhou 510632, China. Email: liaojian@stu2017.jnu.edu.cn

20162. Liu, H.; Jiang, F.; Wang, S.; Wang, H.; Wang, A.; Zhao, H.; Xu, D.; Yang, B.; Fan, W. (2022): Chromosome-level genome of the globe skimmer dragonfly (Pantala flavescens). GigaScience 11(1): 1-8. (in English) ["Background:

The globe skimmer dragonfly (Pantala flavescens) is a notable Odonata insect distributed in nature fields and farmlands worldwide, and it is commonly recognized as a natural enemy because it preys on agricultural pests and health pests. As one of the sister groups of winged insects, odonatan species are key to understanding the evolution of insect wings. Findings: We present a high-quality reference genome of P. flavescens, which is the first chromosome-level genome in the Palaeoptera (Odonata and Ephemeroptera). The assembled genome size was 662 Mb, with a contig N50 of 16.2 Mb. Via Hi-C scaffolding, 648 Mb (97.9%) of contig sequences were clustered, ordered, and assembled into 12 large scaffolds, each corresponding to a natural chromosome. The X chromosome was identified by sequence coverage depth. The repetitive sequences and gene density of the X chromosome are similar to those of autosomal sequences, but the X chromosome shows a much lower degree of heterozygosity. Our analysis shows that the effective population size experienced 3 declining events, which may have been caused by climate change and environmental pollution. Conclusions: The genome of P. flavescens provides more information on the biology and evolution of insects and will help for the use of this species in pest control." (Authors)] Address: Fan, W., Agricultural Genomics Institute at Shenzhen, Chinese Academy of Agricultural Sciences, 7 Pengfai Road, Shenzhen 518120, China. Email: fanwei@caas.cn

20163. Lockwood, M. (2022): Catàleg dels odonats de la Moixina i del Parc Nou. Consorci de Medi Ambient i Salut Pública de la Garrotxa, SIGMA; Ajuntament d'Olot; Parc Natural de la Zona Volcànica de la Garrotxa (Catàleg de biodiversitat dels paratges de la Moixina i del Parc Nou (Olot, la Garrotxa)). DOI: https://doi.org/10.2436/10.8080.03.4: 18 pp. (in Catalan, with English summary) ["Fieldwork and a literature review enabled a catalogue of the damselflies and dragonflies of La Moixina (Olot, Catalonia), and Parc Nou (Olot) to be compiled. In all, 40 species have been detected in this area, of which 19 are only occasional visitors. The remaining 21 species breed or are observed regularly in the area's three main habitats, the canals, the ponds and in the meadows and on woodland edges. Using an index of vulnerability for Catalan dragonflies (IVOC), it becomes clear that the most threatened species are all linked to the canals, of which Calopteryx virgo and Boyeria irene are good examples. By contrast, the species that breed in the ponds Basses d'en Broc are much more generalist and are not threatened." (Author)] Address: Lockwood, M., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47; 08001 Barcelona, Spain. E-mail: mike@walkingcatalonia.net

20164. Löcse, F.; Löcse, E. (2022): Beitrag zur Libellenfauna (Odonata) und zur Aaskäferfauna (Coleoptera: Silphidae) am Herrnsdorf-Bräunsdorfer Bach im Landkreis Zwickau / Sachsen. Mitteilungen Sächsischer Entomologen 41(141): 35-43. (in German) ["Sachsen, Germany; seven odonate species are listed: Aeshna cyanea, A. mixta, Calopteryx splendens, Ischnura elegans, Lestes sponsa, Sympetrum sanguineum, Platycnemis pennipes] Address: Löcse, F., Am Ullersberg 3, 09212 Limbach-Oberfrohna, Germany

20165. Lohaka, J.D.; Kamb, J.-C.T.; Isumbisho, P.; Sisa, E.M.; Eume, T.L. (2022): Preliminary study of the structure of the aquatic macroinvertebrate stands in lake Mai Ndombe in the province of Mai Ndombe in the RDC. International Journal of Science and Research Archive 6(1): 125-138. (in English) [Democratic Republic of the Congo; "The preliminary study of the structure of the macroinvertebrate stands of Lake Mai Ndombe in the DRC was carried out in February 2020. Six hundred and ten (610) aquatic macroinvertebrates were captured, divided into 7 orders and 28 families. The family of Corduliidae was the most abundant with 17.7% of the total specimens, it was followed by the Dystiscidae (14.1%), Naucoridae (12.7%), Limnebiidae (11.3%), Atyidae (7.7%), Coenagrionidae (6.5%) and Libellulidae (6.4%). The other families were poorly represented. The diversity indices calculated for the different stations varied between 1.67 (Ndom IV) and 2.8 (Ndom I) and the fairness between 0.93 (Ndom III and Ndom IV) and 0.96 (Ndom II) . The IBGN calculation revealed that the biological and ecological quality of the waters of this lake ranges from fair quality with Polycentropodidae as the indicator group to poor quality with the oligochaetes as the indicator group." (Authors) As only European odonate families are listed, we may suppose wrong identifcations.] Address: Sisa, E.M., Hydrobiology Laboratory, National Pedagogical University (NPU) B.P. 8815 Kinshasa I, Congo

20166. Ma, C.-H.; Chen, S.-L.; Lou, C.-M.; Lee, I.-L.; Hu, F.-S. (2022): The Genus Sympetrum Newman, 1833 (Odonata: Libellulidae) in Taiwan: Distribution, bionomics and a report of a newly recorded species. Taiwanese Journal of Entomological Studies 7(3): 27-42. (in English, with Chinese summary) ["We summarize the bionomics, distributional information, and habitus photos of all Taiwanese Sympetrum, including S. bacha bacha, S. cordulegaster, S. darwinianum, S. depressiusculum, S. eroticum ardens, S. fonscolombii, S. infuscatum, S. kunckeli, S. nantouensis and S. speciosum. Sympetrum infuscatum is reported from Taiwan for the first time, based on a photo taken on 7-X-2009 in Keelung City. A new record of S. darwinianum found on 09 October 2010 in New Taipei City is reported, representing the second record of the species in Taiwan. Distributional maps of all species and phenological graphs, based on 25 years of citizen science data of 6 selected species (S. cordulegaster, S. depressiusculum, S. eroticum ardens, S. fonscolombii, S. nantouensis and S. speciosum) are also provided." (Authors)] Address: Hu, F.-S., Dept Biol. Sciences, National Sun Yat-sen Univ., 70 Lienhai Rd., Kaohsiung 80424, Taiwan. Email: fangshuo_hu@smail.nchu.edu.tw

20167. Macgregor, C.J.; Bunting, J.; Deutz, P.; Bourn, N.A. D.; Roy, D.B.; Mayes, W.M. (2022): Brownfield sites promote biodiversity at a landscape scale. Science of The Total Environment Volume 804, 15 January 2022, 150162: (in English) ["Highlights: • Species richness of birds, plants and insects is higher in landscapes containing ex-landfill sites. Birds also have higher assemblage rarity in landscapes containing ex-landfill sites. For birds, plants and insects, species richness increases with increasing area of ex-landfill sites. For birds and insects, species richness declines over time after landfill site closure. For plants, species richness increases over time after landfill site closure. Abstract: Repurposing of brownfield sites is often promoted, because it is perceived that protecting the "green belt" limits damage to biodiversity; yet brownfield sites provide scarce habitats with limited disturbance, so conversely are also perceived to be ecologically valuable. Combining data from three national-scale UK biological monitoring schemes with location data on historical landfill sites, we show that species richness is positively associated with both the presence and increasing area of ex-landfill sites for birds, plants and several insect taxa. Assemblage rarity of birds is also positively associated with presence of ex-landfill sites. Species richness

associated with ex-landfill sites declined over time for birds and insects but increased over time for plants. These findings suggest that development of brownfield sites may have unintended negative consequences for biodiversity, and imply that to minimise loss of biodiversity, brownfield site repurposing could be targeted towards smaller sites, or sites in areas with a high density of other brownfield sites." (Authors)] Address: Macgregor, Callum, Energy and Environment Institute, University of Hull, Cottingham Road, Kingston upon Hull, 7 HU6 7RX, UK. Email: callumjmacgregor@gmail.com

20168. Makbun, N. (2022): Macromia siamensis, a new species from North Thailand (Odonata: Anisoptera: Macromiidae). Zootaxa 5133(3): 346-354. (in English) ["Macromia siamensis sp. nov., is described and illustrated based on male specimens collected from Ban Luang, Chom Thong, Chiang Mai province, Thailand. Macromia siamensis sp. nov. shares the hammer-shaped tip of posterior hamulus with M. amphigena, M. sombui, M. cydippe, M. vangviengensis, M. clio, M. malleifera and M. macula, but it differs from all of the mentioned species by a set of coloration characters including antehumeral stripe, abdominal pattern and facial markings." (Author)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. Email: noppadon.makbun@gmail.com

20169. Maldonado-Benitez, N.; Mariani-Ríos, A.; Ramírez, A. (2022): Effects of urbanization on Odonata assemblages in tropical island streams in San Juan, Puerto Rico. International Journal of Odonatology 25: 31-42. (in English) ["Urbanization has considerable impacts on stream ecosystems. Streams in urban settings are affected by multiple stressors such as flow modifications and loss of riparian vegetation. The richness and abundance of aquatic insects, such as odonates, directly reflect these alterations and can be used to assess urban impacts on streams. The effects of urbanization on odonate richness and abundance on tropical islands is as yet poorly understood. The objective of this study is to identify the effects of urbanization on stream habitat quality and associated odonate assemblages in Puerto Rico. We sampled 16 streams along a rural to urban gradient in the San Juan Metropolitan Area, where each stream was characterized using the Stream Visual Assessment Protocol (SVAP) for Puerto Rico and by analyzing their surrounding land cover. A 100-m segment of each stream was surveyed to assess adult odonate richness and abundance during the rainy and dry seasons. Adults were identified visually, and their abundance was recorded. Favorable local scale factors, like improved habitat quality, as measured with the SVAP, resulted in higher abundances of odonates. However, regional factors such as percent urban cover did not appear to significantly affect richness and abundances of odonates. Overall, our study indicates that odonate assemblages are affected by the loss of habitat integrity, and conservation of tropical odonates may benefit from focusing on local scale factors." (Authors)] Address: Maldonado-Benítez, N., Dept of Environmental Sciences, University of Puerto Rico, Río Piedras Campus, San Juan, Puerto Rico. Email: nmb.957@gmail.com

20170. Mariani-Ríos, A.; Maldonado-Benítez, N.; Ramírez, A. (2022): Natural history of Odonata assemblages in tropical streams in Puerto Rico. Neotropical Biodiversity 8(1): 112-123. (in English) ["Freshwater macroinvertebrates play an important role in maintaining stream food webs. Odonata are important top predators in these communities and serve as indicators of stream health. Our understanding of odonate assemblages is limited in the Caribbean and the natural history of most odonate species in the region remains unknown. The focus of this research is to study the natural history of odonate species in headwater montane streams following major hurricane impacts in Puerto Rico. We monitored assemblages from August 2018 to July 2019 in two headwater streams within El Yunque National Forest, Puerto Rico. The study streams drain a protected forest, with aseasonal precipitation patterns, relatively constant water temperature, and flashy hydrographs that quickly respond to rain events. We sampled 226 adults and 550 larvae, dominated by three Caribbean endemics: Scapanea frontalis, Macrothemis celeno, and Telebasis vulnerata. Only S. frontalis and M. celeno were abundant enough to assess the temporal patterns and their natural history. Larval density fluctuated throughout the year with short peaks in abundance during different times of the year, according to the species. Small individuals (=10 mm body length) were more abundant than the large ones. However, all size classes were present during the year. The dominant species, S. frontalis and M. celeno, had continuous development patterns, without identifiable size classes and multiple overlapping generations. The exception was the last stadium that formed a separate group in the body length vs head width plots. Species had clear habitat preferences; S. frontalis was abundant in riffles and preferred areas with high amounts of cobble. Macrothemis celeno prefers pool habitats with fine substrates. While we found trends for negative relations between abundance and discharge, canopy cover, water temperature, and rainfall, none was statistically significant. Observed patterns suggest a lack of strong temporal seasonality in the natural history of Odonata, which coincides with the aseasonal environment of streams draining our study area. Overall, our study is the first to assess temporal variability of Odonata assemblages in montane streams of Puerto Rico and provides information on Caribbean endemic species." (Authors)] Address: Maldonado-Benítez, N., Dept of Environmental Sciences, University of Puerto Rico, Río Piedras Campus, San Juan, Puerto Rico. Email: nmb.957@gmail.com

20171. Marinov, M. (2022): On two unjustified rankings of Pacific Odonata (Insecta). Faunistic Studies in Southeast Asian and Pacific Island Odonata 38: 1-10. (in English) ["Modifications of nomina proposed for two Pacific Odonata taxa are found to be unsubstantiated. Each has been proposed without the support of taxonomic studies. Herein, it is demonstrated that the raising of the subgenus Adversaeschna Watson, 1992 to genus rank and subsuming the genus Amorphostigma Fraser, 1925 to Ischnura Charpentier, 1840 are not justified. The first, Adversaeschna, was a mistake introduced and multiplied widely in nomenclature lists adopted by online databases and other studies. The second, Amorphostigma, was based on premature information to propose a plausible taxonomy of a diverse Pacific clade which most likely consists of several taxa deserving of separate generic ranks, supported by preliminary phylogenetic work. Therefore, these nomina should be reverted to reflect current taxonomic revisions. Adversaeschna should be considered as a subgenus of Aeshna Fabricius, 1775 and Amorphostigma as a nomen of generic rank." (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand. Email: milen.marinov@mpi.govt.nz

20172. Marinov, M. (2022): Amorphostigma kessleri, sp. nov. from American Samoa (Odonata: Coenagrionidae).

Faunistic Studies in SE Asian and Pacific Island Odonata 40: 1-14. (in English) ["This study describes Amorphostigma kessleri, a new species […] from Tutuila Island, American Samoa. Specimens of both sexes are compared with the two species presently included in the genus: A. armstrongi Fraser, 1925 and A. auricolor Fraser, 1927. The study mentions the preferred generic status of Amorphostigma as discussed in Marinov (2022). " (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand. Email: milen.marinov@mpi.govt.nz

20173. Medeiros Chaviel, B.; Silveira Mascarenhas, C.; Corrêa, F.; Costa Silveira, E.; Afonso Coimbra, M.A.; Müller, G. (2022): Diet of Acanthochelys spixii and Hydromedusa tectifera (Chelidae) in the southern Brazil. Caldasia 44(1): 178-183. (in English, with Spanish summary) ["Data about the diet of the freshwater turtles Acanthochelys spixii and Hydromedusa tectifera from southern Brazil populations remain little known. In this context, the digestive tract of 21 A. spixii and 20 of H. tectifera individuals from three municipalities in the state of Rio Grande do Sul, Brazil were examined. The food items were identified at the lowest possible taxonomic level, quantified, and conserved in ethanol 70°GL. The frequency of occurrence (F %) and volume percentage (V %) were estimated, as well as the food importance index (IAi %). The range of the trophic niche and the feeding strategy of both species were analyzed. The diet of A. spixii and H. tectifera was compared through the Mann-Whitney test ($P < 0.05$). Both species presented a generalist food strategy, consuming mainly insects, represented by Hemiptera, Odonata, Coleoptera, and Diptera. There was no significant difference in the volume of items consumed by both species (Mann-Whitney test, $z = -0.387$, $P = 0.69$). Concerning the trophic niche range, we observed low values for both species, it was of 0.41 for A. spixii and 0.39 for H. tectifera suggesting a more restricted diet with uniformity in food consumption, however, we highlight that a more restricted diet does not suggest a trophic specialization, because the availability of food items have variation in time and space. The study contributed information on the diet of species in the region, generating data that can be used in programs for the conservation of species and their habitats." (Authors)] Address: Medeiros Chaviel, Bruna, Laboratório de Parasitologia de Animais Silvestres, Instituto de Biologia, Depto de Microbiologia e Parasitologia, Universidade Federal de Pelotas, Caixa Postal: 354, CEP 96010-900, Pelotas, RS, Brazil. brunachaviel@gmail.com

20174. Medina-Espinoza, E.F. (2022): Abundance of Odonata in different microhabitats at an oxbow lake in the Peruvian Amazon. Acta Amazonica 52(3): 236-240. (in English, with Spanish summary) ["The relationship between Odonata and vegetation in Amazonia has been studied primarily in streams. In this study, I examined the abundance of adult Odonata in two vegetation types (shrubs and herbs) surrounding an oxbow lake in the Peruvian Amazon. Daytime visual samplings of Odonata were carried out in time blocks along transects in each habitat. Thirteen taxa were identified. Five species were similarly abundant in both habitats, three used mainly herbs, and one mainly shrubs, with no variation among time blocks. The results suggest that most Anisoptera and Zygoptera are adapted to unshaded areas of the lake. Some Odonata also were observed during sunless days with light rainfall, suggesting they are adapted to rainy conditions in tropical climate." (Author)] Address: Medina-Espinoza, Emmy Fiorella, Univ. Nacional Mayor de San Marcos, Museo de Historia Natural, Depto de Entomología, Avenida Arenales 1256, Jesús María, Lima 15072, Peru. Email: efme.04@gmail.com

20175. Mendoza-Penagos, C.C.; Juen, L.; Vilela, D.S. (2022): Heteragrion calafatiensis (Odonata: Heteragrionidae) sp. nov. from Northern Brazil. Zootaxa 5124(2): 223-229. (in English, with Portuguese summary) ["The Neotropical genus Heteragrion Selys, 1862 is the second most speciose among the Neotropical Zygoptera. However, most of its species are poorly known regarding their biology, distribution, and taxonomy, especially those from undersampled areas like Northern Brazil. Here we describe Heteragrion calafatiensis sp. nov. from the coastal environments of the Brazilian Amazon of Para state (Holotype male, Brazil, Para, municipality of Magalhaes Barata, near the Marapanim River, (-0.863291, -47.668058, 20 m, 26.ix.2021), C.C. Mendoza-Penagos leg, in UFPA). This is the nineth Heteragrion species recorded for the Northern region of Brazil. The new species can be separated from congeners by cercal morphology and thoracic coloration pattern." (Authors)] Address: Mendoza-Penagos, C.C., Post-Graduate Program in Zoology-PPGZOOL, Univde Federal do Pará, Belém, Brazil. Email: cristian.penagos@icb.ufpa.br;

20176. Mendoza-Penagos, C.C.; Bota-Sierra, C.A. (2022): Primera localidad confirmada para Telebasis isthmica Calvert, 1902 en Colombia y algunos datos sobre su historia natural. - First confirmed locality for Telebasis isthmica Calvert, 1902 in Colombia and notes about its natural history. Hetaerina 4(2): 6-11. (in Spanish, with English summary) ["The species Telebasis isthmica has a wide distribution through tropical dry forests from western Mexico in Nayarit to the state of Falcón in Venezuela. Although its presence in Colombia has been previously reported, not a specific locality for the species in the country is known. Furthermore, its natural history is poorly understood. In this note, we present some data on its natural history and assign the first locality, thus confirming its presence in the tropical dry forests of the Magdalena River (Cundinamarca, Colombia)." (Authors)] Address: Mendoza-Penagos, C.C., Post-Graduate Program in Zoology-PPGZOOL, Universidade Federal do Pará, Belém, Brazil. Email: cristian.penagos@icb.ufpa.br;

20177. Merchant, M.; McClure, M.R. (2022): Phenoloxidase and melanization innate immune activities in Green Darner dragonfly nymphs (Anax junius). Advances in Biological Chemistry 12(4): 130-141. (in English) ["Odonata are highly subject to infection by gregarine parasites. However, despite the important ecological roles that insects play in every ecosystem in which they exist, little research has been devoted to the description of insect immunity. Insects rely heavily on the rapid actions of innate immune mechanisms to prevent infection. We characterized the melanization response in the hemolymph of A. junius nymphs. Incubation of chymotrypsin-activated hemolymph with L-DOPA resulted in volume- and time-dependent production of dopaquinone via the phenoloxidase (PO) enzyme, with biphasic accumulation of product. The PO activity was temperature-dependent, with a stepwise increase from 20°- 35° and maximum activity measured at 35° - 40°. The formation of product was also inhibited in a concentration-dependent manner by diethylcarbonate, a specific inhibitor of PO activity, which indicated that the observed activity was due to the presence of PO enzyme. The rate of formation and quantity of melanin was dependent on exposure to different titers of bacteria. This is the first characterization of both PO activity and melanization response in A. junius." (Authors)] Address:

Merchant, M., Dept Chemistry, McNeese State Univ., Lake Charles, USA. Email: mmerchant@mcneese.edu

20178. Min, J.-K.; Lee, H.; Kong, D. (2022): Development of a benthic macroinvertebrate predictive model based on the physical and chemical variables of rivers in the Republic of Korea. Journal of Freshwater Ecology 37(1): 425-453. (in English) ["Predictive models for the benthic macroinvertebrate community based on environmental variables facilitate the identification of the organisms expected to inhabit an area according to the target environmental conditions when restoring rivers. In this investigation, a biotic community predictive model was developed using benthic macroinvertebrate and environmental variable data collected from 1,210 sites in the Republic of Korea from 2010 to 2020. The sites were classified into six groups according to Two Way Indicator Species Analysis (TWINSPAN) and based on their individual abundance/m2 of benthic macroinvertebrates. The TWINSPAN groups were related to 14 variables by stepwise multi-discriminant analysis. The relative importance of the environmental variables that classified each TWINSPAN group was in the order of mean diameter of particle size, catchment area, altitude, velocity, total phosphorus, latitude, pH, longitude, conductivity, water depth, suspended solids, biochemical oxygen demand, stream order, and total nitrogen. Discriminant functions 1–4 showed statistically significant and a predictive model was developed using functions 1 and 2 based on Wilks' lambda values. The fit of the derived model was confirmed using Sørensen similarity (number of taxa) and Bray–Curtis dissimilarity (individual abundance/m2) analyses between the predicted organisms and those observed at the sites. The distributions of similarity and dissimilarity that were confirmed by stream type ranged from 0.60 to 0.72 and 0.46–0.56, respectively, based on the mean. Based on the predicted and observed values, the ratio of shredders and scrapers to collectors showed similar results overall for each stream type. The predictive model derived using nationally managed available data is expected to be applicable to stream and river restorations in the future, as it provides a statistical assessment of the biotic communities that are expected to inhabit a given environment." (Authors) (Odonate) taxa are treated at the family level.] Address: Kong, D., Dept of Life Science, Kyonggi University, Suwon-si, 16227, Gyeonggi-do Province, Republic of Korea. Email: dskong@kgu.ac.kr

20179. Miranda Filho, J.M.; Mendoza Penagos, C.C.; Calvão, L.B.; Miguel, T.B.; Bastos, R.C.; Ferreira, V.R.S.; Lima, D.V.M.; Vieira, L.J.S.; Brasil, L.S.; Juen, L. (2022): Checklist of damselflies and dragonflies (Odonata) from Acre state, and the first record of Drepanoneura loutoni von Ellenrieder & Garrison, 2008 for Brazil. Biota Neotropica 22(2): e2021-1320, 2022: 22 pp. (in English, with Portuguese summary) ["Here we present the first Odonata (Insecta) species list for the state of Acre, Northern Brazil, adding ecological aspects and notes on its taxonomy and conservation status. Regarding Odonata samplings, Acre is one of the least explored states in the northern region of Brazil and an area of geographic importance, as it is a transition between the Andean and Amazon regions. Collections were carried out in 35 streams, distributed in nine municipalities. We also supplemented our database from the review of secondary literature and data from biological collections. We recorded 140 species, distributed in 55 genera, of which 16 species are new records for the state, making Acre state the second in the number of recorded species in northern Brazil. Of the recorded species, 113 are classified within some threat category of the IUCN red list and 110 in the ICMBio national list. Analyzing the taxonomic information on each recorded species, knowledge of females and larvae is still very limited and, most of the time, only available to adult males. For the first time, the occurrence of Drepanoneura loutoni is reported for Brazil, and we also present photos of its main morphological characters, with comments on its biology. Our study shows the importance of conducting biodiversity research in poorly studied areas; such as the state of Acre, and serves as a basis for future expeditions in the region." (Authors)] Address: Mendoza Penagos, C.C., Inst. de Ciências Biológicas, Laboratório de Ecologia e Conservação, Rua Augusto Corrêa, n° 1, Guamá, CEP 66.075-110, Belém, PA, Brasil. Email: cristian.penagos@icb.ufpa.br

20180. Mogali, S.M.; Shanbhag, B.A.; Saidapur, S.K. (2022): Predatory influence of dragonfly larvae and water scorpions on eggs and tadpoles of Indosylvirana temporalis (Anura: Ranidae). Phyllomedusa 21(1): 51-57. (in English, with Portuguese summary) ["We assessed in the laboratory the vulnerability of Bronzed frog (Indosylvirana temporalis) eggs and tadpoles to two potential sit-and-wait insect predators, larvae of Pantala flavescens and adult water scorpions (Laccotrephes sp.; Hemiptera: Nepidae). We exposed a series of different developmental stages of I. temporalis (from eggs to metamorphic climax stage) to these two predators. The results of this study showed that larvae of P. flavescens preyed on eggs and tadpoles of I. temporalis but only to stage 36. Laccotrephes sp. did not prey on eggs of I. temporalis but on tadpoles of all stages (22 to 42). This difference in predation rate was likely due to the gape size of the predators. The larvae of P. flavescens are gape-limited and cannot prey on larger tadpoles (above stage 36). Adults Laccotrephes sp. are non-gape-limited predators, using a segmented beak to pierce I. temporalis and suck the body fluids. They captured small to large tadpoles by quickly grabbing and immobilizing them using the front pair of raptorial legs. The present study shows that both predatory insects are a threat to I. temporalis at early and later stages of larval development." (Authors)] Address: Mogali, S.M., Dept Zool., Karnatak Univ., Dharwad-580 003, Karnataka State, India. E-mail: santoshmogali@rediffmail.com.

20181. Mohammed, I.; Wondie, A.; Mengist, M. (2022): The environmental quality and macroinvertebrate community structures of wetlands found in the Lake Tana Watershed, Ethiopia. Journal of the Cameroon Academy of Sciences 17(3): 183-203. (in English, with French summary) ["The present study was conducted to assess the environmental quality status and macroinvertebrate community structures of wetlands using macroinvertebrates as bioindicators. A multimetric biotic index approach was used for the study. The findings revealed 3,367 macroinvertebrates belonging to 37 families. The percentages of Ephemeroptera, Odonata, and Trichoptera (%EOT), percent Diptera, percent filtererCollectors, the ratio of Ephemeroptera, Plecoptera, and Trichoptera to Chironomid (EPT/C), the Biological Monitoring Working Party Score, and the Shannon–Wiener diversity index were all significantly related to human disturbance and could be used to assess water quality. Based on the macroinvertebrate index, human disturbance had a significant impact on Shesher wetland, a relatively lower impact on Avaji and Yitamot, and a moderate impact on Chimba, while Dena and Wonjeta had good habitat quality. Their water quality was very poor, poor, moderate, and very good, in that order. Farming, leather tanning, waste dumping, and effluent discharges were responsible for the poor habitat quality of impacted wetlands. Therefore, unless managed properly, human disturbance activities in the wetlands

catchment were threatening macroinvertebrates and the wetlands ecosystem. Hence, implementation of catchment-based management together with continuous health status monitoring and a standalone wetland policy should be established. " (Authors)] Address: Mohammed, I.,College of Agriculture & Environ. Science, Dept of Fisheries & Aquatic Science, Bahir Dar Univ., PO Box 79, Bahir Dar, Ethiopia

20182. Mohammed, S.H.; Eltaly, R.I.; Salem, H.H. (2022): Toxicological and biochemical studies for chlorpyrifos insecticide on some mosquito larvae and their associated predators. Egyptian Journal of Basic and Applied Sciences 9(1): 254-263. (in English) ["Use of chemical insecticide with natural enemies could be more effective in mosquito control strategy. This study examined the toxicity of chlorpyrifos insecticide against three field-collected mosquito species, Culex pipiens, Anopheles pharoensis and Ochlerotatus caspius and their associated predators (Pantala flavescens) and mayfly (Caenis stephens) naiads as non- target insect for chlorpyrifos. The predation potential of Pa. flavescens and Ca. stephens against tested mosquito larvae was also investigated. Additional biochemical assays were carried out to detect the effect of chlorpyrifos on some detoxifying enzymes of tested mosquito larvae and their associated predators. The results showed that (Pa. flavescens) have higher predation potential than (Ca. stephens). The toxicological results recorded high toxic effect of chlorpyrifos on Ca. stephens followed by An. pharoensis and Oc. caspius with percent mortality 100, 90 and 85% respectively, while Pa. flavescens exhibited high resistance followed by Cx. pipiens with percent mortality 20 and 40% respectively. Moreover, Acetylcholinesterase and glutathione S-transferase were significantly increased only in Cx. pipiens and Pa. flavescens. It could be concluded that, chlorpyrifos have different toxicological effect on the tested mosquito larvae and associated predators. So, the side effect of chlorpyrifos must be taken in consideration before using it in control programs." (Authors)] Address: Mohammed, Shaimaa, Zoology Dept, Faculty of Science, Al-Azhar University (Girls Branch), Cairo, Egypt

20183. Monnerat, C.; Juillerat, L. (2022): The Antoine Senglet collection: a major contribution to the knowledge of the odonates of Morocco from the 1960s (Odonata). Odonatologica 51(1-2): 41-62. (in English) ["Odonata collected by Antoine Senglet in Morocco from 12.vi. to 13.vii.1967 in 28 localities are deposited in the Muséum d'histoire naturelle in Geneva (MHNG, Switzerland). The collection includes 453 imagines of 46 species and 326 exuviae of 24 species, corresponding to 73 % of the presently known Moroccan Odonata fauna. It is one of the largest collections of Odonata ever made in Morocco and includes the first known evidence for Erythromma viridulum, Orthetrum brunneum, O. cancellatum, Selysiothemis nigra, and Sympetrum sinaiticum for Morocco. Reproduction is proven by the presence of exuviae for all these species except E. viridulum. The collection, which has remained undocumented for more than half a century, is comparable in scope to the contributions presented by the first two syntheses on the dragonflies of Morocco published by Lieftinck (1966) and Dumont (1972). A chronological check-list of the odonate fauna of Morocco details the increase in knowledge from 1850 to the present day." (Authors)] Address: Monnerat, C., Info fauna, Bellevaux 51, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

20184. Mühlenhaupt, M.; Jiang, B.; Brauner, O.; Mikolajewski, D.J. (2022): Inter- and intraspecific trait compensation of behavioural and morphological defences in a damselfly genus. Front. Ecol. Evol. 10:874276. doi: 10.3389/-fevo.2022.874276: 10 pp. (in English) ["Predation is a key driver of phenotypic diversification with prey having evolved sets of correlated anti-predator traits. Changes in anti-predator traits can be studied on an evolutionary as well as on a developmental timescale. Using a common garden setup, we studied inter- and intraspecific correlations of behavioural and morphological defences in four damselfly species that either occur in habitats dominated by predatory fish (fish habitats) or fishless habitats by raising larvae either with predatory fish or in a control treatment. We found interas well as intraspecific trait compensation (negative correlations) between behavioural and morphological defences. Compared to fishless habitat species, fish habitat species invested more in behavioural defences and less in morphological defences. This was mirrored by fish habitat species investing more in behavioural defences and less in morphological defences when reared with predatory fish whereas fishless habitat species invested less in morphological defences only. Our results emphasise the role of context-specific combinations of defensive traits to avoid predation. We suggest, considering changes in multiple correlated traits on different timescales when studying the evolution of anti-predator traits." (Authors)] Address: Mühlenhaupt, M., Institut für Biologie, Freie Universität Berlin, Berlin, Germany

20185. Mukherjee, A.; Sardar, S.; Mandal, B.; Chandra Saha, N.; Mitra, B. (2022): First insect faunal inventory from the recently declared Raimona National Park, Assam, India. International Journal of Entomology Research 7(3): 26-30. (in English) ["Protected areas which are essential for biodiversity conservation often provide habitat and protection from other anthropogenic activities threatened to the pristine wildlife. Therefore, establishment of new protected areas like sanctuaries, biosphere reserve and national parks relieve the wildlife a lot from risk. Before starting conservation and management of the protected areas, one need to know which species are endangered or threatened and what we must conserve. Raimona National Park was declared as the National Park by the Government of Assam on the World Environment Day, 2021. A visit of six days to this national park enumerates 62 species of insects. These includes 41 species of butterflies and 5 species of moths, 3 species of dragonflies, 7 species of grasshoppers and crickets, 3 species of bugs and 3 species of bees and wasps. Only 4 species of butterflies are found here under WPA ACT (1972). This paper presents the first insect inventory from the 6th national park of Assam and the last declared national parks in India." (Authors) Three Odonata species are checklisted: Crocothemis servilia, Orthetrum sabina, Potamarcha congener.] Address: Mandal, B., Dept of Zoology, Jogesh Chandra Chaudhuri College, Kolkata, West Bengal, India. Email: bananimandal50@gmail.com

20186. Mzungu, E.; Yakub, S.; Anyimba, E.S: (2022): Macroinvertebrates as bio-indicators of water quality in Omubira Stream, in Kakamega County, Kenya. International Journal of Fisheries and Aquatic Studies 10(4): 70-77. (in English) ["Human-induced environmental stress can impair freshwater ecosystems by destroying them or altering them in negativeways. Laws and ordinances that stress Kenya's water resources' correct management and utilization were prompted by worries about the management of freshwater bodies. Therefore, understanding of the health status of aquatic environments, particularly their biodiversity, is crucial in order to comprehend the status of water

quality and limit the rate of pollution in our streams and rivers. Several well-known biological markers of water quality can be used for this. Bio-indicators are species or groups of species that can quickly reveal the abiotic or biotic condition of an environment, show how environmental change has affected a habitat or ecosystem. In many industrialized nations, including those in Europe and North America, macroinvertebrates are widely utilized as bio-indicators and are part of their national and technical standards for water quality monitoring. Their use is still relatively restricted in developing nations like Kenya. Furthermore, the use of aquatic macroinvertebrates as bio-indicators of water quality to assess the condition of aquatic ecosystems is not stressed by Kenyan environmental laws and regulatory bodies. This can be because the nation doesn't have a well-known and established biomonitoring system. However, only a small number of studies have begun utilizing macroinvertebrate species as bio-indicators at this time. A greater comprehension of the macroinvertebrate variety of the Omubira River could help in the stream management due to continued municipal and agricultural activities along this river. As a result, this study examined the use of macroinvertebrates as bioindicators of river water quality and determined how they reacted to water quality in the various region of the stream. Macroinvertebrates and selected physicochemical variables were sampled monthly in four sites for a period of four months. On each sampling sites at every sampling episode physicochemical variables including temperature, conductivity, salinity, turbidity, pH, dissolved oxygen and percentage saturation oxygen were measured using a Hydrolab Quanta Multi-Probe Meter. A Surber sampler of an area 1200 cm² and corer sampler were used with catching area of 20.83 cm² to capture macroinvertebrates. There was a general decrease of Temprature, turbidity, salinity, conductivity and pH from the town area to the forested area. However, dissolved oxygen increased from the town area to forested area. A general variation of macroinvertebrates species from manucipal area to forested area in the river was observed. The highest abundance of Belostomatidae (16.87), Chironomidae (16.77), Naididae (14.07) and Gomphidae (18.67) were found in the manucipal reach of the river. The highest abundance of Elmidae (20.49) and Notonectidae (19.87) were found in the agricultural reach while the highest abundance of Gerridae (10.53), Hydropsychidae (28.65) and Perlidae (33.92) were found at the forested reach. From the diverse makeup of the macroinvertebrates, Omubira stream's water quality can be described as moderately clean. This could be harmful to aquatic life and communities living along, which depends on highly clean water to exist. This study therefore recommends continuious monitoring and proper management of pollution sources into the stream by the pertinent authorities as well as embracing bioindictors." (Authors)] Address: Mzungu, E., Dept Biol. Sciences, Masinde Muliro Univ. Science & Technology, Kakamega, Kenya Fisheries Service, North Rift Uasin Gishu, Eldoret, Kenya

20187. Nair, V.P.; Samuel, K.A.; Palot, M.J.; Sadasivan, K. (2022): An updated checklist of Dragonflies and Damselflies (Odonata) of Kerala with their Malayalam names. Malabar Trogon 20(1): 19-27. (in English) ["An updated checklist of odonates of Kerala with their common English and Malayalam names are provided. A total of 181 species of odonates with 68 Western Ghats endemics are confirmed in the state." (Authors)] Address: Nair, V.P., XV/44Ö Ai, Netliaji Housing Colony, Trichambaram, Taliparamba P.O., Kannur, Kerala, India. Email: vmayanpnair@gmail.com

20188. Navarrete-Heredia, J.L. (2022): Homenjae am. en C. Enrique González Soriano. Dugesiana 29(2): 215-216. (in Spanish and English) [Verbatim: Editoral: As istradition, the Centro de Estudios en Zoology of the Universidad de Guadalajara pays on this occasion a well-deserved tribute to the M. in C. Enrique González Soriano, an outstanding specialist in Odonata and founder in Mexico of this line of research.Some Mexican specialists join this tribute and dedicate their work to Master Enrique. We appreciate your collaboration, as well as those who served as reviewers of these works and all those published in this issue.Thank you very much. Your collaboration is essential for the growth and quality of the journal.With admiration and respect, Enrique you have well deserved this tribute. Congratulations. Your friend “Pepe".] Address: Navarrete-Heredia, J.L., Centro de Estudios en Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara. Apartado Postal 234, C.P. 45100, Zapopan, Jalisco, Mexico. Email: glenusmx@yahoo.com.mx

20189. Nazneen (2022): Tramea limbata from Delhi-National capital region. Bradinopyga 6(9): 116-118. (in English) ["Tramea limbata is the second new addi’tion to Delhi’s dragonfly species-list after Urothemis signata, from the India Gate Canal, Delhi-NCR (28°61”-40°30 N”, 77°22”-42°67” E)" (Author)] Address: Nazneen, 208-C, Prakash Mohalla, East of Kailash, New Delhi - 110065, India. Email: naznneen@gmail.com

20190. Nel, A.; Jouault, C. (2022): The odonatan insects from the Paleocene of Menat, central France. Acta Palaeontologica Polonica 67: 631-648. (in English) ["The current knowledge on the Paleocene Odonata is rather limited despite the fact that it is a crucial period for the history of this order. An overview of the fossil odonatans from the Paleocene of Menat (France) is provided. We describe the anisopteran Macrogomphus menatensis sp. nov., first fossil representative of the family Epigomphidae, together with two zygopteran, viz. the dysagrionid Menatagrion hervetae gen. et sp. nov., and the new family Menatlestidae fam. nov., with its type species Menatlestes palaeocenicus gen. et sp. nov. The genus Menatagrion gen. nov. is the first Paleocene record of the Dysagrionidae, otherwise known by a putative Cretaceous genus and several Eocene to Miocene genera. Menatlestes gen. nov., putatively attributed to the stem-group of the Lestinoidea (Megalestidae and Lestidae), would correspond to the oldest record of this clade. With these three new taxa, and the previously described Thanetophilosina menatensis, Valerea multicellulata, “Lestes” zalesskyi, and an Aeshna species indet., the total number of Odonata from Menat goes up to seven species in total; two Anisoptera and five Zygoptera. Furthermore, we propose new evidences showing that the head characters defining the putative suborder Cephalozygoptera are due to deformations, very frequent among the fossil Odonatoptera. We treat the Cephalozygoptera as a junior synonym of Zygoptera." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

20191. Ngiam, R.W.J.; Foo, V.T.F.; Lim, K.K.; Lim, H.X. (2022): Biodiversity Record: New Singapore record of the dragonfly, Heliaeschna simplicia. Nature in Singapore 15: e2022020: 3 pp. (in English) [Singapore Island, Kranji Marshes, Core Conservation Area; 3 September 2021; 0935 hrs. Young secondary forest dominated by exotic vegetation, beside a freshwater marsh.] Address: Ngiam, R.W.J., Ang Mo Kio Avenue 10, Singapore 560539. Email:

yanrobin@hotmail.com

20192. Novello-Gutierrez, R.; Bota-Sierra, C.A. (2022): Description of the final larval stadium of Miocora aurea (Ris, 1918) (Odonata: Polythoridae). Zootaxa 5182(3): 279-287. (in English, with Spanish summary) ["The larva of Miocora aurea (Ris, 1918) was found in first and second order forested streams at the Tatamá National Park in the Colombian Western Andes. Here it is described and figured the final larval stadium. It differs from the larva of M. chirripa (Calvert, 1917) by a combination of features such as antennal pedicel (0.25x longer than 3rd antennomere), prementum (0.20x longer than its widest part), and posterior margin of tergite 10 with a moderate incision." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

20193. Nur Zaman, M.; Fuadi, B.F.; Luthfika, M. (2022): Struktur Komunitas Capung Dan Capung Jarum Di Sungai Gajah Wong Segmen Perkotaan Daerah Istimewa Yogyakarta. Bioveritas Journal of Biology 1(1): 31-36. (in Indonesian, with English summary) ["Dragonflies play an important role in controlling other insect populations in nature, and are also natural indicators of environmental cleanliness. This study aims to reveal the population of dragonflies in the Gajah Wong river in urban areas in Yogyakarta. The method of determining the research area is to use transects following the river flow, and dividing the research area into 8 locations. The length of each observation site is adjusted to the distance between the large bridges that cross the top of the river. The results showed that there were 16 types of ordinary dragonflies and 9 types of dragonflies found there. The species with the highest number was Pseudagrion rubriceps as many as 255. and the least species was Gynacantha subinterrupta, Onycothemis culminicola, Ischnura senegalensis, Pseudagrion microcephalum, each found only 1 individual. An interesting finding was the presence of 2 types of Javan endemic dragonflies that were recorded along the research site." (Authors)] Address: Nur Zaman, M., Anggota Waterforum Kalijogo dan Mahasiswa Prodi Biologi UIN Sunan Kalijaga Yogyakarta Ambarukmo Desa Catur Tunggal, Depok, Sleman, Indoonesia. Email: azamavicenna@gmail.com

20194. Oldak, K. (2022): Dragonflies (Odonata) of retention ponds situated near the Miñsk Mazowiecki motorway bypass (east-central Poland). Odonatrix 183 (2022): 17 pp. (in Polish, with English summary) ["he aim of this study was to determine the species composition of Odonata of 8 motorway retention ponds situated in the Miñsk Mazowiecki district (Province of Mazovia). A total of 36 species were found (48.6% of the Polish odonate fauna), 24 of which were classified as autochthonous or probably autochthonous. The most abundant species in the ponds were Coenagrion puella, Erythromma viridulum and Ischnura elegans. Two species protected in Poland were recorded – Leucorrhinia albifrons and Sympecma paedisca. The records of Sympetrum depressiusculum, S. meridionale and Crocothemis erythraea were the first from the Miñsk Mazowiecki district. The ponds exhibited a considerable qualitative faunistic similarity. As the odonate fauna of the individual ponds was qualitatively poor, these offered suitable habitats for only a small number of dragonfly species. This was due, among other things, to the small surface areas of the ponds and the inappropriate management of the plant succession in them. As the species found were mostly eurytopes and common ones, the ponds are unlikely to enhance the regional dragonfly diversity. To date, there have been no published records of the odonate fauna of motorway retention ponds in Poland, so the present paper provides a comparative background for further research in this field. In addition, these results add to our knowledge of the dragonfly fauna of both the Miñsk Mazowiecki district and two hitherto poorly studied UTM squares (EC38, EC48), within which many species were found for the first time." (Author)] Address: Oldak, K., Ziemowita 14, 05-300 Miñsk Mazowiecki, Poland. Email: krystian.adam.oldak@gmail.com

20195. Oldak, K.A. (2022): Dragonflies (Odonata) in spider webs – cases from motorway retention ponds in the Miñsk Mazowiecki district (east-central Poland). Odonatrix 184 (2022): 6 pp. (in Polish, with English summary) ["Instances of dragonflies (Odonata) caught in spider webs were documented as part of a study of the odonate fauna of motorway retention ponds conducted in 2020. Identification of the dragonfly and spider (Araneae) species was based on photographs taken in the field. 46 cases of dragonflies caught in spider webs were recorded. Zygopterans made up 87.0% of all these prey items. In 46.7% of the cases where the dragonfly species was identifiable, the prey was Ischnura elegans. This was most likely due to the ubiquity and abundance of this species on these retention ponds. The quite characteristic appearance of the terminal abdominal segments of I. elegans sometimes enabled identification of this species even if the victim had been partially consumed. Fourteen spiders from two families – Araneidae and Tetragnathidae – were recorded, the former being somewhat more abundant (57.1%). Water bodies are the typical habitat for three of the five identified spider species – Tetragnatha extensa, T. striata and Larinioides cornutus; the other two – Argiope bruennichi and Araneus quadratus – inhabit more diverse habitats. T. extensa was the spider species found in the greatest number of cases." (Author)] Address: Oldak, K.A., Ziemowita 14, 05-300 Miñsk Mazowiecki, Poland. Email: krystian.adam.oldak@gmail.com

20196. Olsen, K.; Svenning, J.-C.; Balslev, H. (2022): Niche breadth predicts geographical range size and northern range shift in European dragonfly species (Odonata). Diversity 2022, 14(9), 719; https://doi.org/10.3390/d14090719: 14 pp. (in English) ["We studied how range sizes and shifts in species ranges depend on niche breadth in European dragonflies. We measured range sizes and shifts over a 22-year period (1988–2010) and grouped species into those reproducing in permanent running (perennial lotic) water, permanent standing (perennial lentic) water, and temporary (running or standing) water. Running water species are more specialized and have narrower niches with a more fixed niche position than standing water species. Temporary water species are more generalist and have broader niches without a fixed niche position as clear as permanent water species because they may utilize both temporary and permanent habitats. Running water species have smaller ranges, and some of them have contracted their ranges more than species reproducing in standing or temporary waters; that is, they are especially at risk of habitat loss and climate change because of the joint effects of their narrow niches and small range sizes. Temporary water species track climate changes better than permanent water species. This suggests that ecological specialization may cause contemporary range shifts to lag behind changes in climate and resources. Furthermore, it indicates that recent changes in climate and human land use cause biotic homogenization,

where specialists are outperformed and replaced by generalists." (Authors)] Address: Olsen, K., Research and Collections, Natural History Museum Aarhus, Wilhelm Meyers Allé 10, DK-8000 Aarhus, Denmark. Email: kent@nathist.dk

20197. Onah, I.E.; Ajanwachukwu, O.J.; Ubachukwu, P.O. (2022): Comparison of physico-chemical parameters with macroinvertebrate and vertebrate fauna of Lake Ogelube and Lake Ojii, Opi-Agu, south-eastern Nigeria. African Journal of Aquatic Science: (in English) ["The physico-chemical parameters of water provide crucial information on the condition of a waterbody at a point in time. Physico-chemical parameters determine the primary and secondary productivity of an aquatic ecosystem. Data on water temperature, pH, turbidity, water depth, total dissolved solids, total hardness, biochemical oxygen demand, dissolved oxygen, chloride, nitrate and phosphate, together with information on the aquatic macroinvertebrate and vertebrate species composition and abundance were collected for two Nigerian lakes, Lake Ogelube and Lake Ojii at Opi-Agu. The physico-chemical parameters were analysed using standard methods. Macroinvertebrate and vertebrate (Actinopterigii and Amphibia) species composition and abundance in the lakes were correlated with the physico-chemical parameters. Temperature, depth, biochemical oxygen demand and phosphate were significantly higher in Lake Ojii than in Lake Ogelube, while pH, turbidity and nitrate were significantly higher in Lake Ogelube ($p < 0.05$). In total, 1 442 animals were collected from the lakes of which 1 101 were macroinvertebrates and 341 vertebrates. The family Libellulidae (Order: Odonata) and the species Coptodon zillii (synonym: Tilapia zillii) (Gervais, 1848) (Perciformes: Cichlidae) were the most abundant macroinvertebrate and vertebrate taxa, respectively. Libellulidae were negatively associated with biochemical oxygen demand, temperature, turbidity, phosphate and chloride and Coptodon zillii was positively associated with dissolved oxygen." (Authors)] Address: Onah, I.E., Dept of Zoology and Environmental Biology, University of Nigeria. Email: ikechukwu.onah@unn.edu.ng

20198. Onishko, V.V.; Koterin, O.E. (2022): Ischnura elegans malikovae subspecies nova (Odonata, Coenagrionidae) from the Far East of Eurasia, with discussion of other possible subspecies. Zootaxa 5120(4): 573-585. (in English) ["Ischnura elegans malikovae ssp. n. is described from the southern Far East of Russia (type locality: Russia, Primorskiy Kray, Pozharskiy District, Luchegorsk Town, the Luchegorsk Reservoir). Reconsideration of literature suggested it to broadly range in East Asia including Korea, Japan (Hokkaido and northernmost Honshu), north and northeast China and to be hitherto mistaken for Ischnura elegans elegans (Vander Linden, 1820) in Japan. The main difference of the new subspecies from I. e. elegans is the male paraprocts that are about 1.5 times shorter and scarcely divaricating in dorsal view and directed obliquely upward in lateral view. Ischnura elegans ebneri Schmidt, 1938 is reconsidered as the presumably Anterior Asian subspecies characterised by scarcely or not diverging male paraprocts in dorsal view, versus strongly diverging in I. e. elegans. Based on scarce information in the literature, I. elegans marquardti Schmidt, 1938 is supposed to be a junior synonym of I. elegans ordosi Bartenev, 1912 stat. rev., which is suggested to be an eastern Central Asian subspecies characterised by an incised prothoracic process in males." (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

20199. Onishko, V.V.; Kosterin, O.E.; Blinov, A.G.; Sukhikh, I.S.; Ogunleye, A.T.; Schröter, A. (2022): Aeshna soneharai Asahina, 1988, stat. rev., bona species – an overlooked member of the European fauna? (Odonata: Aeshnidae). Odonatologica 51(1-2): 111-145. (in English) ["Specimens and observations of Aeshna mixta Latreille, 1805, obtained in 2021 from Moscow and Moscow Province, Russia, lead us to the conclusion that what used to be regarded as this well-known Palaearctic species in fact represented two species. They differ in details of the abdominal maculation, including the conspicuous dorsal mark on the second segment, the relative length of the male epiproct, and some other characters. In addition, they also differ in the mitochondrial COI and COII gene sequences (with one odd specimen of A. mixta from Balkan Peninsula), but not in the ITS2 sequence. A potential hybrid male was observed. Analysis of photographic observations on the website “iNaturalist.org” suggests that the true A. mixta ranges in North Africa, Europe, the Caucasus, and West Asia, and extends north-east to South Ural and south-eastern Kazakhstan and east to Kashmir. The name available for the second species is Aeshna soneharai Asahina, 1988 stat. rev., bona species, described from Japan in subspecies rank. This species ranges in East Europe west to the longitude of Moscow and Voronezh, in Ural, Kazakhstan, Siberia, West China, Mongolia, the Far East including Russia, Northeast China, Korea, and Japan. Both species co-occur in Russia between the Don River and South Ural, in Kyrgyzstan and in southeastern Kazakhstan. The iNaturalist photographs suggest that outside their contact zone, both species (especially A. mixta in southern Europe) exhibit some variation with respect to almost all characters that are diagnostic in Moscow Province but, on the other hand, are still identifiable using most of these characters. Aeshna soneharai seems not to share the swarming behaviour and the migratory abilities of A. mixta. The enigmatic Aeshna lucia Needham, 1930, is reconsidered a doubtful species rather than a synonym of A. mixta." (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

20200. Orlowska, A.B. (2022): Study of biocompatibility of nanostructured materials on in vitro and in vivo models. PhD thesis, Departament de Química Física i Inorgànica, Universitat Rovira i Virgili, Tarragona: 361 pp. (in English) ["Biomaterials play a substantial role in the health care industry. Each year, the number of medical devices used in humans is estimated to be around 1.5 million individual devices, according to the World Health Organization, with about 10 000 types of generic device groups available worldwide. As new devices emerge, the topic of the biocompatibility of these materials becomes more relevant. This thesis studies biocompatibility of biomaterials and their interaction with tissues and cells combining in vitro and in vivo models. The studied biomaterials are classified in synthetic (polymers, silicon, titanium, and alloys) and nature-derived biomaterials, which in turn, classify in xenogenic, derived from natural materials but foreign for the organism and autologous biomaterials, derived from the tissues of the same organism. In the case of synthetic materials, it was shown how different functionalization strategies of surfaces (in particular, the effect of protein coating and surface topography) affect mammalian cell response. Autologous biomaterials were represented by platelet rich fibrin (PRF), derived from the blood of the patient. Their potential as implantable system was studied in vitro and in vivo. PRF matrixes were characterized by growth factors storage capacity and release as

well as their cellular retention. In regard to xenogenic biomaterials, cell permeation and liquid absorption into different collagen membranes were studied in vitro, while evaluation of the host's tissue response was studied with in vivo implantation model. Results show that all tested collagen membranes were biocompatible, showcasing the formation of new blood vessels regardless of the presence of multinucleated giant cells." (Author) The study includes references to Odonata.] Address: Orlowska, Anna Barbara, Departament de Química Física i Inorgànica, C/ Marcel.lí Domingo s/n, Edifici N4, 43007 Tarragona, Spain

20201. Orr, A.G.; Pricexy, B.W. (2022): A description of the larva of Matronoides cyaneipennis Förster, 1897 from northern Borneo (Odonata: Calopterygidae). Odonatologica 51(1-2): 157-165. (in English) ["We describe the larva of Matronoides cyaneipennis Förster, 1897, based on an incomplete, dried F0 specimen collected at Mt Kinabalu, Sabah, in 1964, and held at the Natural History Museum, London. Since its collection nearly 60 years ago no other specimen has come to light despite considerable searching of its habitat. Identification is by supposition, but given its provenance the identity of the specimen is not in doubt. All diagnostic features remain intact. The larva is compared with those of the related genus Neurobasis, especially the potentially syntopic N. longipes from which it differs markedly." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, QLD, Australia. Email: agorr@bigpond.com

20202. Pacioglu, O.; Dutu, L.; Dutu, F.; Pavel, A.B. (2022): Habitat preferences and trophic interactions of the benthic invertebrate communities inhabiting depositional and erosional banks of a meander from Danube Delta (Romania). Global Ecology and Conservation 38 e02213: 15 pp. (in English) ["River restoration and biodiversity conservation programs require an in-depth knowledge of the influence that sediment composition and hydraulic stress have on invertebrate fauna composition and spatial distribution, as well as on nutrients cycling and food websf structure and functionality. Compared to low-order streams, the traditional focus of river ecology, the knowledge of these ecosystem properties of the meanders developed along large, lowland watercourses, is currently insufficient. The present study assessed the ecological preferences and the trophic interactions of the benthic invertebrate communities inhabiting erosional and depositional banks developed within a meander of the River Danube flowing through its delta (Danube Delta, Romania). The invertebrates from two mesohabitats, the concave (i.e. erosional) and convex (i.e. depositional) banks developed in the apex region of the meander were sampled quantitatively and qualitatively, along with sediment samples for assessing the grain-size characteristics and hydrodynamic parameters (i.e., critical shear stress, the Reynolds number, the critical velocity and Shields parameter). For assessing their mesohabitat preferences, quantitative samples were taken from both banks, whereas for inferring the trophic interactions, stable isotopes of $\delta^{15}N$ and $\delta^{13}C$ were measured from qualitative samples, comprising both invertebrates and basal resources. The results showed that increased siltation with fine sediments in the depositional bank led to a community dominated by chironomids, oligochaetes and bivalves, whereas the opposite bank comprised crayfish, caddis fly larvae and amphipods with a preference for coarser sediments. The $\delta^{13}C$ of most consumers revealed that the dominant forms of carbon entries in the analysed food webs were photosynthetic based, whereas certain snails, chironomids and basal resources from the depositional bank were $\delta^{13}C$ depleted ($\delta^{13}C$: -35 to - 39 ‰). Such low ratios for $\delta^{13}C$ (mean <-35 ‰) reflected the potential of carbon entry through the base of depositional food web as a result of methane oxidation at sediment-water interface (i.e. chemosynthesis), induced by the fine sediments deposition that could have favoured the methane production. Grazing methaneoxidising bacteria in the depositional meander bank could have provided the primary consumers with up to 50 % and the omnivores and predatory invertebrates with up to 30 % of their carbon, which could represent an important subsidy from an additional, chemosynthetic source. The impact of a supplementary carbon input was further reflected in increasing depositional food web basal niche diversity, which led to distinct trophic niches and lower interspecific competition of consumers compared to the erosional bank of the meander." (Authors)] Address: Pacioglu, O., National Institute of Research & Development for Biological Sciences, Splaiul Independen.ei 296, 060031 Bucharest, Romania. Email: octavian.pacioglu@incdsb.ro

Padilla-Morales, B.; Cornejo-Páramo, P.; García-Miranda, O.; Carrillo Muñoz, A.I.; Lopez, A.N.; Castillo-Morales, D.L.; Barragán, G.W.; Urrutia, A.O.; Serrano-Meneses, M.A. (2022): Fast species diversification among dragonflies (Anisoptera: Odonata: Insecta) inhabiting lentic environments regardless of wing pigmentation. Ecological Entomology 47(3): 314-322. (in English) ["1. In dragonflies, species richness shows a marked variation between lineages. Species diversification in this lineage has been linked with habitat variation, but the role of other factors, such as wing pigmentation, arguably one of the most conspicuous traits in dragonflies, have not yet been explored. 2. In this study, using novel methodology that takes into account state-dependent speciation, extinction models, and ancestral reconstruction, we investigate the role of wing pigmentation (present/absent) in conjunction with habitat variation (lentic/lotic), to unveil the drivers of species diversification in dragonflies. 3. We found that wing pigmentation is associated with a marginal increase in diversification compared to unpigmented lineages. Inhabiting a lentic habitat is associated with higher diversification rates. When considering both factors in a single model, lentic environments are associated with higher diversification compared to lotic habitats regardless of pigmentation status. In contrast with results across the whole tree, in lotic environments, wing pigmentation is associated with marginally higher diversification rates compared to non-pigmented species. Ancestral state reconstruction revealed that the last common ancestor of dragonflies was most likely non-pigmented and lived in lotic habitats. 4. Our study provides evidence that wing pigmentation in conjunction with habitat has an important influence on dragonfly species diversification, with habitat being a better differentiator than wing pigmentation." (Authors)] Address: Padilla-Morales, B., Milner Centre for Evolution, Department of Biology and Biochemistry, University of Bath, Bath BA2 7AY, UK. Email: bpm29@bath.ac.uk and a.urrutia@bath.ac.uk

20203. Papazian, M.; Filippi, G.; Coache, A.; Deffontaines, J.-B. (2022): Contribution a la connaissance des Odonates de l'archipel de Sâo Tome-et-Principe. 3. Presence d'Ischnura senegalensis (Rambur, 1842), de Tramea limbata (Desjardins, 1835) et de Rhyothemis notata (F., 1787) (Odonata: Coenagrionidae, Libellulidae). L'Entomologiste 78(2): 115-119. (in French, with English and Portuguese summaries) ["The first two expeditions carried out in 2019, as part of the Sao Tome and Principe - Archipelago of Biodiversity" project, enabled the collection of Zygonyx torridus (Kirby, 1889) and Agriocnemis zerafica Le Roi, 1915, new

species for Sao Tome and Principe. It was only in October 2021 that a third expedition could be organized, allowing the discovery of Ischnura senegalensis (Rambur, 1842), Tramea limbata (Desjardins, 1835) and Rhyothemis notata (F., 1787), bringing to 20 the number of Odonata currently known from the archipelago." (Authors)] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

20204. Papazian, M., Filippi, G.; Coache, A. (2022): Contribution a la connaissance des Odonates de l'farchipel de Sáo Tomé-et-Principe 4. Presence de Gynacantha cylindrata Karsch, 1891 (Odonata Aeshnidae). L'Entomologiste 78(4): 279-283.["A new expedition to Sao Tome, in March 2022 as part of the Sao Tome and Principe "Archipelago of Biodiversity" project, allowed the collection of Gynacantha cylindrata Karsch, 1891 during a night hunt, at the using a light trap." (Authors)] Address: Papazian, M., Opie Provence . Alpes-du-Sud. Museum d'fhistoire naturelle de Marseille, palais Longchamp, f-13233 Marseille cedex 20, France. Email: papazianmichel@orange.fr

20205. Park, J.S.; Kim, M.J.; Kim, S.S.; Kim, I. (2022): Complete mitochondrial genome of Asiagomphus coreanus (Odonata: Gomphidae), which is endemic to South Korea. Mitochondrial DNA Part B Resources 7(5): 791-793. (in English) ["Asiagomphus coreanus (Doi & Okumura, 1937) […]has been listed as an endemic species in South Korea. Here, we assembled its complete mitochondrial genome (mitogenome) which is 15,649 base pairs (bp) in length. The A. coreanus mitogeneome consists of a typical set of genes [13 protein-coding genes (PCGs), 2 ribosomal RNA (rRNA) genes, and 22 transfer RNA (tRNA) genes] and one major non-coding A + T-rich region which is 846 bp long. The gene arrangement of the species was identical to that of commonly found in the majority of the insects. Phylogenetic analyses using the concatenated sequences of 13 PCGs and two rRNA genes of the representative odonate mitogenomes by Bayesian inference method revealed that A. coreanus belongs to the Gomphidae family with a strong nodal support (Bayesian posterior probabilities = 1). Unlike previous phylogenetic analyses (with regards to suborder relationships) the suborder Anisozygoptera — which was represented by a single species, Epiophlebia superstes — was placed as the sister to Zygoptera." (Authors)] Address: Kim, I., Coll. Agriculture & Life Sciences, Chonnam National Univ., Gwangju, Republic of Korea. Email: ikkim81@chonnam.ac.kr

20206. Payra, A.; Deshpande, A.; Koparde, P. (2022): Up and above: Northernmost records of Macromidia donaldi donaldi (Fraser, 1924) and Merogomphus longistigma (Fraser, 1922) from the Western Ghats of India (Odonata: Synthemistidae: Gomphidae). Revista de la Sociedad Entomológica Argentina 81(2): 63-69. (in English, with Spanish summary) ["The occurrences of Macromidia donaldi donaldi (Fraser, 1924) and Merogomphus longistigma (Fraser, 1922) are reported for the first time in the northern Western Ghats of India. The observations are the northernmost records of these species. Detailed descriptions, diagnostic characters and a comparison on with closely related species are provided." (Authors)] Address: Payra, A., School of Ecology & Environmental Management, Faculty of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Kothrud, Pune, Maharashtra , 411038 India. Email: arapayra@gmail.com

20207. Peng, L.; Pan, T.; Zheng, M.; Song, S.; Su, G.; Li, Q. (2022): Kinematics and aerodynamics of dragonflies (Pantala flavescens, Libellulidae) in climbing flight. Frontiers in Bioengineering and Biotechnology 10:795063. doi: 10.3389/fbioe.2022.795063: 14 pp. (in English) ["This study presents a detailed analysis of dragonflies' climbing flight by integrating highspeed photogrammetry, three-dimensional reconstruction, and computational fluid dynamics. In this study, a dragonfly's climbing flight is captured by two high-speed cameras with orthogonal optical axes. Through feature point matching and threedimensional reconstruction, the body kinematics and wing kinematics of 22 dragonflies in climbing flight are accurately captured. Experimental results show that the climbing angles (ç) are distributed from 10° to 80° and are concentrated within two ranges, 60°–70° (36%) and 20°–30° (32%), which are defined as large angle climb (LAC) and small angle climb (SAC), respectively. In order to study the aerodynamic mechanism of the climbing flight based on the biological observation results, the kinematic parameters of the dragonfly during LAC and SAC are selected for analysis and numerical simulation. The results show that the climbing angle ç and wing kinematics are related. There are considerable differences in wing kinematics during climbing with different ç, while the wing kinematics are unchanged during climbing with similar ç. With the increase in ç, the phase difference (ë) between the forewing and the hind wing decreases and the amplitude of the positional angle (èmean) of the hind wing increases, while èmean of the forewing remains almost unchanged. Through numerical simulation of LAC and SAC, it can be found that during the climb with different ç, the different wing kinematics have a significant influence on aerodynamic performance. During SAC, the increase in ë and the decrease in èmean of the hind wing weaken the aerodynamic disturbance of the forewing by the vortex wing of the hind wing, thus improving the flight efficiency." (Authors)] Address: Zheng, M., Reserach Inst. Aero-Engine, Beihang University, Beijing, China. Email: zhengmengzong@buaa.edu.cn

20208. Pérez-Hernández, C.X. (2022): Enrique González Soriano, entomólogo de formación y naturalista de vocación. Enrique González Soriano, entomologist by training and naturalist by vocation. Dugesiana 29(2): 217-224. (in Spanish, with English summary) ["A brief review of the life and work of the entomologist and naturalist Enrique González Soriano is presented, as well as comments on the impact of almost 45 years of research on Mexican and Latin American odonatology.Key words: Odonata, taxonomy, natural history, National Insect Collection, Latin American Odonatology." (Author)] Address: Pérez-Hernández, C.X., Laboratorio de Ecología de la Conducta, Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, México. Email: cxinum@gmail.com

20209. Phan, Q,T,M Yokoi, N.; Ngo, Q.P.; Nguyen, M.T. (2022): Taxonomic and faunistic notes on the genus Protosticta Selys, 1885 in Laos (Odonata: Zygoptera: Platystictidae). Aquatic Insects 43(3): 236-245. (in English) ["A re-examination and discussion of the records of the genus Protosticta Selys, 1885 of Laos is provided. Protosticta ngoai Phan & Kompier, 2016 and P. spinosa Phan & Kompier, 2016 are reported for the first time from Laos. Protosticta curiosa Fraser, 2009 [sic!, must be Fraser, 1934] is assigned as junior synonym of P. trilobata Fraser, 1933. The Protosticta curiosa-group should henceforth be referred to as the Protosticta trilobata-group." (Authors)] Address: Phan, Q.T., Center for Ento. & Parasit. Res., Inst. Res. &Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

20210. Phan, Q.T.; Keetapithchayakul, T.S.; Ngo, Q.P. (2022): New additions to the Vietnamese Odonata fauna: Records of Podolestes pandanus Wilson & Reels, 2001a: Zygoptera: Argiolestidae) and Risiophlebia guentheri Kosterin, 2015 (Anisoptera: Libellulidae) from a swamp cypress nature reserve in the Central Highlands of Vietnam. International Dragonfly Fund - Report 172: 1-7. (in English) ["Podolestes pandanus Wilson & Reels, 2001, is recorded for the Vietnamese fauna and the occurrence of Risiophlebia guentheri Kosterin, 2015 in the Central Highlands of Vietnam is confirmed." (Authors)] Address: Phan, Q.T., Center for Ento. & Parasit. Res., Inst. Res. &Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

20211. Phattanarak, C.; Boonsoong, B. (2022): Diversity of dragonfly larvae in some parts of northern Thailand. Agriculture and Technology Journal 3(2): 63-75. (in Thai, with English summary) ["Diversity of dragonfly larvae (Order Odonata, Suborder Anisoptera) were investigated at stream and wadeable river of Chiang Mai, Nan and Chiang Rai provinces. Eighteen sampling sites were sampled during October 2020 to March 2021. Dragonfly larvae were collected using D-frame net and fully-grown larvae were reared in laboratory. Unidentified larvae were associated using DNA barcoding (COI). A total of 291 specimens of dragonfly larvae were identified into 23 species, 17 genera and 5 families (Aeshnidae, Gomphidae, Libellulidae, Macromiidae and Synthemistidae). The family Gomphidae (13 species) is the most diverse species richness followed by Libellulidae and Aeshnidae, respectively. The association of larvae and adult succeed in 3 species (Idionyx selysi, Paragomphus capriconis and Tetracanthagyna plagiata). The similarity analysis (Blastn) found that 3 species which Heliogomphus selysi, Pantala flavescens and Trithemis festiva presented in GenBank and BOLD database. Principal Component Analysis (PCA) analysis revealed that dragonfly larvae were correlated with each provincial region, which Megalogomphus sp., Stylogomphus sp. and Idionyx sp. associated with Chiang Rai Province. Undisturbed and headwater stream sites scatter more than disturbed and wadeable river sites." (Authors)] Address: Boonsoong, B., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok, Thailand 10900. E-mail: fscibtb@ku.ac.th

20212. Pires, M.M.; Sahlén, G.; Périco, E. (2022): Agricultural land use affects the heterogeneity of Odonata communities in the Brazilian Pampa. Journal of Insect Conservation 26: 503-514. (in English) ["Farming expansion has negative impacts on freshwater biodiversity. However, the effects of agricultural land use are not similar across taxa and depend on local context. For instance, the impacts of agricultural expansion are understudied in the Neotropics (one of the leading regions in cropland expansion). Knowledge of the effects of agricultural land use on aquatic insects from South American subtropical grasslands (Pampa) is even more incipient. We tested whether landscape modification related to increased agricultural land use was associated with taxonomic homogenization in odonate communities in waterbodies in the Brazilian Pampa. Odonates were collected in waterbodies differing in the main land-use class in their surroundings (cropland or grassland). Cropland and grassland sites differed with respect to their abiotic conditions (water chemistry) and species composition of Odonata. Additionally, we found higher variation in the composition of Odonata (and suborders Anisoptera and Zygoptera separately) in grassland than cropland sites. We found an interplay between agricultural and grassland land uses and the variation in the composition of odonate communities in the Brazilian Pampa. Specifically, landscape modification by agriculture modified the abiotic conditions in the waterbodies, which may have favored species able to establish as larvae under harsher environmental conditions. Implications for insect conservation: We suggest that the maintenance of mixed-grassland and cropland land uses in the fields adjacent to waterbodies can limit the negative effects of agricultural encroachment on Odonata communities with respect to biotic homogenization in the Brazilian Pampa." (Authors)] Address: Pires, M.M., Ecology and Evolution Lab , Universidade do Vale do Taquari (UNIVATES) , Avelino Tallini Av. 171 , 95914-014 , Lajeado, RS, Brazil

20213. Prieto-Merino, C.; Martínez-Gonzaga, F. (2022): Estudio de la calidad de agua con macroinvertebrados en el sector turístico Pailas Rotas, Cantón Gonzanamá Provincia de Loja. Study of the quality of water with macroinvertebrates in the tourist sector Pailas Rotas, Canton Gonzanamá Province of Loja. Estudo da qualidade da água com macroinvertebrados no setor turístico Pailas Rotas, Cantão Gonzanamá Província de Loja. Polo del Conocimiento 7(7) (Edición núm. 70): 735-751. (in Spanish, with English and Portuguese summaries) [Ecuador; "The objective of the present study was to evaluate the water quality of the Pailas Rotas tourist sector of the Changaimina parish, Gonzanamá sector through analysis of aquatic macroinvertebrates, for this investigation a surber network and a kick network were used, establishing three monitoring points, it was achieved collect a total of 79 specimens of aquatic macroinvertebrates, of which taxonomically correspond to 9 orders and a total of 15 families. The order with the largest number of macroinvertebrates was obtained by the order Hemiptera with 40 individuals (51%), the order Ephemeroptera with 17 individuals (21%), the order Trichoptera and Odonata with 7 individuals each (9%) [Aeshnidae, Corduliidae, Libellulidae], the order Coleoptera, Diptera and Haplotaxida 2 individuals each (3%), the order Lepidoptera and Pulmonata with 1 individual (1%), the EPT and BMWP/Col indices were determined, obtaining as a result good quality in the upper part, in the middle part where it is found Regular tourist activity and poor quality in the lower part. The results of this study indicate that anthropogenic activities influence the quality of the waters." (Authors)] Address: Prieto-Merino, C., Tecnología Superior en Desarrollo Ambiental, Instituto Superior Tecnológico Sudamericano Loja, Ecuador. Email: cfprieto@tecnologicosudamericano.edu.ec

20214. Priyadarshana, T.S.; Lee, M.-B.; Ascher, J.S.; Qiu, L.; Goodale, E. (2022): Crop heterogeneity is positively associated with beneficial insect diversity in subtropical farmlands. Journal of Applied ecology 58(12): 2747-2759. (in English) ["1. Increasing crop configurational heterogeneity – smaller crop fields with more field margins – has been repeatedly found to support farmland biodiversity. But research on compositional crop heterogeneity – the number and evenness of crop types – has usually shown only weak effects. However, much of this research has been conducted in large-scale temperate agroecosystems. 2. We examined smallholder subtropical agroecosystems in southern China to assess the effects of crop heterogeneity on beneficial insect biodiversity. In addition to pollinators (bees, apoid and vespid wasps, butterflies), we studied dung beetles and dragonflies/damselflies, which are not usually considered in cropland heterogeneity studies, but are abundant in these multi-functional agroecosystems. We sampled these taxa in 468 transects placed inside 52 farms across

three seasons (summer, spring, winter), collecting data on 27,245 insects belonging to 160 species. 3. We found a strong positive effect of crop compositional heterogeneity (measured by Shannon-Wiener index) on dung beetle and dragonfly/damselfly diversity. Bees/wasps and butterflies, conversely, were positively affected by crop configurational heterogeneity (measured by cumulative field margin length). 4. Field margin type, categorized by the structure of the dominant crop types, was consistently an important explanatory variable, with weedy margins having high insect diversity. The presence of a vegetable crop on one side of the field margin, compared to non-vegetable monocultures on both sides, increased diversity in 3/4 taxon-season comparisons made for rice, and 6/9 comparisons made for sugarcane or corn. 5. Synthesis and applications. We demonstrate that crop compositional heterogeneity can support insects that respond to differences among crop types, including taxa that play a key role in nutrient cycling (dung beetles) and natural pest control (dragonflies/damselflies). Incorporating structurally diverse crops into monoculture Asian agroecosystems can reduce the adverse effects these intensive systems have on beneficial insects, and increase crucial ecosystem services." (Authors) Odonate taxa are not specified.] Address: Goodale, E., Guangxi Key Lab. Forest Ecology & Conservation, College of Forestry, Guangxi University, 100 DaXue Rd. Nanning, Guangxi, 530004 China. E-mail: ebengoodale@gxu.edu.cn

20215. Priyadi, S.; Setiawan, L.A.; Utami, D.S.; Azies, A.F.; Haryuni (2022): Impact of carbofurans on sweet corn pest predators: A study of good agroecosystem practices. Jurnal Ilmiah Agrineca 22(2): 49-57. (in English) ["Sweet corn (Zea mays var. Saccharata, Sturt) is a horticultural crop with high economic value. Sweet corn plants are susceptible to attack by plant pest organisms, reducing production yields. Using synthetic chemical pesticides of the carbamate group can reduce the diversity of predatory insects as biological controllers. Many farmers do not know about the role of predatory insects in agriculture, so there is often a mistarget in control. This study aimed to determine the diversity of predatory insects on sweet corn. The research was conducted in Cabeyan, Sukoharjo district, using the descriptive observation method. Data collection is done directly. In this study, several types of predatory insects were found, including 3 species from the Araneae order, 2 from the Odonata [Agriocnemis femina, Orthetrum sabina], one from the Hymenoptera, one from the Diptera, and one species from the Coleoptera." (Authors)] Address: Priyadi, S., Agrotechnology Dept, Agriculture Fac., Tunas Pembangunan Univ., Surakarta, Indonesia. Email: haryuni@lecture.utp.ac.id

20216. Raczynski, M.; Stoks, R.; Johansson, F.; Barton, K.; Sniegula, S. (2022): Phenological shifts in a warming world affect physiology and life history in a damselfly. Insects 2022, 13, 622. https://doi.org/10.3390/insects13070622: 13 pp. (in English) ["Simple Summary: Climate warming affects phenological events of cold-blooded organisms. In this analysis we studied, in laboratory conditions, the impact of warming and hatching dates on key life history and physiological traits in a cannibalistic damselfly, Ischnura elegans. Larvae were reared in groups from hatching to emergence through one or two growth seasons, depending on the voltinism. Larvae were equally divided by hatching dates (early and late) and temperature treatment (current and warming). Early and late hatched groups were not mixed. Despite no difference in cannibalism rate between different hatching dates and temperatures, early hatched larvae reared under warming had elevated immune function measured as phenoloxidase (PO) activity. This increased PO activity was not traded off with life history traits. Instead, age and mass at emergence, and growth rate were mainly affected by temperature and voltinism. Our results confirm the importance of phenological shifts in a warming world for shaping physiology and life history in a freshwater insect. Abstract: Under climate warming, temperate ectotherms are expected to hatch earlier and grow faster, increase the number of generations per season, i.e., voltinism. Here, we studied, under laboratory conditions, the impact of artificial warming and manipulated hatching dates on life history (voltinism, age and mass at emergence and growth rate) and physiological traits (phenoloxidase (PO) activity at emergence, as an indicator of investment in immune function) and larval survival rate in high-latitude populations of the damselfly Ischnura elegans. Larvae were divided into four groups based on crossing two treatments: early versus late hatching dates and warmer versus control rearing temperature. Damselflies were reared in groups over the course of one (univoltine) or two (semivoltine) growth seasons, depending on the voltinism. Warming temperature did not affect survival rate. However, warming increased the number of univoltine larvae compared to semivoltine larvae. There was no effect of hatching phenology on voltinism. Early hatched larvae reared under warming had elevated PO activity, regardless of their voltinism, indicating increased investment in immune function against pathogens. Increased PO activity was not associated with effects on age or mass at emergence or growth rate. Instead, life history traits were mainly affected by temperature and voltinism. Warming decreased development time and increased growth rate in univoltine females, yet decreased growth rate in univoltine males. This indicates a stronger direct impact of warming and voltinism compared to impacts of hatching phenology on life history traits. The results strengthen the evidence that phenological shifts in a warming world may affect physiology and life history in freshwater insects." (Authors)] Address: Raczynski, M., Institute of Nature Conservation, Polish Academy of Sciences, 31-120 Krakow, Poland; kbarton@iop.krakow.pl

20217. Raczyñski, M.; Stoks, R.; Sniegula, S. (2022): Warming and predation risk only weakly shape sizemediated priority effects in a cannibalistic damselfly. Scientific Reports 12(17324): 12 pp. (in English) ["1. Differences in hatching dates can shape intraspecific interactions through size-mediated priority effects (SMPE), a phenomenon where bigger, early hatched individuals gain advantage over smaller, late hatched ones. While SMPE may be important for population dynamics, to what extent and how these are affected by key environmental factors such as warming and predation risk imposed by top predators remains unclear. 2. In a laboratory experiment, we studied effects of warming (low and high temperature) and predation risk (presence and absence of predator cues of perch) on SMPE in life history and physiological traits in the cannibalistic damselfly Ischnura elegans. We induced SMPE by manipulating hatching dates, thereby creating four groups: non-mixed phenology early (E) and late (L) hatchers, and mixed phenology early (E+L) and late (L+E) hatchers. 3. We found strong SMPE for survival and emergence success, with the highest values in E+L larvae and the lowest values in L+E larvae. Neither temperature nor predator cues affected SMPE for these two life history traits. The other life history traits (development rate and mass at emergence) did not show SMPE, but were affected by temperature and predator cues. 4. SMPE was found for protein content, but only in the high temperature treatment. The other physiological

traits (immune function measured as phenoloxidase activity and fat content) showed fixed expressions across treatments, indicating decoupling between physiology and life history. 5. The results underline that SMPEs are trait-dependent, and only weakly affected by temperature and predation risk." (Authors)] Address: Sniegula, S., Inst. Ochrony Przyrody Polskiej Akademii Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, e-mail: sniegula@iop.krakow.pl

20218. Radanovich, S.B.; Vladimirovich, Y.K. (2022): [The use of the macro-photography method in the classification of taxonomical groups of the order Odonata on the example of Aeshna grandis and Lestes sponsa]. Research Institute of Pedagogy and Psychology: 29-33: 29-33. (in Russian) ["The authors of this scientific article consider the morphological criteria for the larvae of dragonflies Lestes sponsa and Aeshna grandis, obtained as a result of the macrophotography method. The morphological criteria depicted in the work are subsequently used for species identification of Odonata larvae using the example of 2 dragonfly species of different suborders. The article describes the possibilities of using dragonfly larvae by humans in the bioindication of the aquatic environment; the equipment used, as a result of which high-quality macrophotographs of morphological criteria were obtained. The scope of the studied material included the determinant “Dragonfly larvae of the fauna of the USSR (Odonata)”, a descriptive and evidential base of the taxonomic belonging of individuals to certain species presented in the photographs was formed." (Google translate)] Address: Radanovich, S.B., Karaganda University named after E.A. Buketov, Karaganda, Kazakhstan

20219. Rashid, M.; Ridoy, M.K.; Rahman, M.M.; Rahman, M.M.; Mondal, M.F. (2022): Does solar light trap reduce the cost of pesticides used in rice field? Effect of solar light trap in rice field. SAARC Journal of Agriculture 20(1): 171-183. (in English) ["Pesticide application against insect pest infestation is environmentally unsafe and costly. An attempt was taken to evaluate the solar light trap as ecofriendly and cost-effective approach in Transplanted Aman rice (BRRI dhan32) field at Barhatta Upazila (Sub-district) in Netrokona district of Bangladesh. It was found that rice pest like Rice yellow stem borer, Rice leaf roller, Green leaf hopper, Brown plant hopper, Rice leaf miner, Rice gall midge, White leaf-hopper, Rice bug, Rice ear cutting caterpillar, White-backed planthopper, Rice caseworm, Grasshopper, Rice skipper and Rice beetle were the major insects that captured under the solar light traps. Some beneficial insects were also attracted by the trap these were Ladybird beetle, Water scavenger, Giant water bug, Ground beetle, Rove beetle, Damsel fly. All the harmful and the beneficial insects were belonging the order of Lepidoptera, Hemiptera, Orthoptera, Coleoptera, Diptera and Odonata ["Nehalennia gracilis"]. Though the mean yield of rice was statistically insignificant in both fields, the light trap installed fields required the less frequency of pesticides than the control fields which ultimately rendered the low pesticides cost in a great extent. On an average 1,034 BDT was reduced in per hectare." (Authors)] Address: Mondal, M.F., Dept of Agricultural Extension, Ministry of Agriculture, Bangladesh. Email: mondalmf.entom@sau.ac.bd

20220. Rengifo-Correa, L.; Rocha-Ortega, M.; Córdoba-Aguilar, A. (2022): Modeling mosquitoes and their potential odonate predators under different land uses. EcoHealth 19(3): 417-426. (in English) ["To efficiently face the accelerated landscape transformation and its consequences in restructuring biotic communities and ecosystem services, one first question is which regional systems deserve prioritization for empirical assessments and interventive strategies. For the particular case of vector-borne disease control, we should consider generalist predators exhibiting differential responses to land-use change, as is the case of odonate insects. Thus, our aim was to infer land uses in Mexico where odonates (i.e., damselflies and dragonflies) might have some potential to predate mosquitoes of medical relevance. The study area included the hydrological basins of central Mexico. We modelled 167 species of odonates, four species of mosquitoes, and 51 land-use categories. Inferring spatial co-occurrence patterns from data mining and complex networks, we identified: (1) the ecological network of odonates and mosquitoes and (2) the land uses shared by these two groups. We inferred that 34% of odonate species co-occur with mosquitoes of medical relevance mainly in some preserved—mountain mesophyll cloud forest, high evergreen rainforest, and low tropical dry forest—but also in highly modified—human settlements, irrigation-based and pastures crop fields—land uses with strong human presence. Our findings highlight the relevance of community-regional studies for understanding the public health consequences of landscape change." (Authors)] Address: Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

20221. Renner, S.; Périco, E.; Schmidt Dalzochio, M.; Sahlén, G. (2022): The balance of common vs. rare: a study of dragonfly (Insecta: Odonata) assemblages in the Brazilian Pampa biome. Neotropical Biodiversity 8(1): 188-199. (in English) ["We surveyed dragonflies (Odonata) at 87 sites in the anthropologically modified Pampa biome of southern Brazil to evaluate how regionally rare and common species form species assemblages in habitats with different water physiochemistry, habitat structures, and other environmental variables. We classified 9 out of the 90 species encountered as regionally common and 59 as regionally rare. A discriminant analysis confirmed that localities with only a few common species were characteristic in the set of rare species present, while localities housing more common species showed no clear pattern. A PCA revealed that a subset of the common species were strongly positively associated with water temperature, turbidity, dissolved O2 and pH but negatively associated with desertification. In contrast, rare species were positively associated with grassland habitat, but negatively with agriculture, salinity, and conductivity. In general, the associations of the rare species were weaker than those of common species. Finally, a correlation suggested that sites with six or more common species present had a reduced number of rare species compared to sites with fewer common species. It is possible that common species reduce the available niche space for weaker competitors among the rare species. We conclude that the original species assemblages in the biome may have been species poor with few regionally common species. Current anthropogenic change has increased the number of common species, which in turn has negative effects on the survival possibilities of rare species." (Authors)] Address: Renner, S., Univde do Vale do Taquari, Lab. de Ecologia e Evolução, Univates, Brazil. Email: samuelrenner@hotmail.com

20222. Richardson, T.W. (2022): First Record of Autumn Meadowhawk, Sympetrum vicinum, for Nevada. Argia 34(1): 16-17. (in English) [20-X-2021, Jennings Pond, Rabe Meadows in Douglas County, Nevada, USA] Address: Richardson, T.W., Tahoe Institute for Natural Science, P.O. 4289

Truckee, CA 96160, USA. E-mail: will@tinsweb.org

20223. Ritter, A. (2022): Onychogomphus forcipatus (Linnaeus, 1758) Kleine Zangenlibelle - Rückkehr an die Wilde Weißeritz nach 222 Jahren. Mitteilungen Sächsischer Entomologen 41(142): 73-75. (in German) [Tharandt, Sachsen, Germany; two males of O. forciaptus along the river Weißeritz, 12-VII-2021.] Address: Ritter, Anje, Eutschützer Str. 14, 01217 Dresen, Germany. Email: gunilla@t-online.de

20224. Rodrigues, M.; Nayakkan, A.; Nair, V.P.; Rowther B, E.; Roshnath, R. (2022): Odonata of Kattampally wetland, Kerala state, India. Notulae odonatologicae 9(9): 441-450. (in English) ["Kattampally wetland is a large swamp on the floodplains of the Valapattanam River in Kannur District of Kerala previously nominated as a Ramsar site. By systemic sampling in different seasons and sites within the wetland, we recorded the diversity of adult odonates. The area was found to be rich in odonate diversity with greater species richness than other wetlands in Kerala. We found a total of 66 species of odonates from 42 genera including four species endemic to the Western Ghats, namely: Ceriagrion chromothorax, Caconeura cf. risi, Pseudagrion indicum, and Platylestes kirani. Land usage and habitat alteration were found to be the main threats to odonate diversity. National and international recognition for the wetland would help in future conservation of the site and its biodiversity." (Authors)] Address: Rodrigues, M., Malabar Awareness and Rescue Centre for Wildlife (MARC), Kannur, Kerala, India. Email: roshnath@gmail.com

20225. Rodriguez-Tapia, G.; Prieto-Amparán, J.A.; Córdoba-Aguilar, A. (2022): Linking potential habitats of Odonata (Insecta) with changes in land use/land cover in Mexico. Eur. J. Entomol. 119: 272-284. (in English) ["Land use/land cover change (LULCC) is a major threat that affects the viability of insect populations worldwide yet our estimates of such effects are usually poor. We analysed how LULCC affected the distribution of 49 species of dragonflies and damselflies in the south-central zone in Mexico during the period 2006-2012. For this, we mapped the potential species richness using ecological niche models in order to analyse predicted future changes and determined the effect of LULCC on the current and future habitats of Odonata. We also estimated current incidence of deforestation and projected its effect to 2050 using the Dinamica-EGO program. Having predicted the level of deforestation in the year 2050, we then compared current vs. expected species richness and the factors that determine it. First, roads and urban areas turned out to be the most important drivers of LULCC in our analysis. Second, deterioration occurred at all sites, but species richness remained high despite considerable habitat fragmentation. Third, there is likely to be a high species turnover rate (i.e. a high species richness, but composed of different species) even in areas where there are significant changes in the vegetation. Our work illustrates both a resilience of Odonata to LULCC and provides a useful method for measuring the effects of LULCC on insects." (Authors)] Address: Rodríguez-Tapia, G., Unidad de Geomática, Instituto de Ecología, Universidad Nacional Autónoma de México, 04510 México, México; e-mail: gerardo@iecologia.unam.mx

20226. Ryu, S.; Zhang, H.; Salcedo, M.K.; Socha, J.J.; Pass, G. (2022): Transient perfusion through a microfluidic dragonfly wing vein model. Bulletin of the American Physical Society, 75th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 20–22, 2022; Indiana Convention Center, Indianapolis, Indiana. Session L04: Animal Flight: Flying Insects II. 8:00 AM–9:57 AM, Monday, November 21, 2022. Room: 131: (in English) [Verbatim: Insect wings include a network of tubular veins through which hemolymph (blood) flows to provide the sensory organs and other tissues with water and nutrients and to remove waste products. Thus, hemolymph flow through veins is important for stability and functionality of the fragile wing blade. However, the perfusion through wing venation has been poorly studied because tracing hemocytes (blood cells) in veins of living specimen provides limited information about flow patterns. To characterize transient perfusion through complex wing venation, we created a microfluidic wing vein model of the dragonfly, Anax junius. Hemolymph flow was simulated by injecting red dye into the device filled with water at a range of flow rates. Visualized perfusion patterns suggested that the perfused area in the device logarithmically increased with time. When water was injected into the device filled with the dye, perfusion occurred slower with different patterns, and the time dependence of the perfused area was not logarithmic. The observed difference suggests that perfusion does not occur uniformly throughout the wing vein network.] Address: not stated

20227. Sadasivan, K.; Nair, V.P.; Samuel, K.A. (2022): The dragonflies and damselflies (Insecta: Odonata) of Shendurney Wildlife Sanctuary, southern Western Ghats, India. Journal of Threatened Taxa 14(6): 21213-21226. (in English) ["The odonate diversity of Shendurney Wildlife Sanctuary, southern Western Ghats (WG) of Kerala state, is discussed in this paper. A total of 181 species belonging to 87 genera and 14 families have been compiled for Kerala and this includes 68 Western Ghats endemics. A total of 116 species of odonates including 33 endemics were recorded for the region. A total of 41 damselflies (Zygoptera) and 75 dragonflies (Anisoptera) were recorded for the sanctuary. Shendurney thus harbours 56.04 % of WG and 64.08 % of the odonate diversity of Kerala. In addition, this includes 48.52% of Kerala and 41.25 % of endemic odonates of Western Ghats. About 29% of all the species recorded for the Shendurney are endemic to WG. With respect to IUCN Red List of Threatened Species, one species is 'Endangered', three 'Vulnerable', two 'Near Threatened', 84 'Least Concern', 20 'Data Deficient', and six species whose IUCN Red List status was not assessed. Family Libellulidae (41 species) dominated the odonate diversity, followed by Coenagrionidae (15 species) and Gomphidae (13 species). Regarding the occurrence status, we found that 11 species were Very Common, 42 species were found to be Common, 34 species Not Rare, 10 species were Rare, and 19 species were Very Rare inside the sanctuary. None of the species listed is protected under the Indian Wildlife Protection Act 1972." (Authors)] Address: Sadasivan, K., Greeshmam, BN439, Bapuji Nagar, Medical College Post, Trivandrum, Kerala 695011, India. Email: kaleshs2002in@gmail.com

20228. Sadasivan, K.; Nair, V.P.; Samuel, K.A. (2022): A new species of Protosticta Selys, 1885 (Odonata: Zygoptera: Platystictidae) from Western Ghats, India. Journal of Threatened Taxa 14(7): 21421-21431. (in English) ["A new species of Protosticta Selys, 1885 is described from Anamalai Hills of southern Western Ghats in peninsular India. The new species is distinguished from its regional congeners by the posterior lobe of the prothorax being devoid of spines; anterior 1/3rd of S8 pale yellow, the marking not connected dorsally; S9 completely black; caudal appendages short, sinuous, and only twice the length of S10, cerci with a small blunt basal tooth; the tip of the superior lobe of

cerci not bilobed but straight, paraprocts beveled at the tip, not clubbed; pterostigma of both wings trapezoidal with maximum length less than twice the breadth, forewing with nine & hindwing with eight postnodals, and the structure of male genital ligula. The new species is described from Peechi Wildlife Sanctuary on the northwestern flanks of the Anamalai hills. A key to the identification of Protosticta of the Western Ghats is provided based on mature males." (Authors)] Address: Sadasivan, K., Greeshmam, BN 439, Bapuji Nagar, Medical College P.O., Thiruvananthapuram, Kerala 695011, India. Email: kaleshs2002in@gmail.com

20229. Sadler, D.; Chelmick, D. (2022): Observations on a new colony of Ischnura pumilio (Charpentier) (Scarce Blue-tailed Damselfly): the first record for West Sussex. Journal of the British Dragonfly Society 38(1): 65-83. (in English) ["In June 2020 Ischnura pumilio (Scarce Blue-tailed Damselfly) was recorded for the first time in West Sussex. This was not an isolated record; a colony had become established on a recently cleared wetland habitat near Sompting. This paper describes the find and provides observations of the colony over the summers of 2020 and 2021. The habitat has been shown to have exceptionally high mid-day water temperatures compared to surrounding habitat. The management regime for the habitat has meant that the area has proved to be transitional for the species. Particular features of this transitional population are: The population appears to have two generations. The female numbers are much lower than in permanent sites especially in the second year, 2021. The androchrome female, which is rare in Europe, has been observed frequently. Males appear to be much more loyal to the site and remain even when the females have mostly disappeared. Males can be individually recognised by the patterning on the taillight. Is this a factor in sexual attraction? There was one Observation of oviposition underwater, which is extremely rare in this genus." (Authors)] Address: Sadler, D., 135 Gordon Road, Shoreham-by-Sea, West Sussex BN43 6WF, UK. Email: dlsadler@yahoo.co.uk

20230. Sajan, K.C.; Sapkota, A. (2022): First Record of Mortonagrion aborense Laidlaw, 1914 (Odonata: Coenagrionidae) from Nepal. Agrion 26(1): 16-19. (in English) ["M. aborense is recorded for the first time from Chitwan, Nepal. One male individual was photographed at Agriculture and Forestry University (AFU), Rampur, Chitwan, 26 September 2021. The total number of Odonata species recorded from Nepal is raised to 181." (Authors)] Address: Sajan, K.C., Pokhara, Kaski-33700, Gandaki Province, Nepal. Email: Sajankc143@gmail.com

20231. Salsabiela, N.; Novitasari, A.; Windianingsih, A.C.; Alfian, R.B.; Setyaningrum, A.; Yudharta, B.E.; Safa'ah, O.A.; Sukirno, S. (2022): Effect of altitude on Odonata biodiversity in the paddy field of Sleman Regency, Special Region of Yogyakarta. Advances in Biological Sciences Research. Proceedings of the 7th International Conference on Biological Science (ICBS 2021): 171-180. (in English) ["Odonata acts as a natural enemy in the paddy field ecosystem. The Odonata diversity is highly related to habitat condition. This research analyzed the effect of altitude on the diversity of Odonata in paddy field ecosystems in Sleman Regency, Special Region of Yogyakarta. This research was conducted in Palagan and Cangkringan at four different altitude levels: 160-250 masl, 260-350 masl, 360-450 masl, and 460-550 masl. The Odonata sample was obtained from purposive sampling and identified using the Wendit Flying Dragon reference book. The specimens obtained were 2,342 individuals, consisting of 13 species, 11 genera, three families, and two suborders. The Shannon-Wiener index showed the highest Odonata diversity index at an altitude of 360-450 masl. In contrast, the evenness index analysis showed that they varied in each altitude coordinate. Correlation analysis showed that the altitude coordinate of the paddy fields was positively correlated with the biodiversity index and evenness index of Odonata, with the correlation value obtained less than 0.5.] Address: Alfian, R.B., Faculty of Biology, Universitas Gadjah Mada, Jl. Teknika Selatan, Sekip Utara, Bulaksumur, Yogyakarta 55281, Indonesia. Email: reza.b.a@mail.ugm.ac.id

20232. Samanta, T.; Chatterjee, L.; Roy, A.B.; Sinha, S.; Besra, S. (2022): Importance of Ecopark, Kolkata in the context of sustainability, compare to Rajarhat grassland, as a habitat for Odonata (Dragonflies and Damselflies) diversity. World News of Natural Sciences 44: 165-175. (in English) ["The study was carried out from June 2021 to May 2022, to know the status and diversity of the Odonata fauna at Ecopark, West Bengal. They are essential for environmental monitoring and serve as biological indicators of the health of the ecosystem. During the study period, 34 species of odonates from 26 Genera and 5 Families were identified in the study area. Three families made up Suborder Anisoptera, while two families made up Suborder Zygoptera. Among them, 29 species of dragonflies belonged to the Aeshnidae, Gomphidae and Libellulidae families, while 11 species of damselflies belonged to the Coenagrionidae and Platycnemididae families. The family Libellulidae had the highest species composition (62%) followed by the family Coenagrionidae (29 %). Among all Odonates, 35% were very common (VC), 44% Common (C) 15% rare (R) and 6% were very rare (R) on the presence of their abundance. Such observation can provide insightful data on the status of Odonate populations in context to Rajarhat grassland." (Authors)] Address: Samanta, T., Nature Mates –Nature Club, 6/7, Bijoygarh, Kolkata 700032, West Bengal, India. Email: pakhibitan2019@gmail.com

20233. Sandall, E.L.; Pinkert, S.; Jetz, W. (2022): Country-level checklists and occurrences for the world's Odonata (dragonflies and damselflies). Journal of Biogeography 49(8): 1586-1598. (in English) ["Aim: Biogeographical inference and assessments of species' threat status and trends depend on comprehensive information on the current geographical distribution of species. Even country-level presences remain poorly known for many insect species and consistent global overviews for those species are missing. Here we integrate information from literature checklists, point occurrences, and identify potential species range gaps to provide a database of country-level checklists of dragonfly and damselfly species and a useful baseline for global biogeographical assessment and for assessing remaining gaps in taxonomic and spatial knowledge. Location: Global. Taxon: Odonata (damselflies and dragonflies). Methods: Our database of checklist information contains country-level species distribution information from 491 literature sources, with a focus on checklist data from 1990 to 2021 to reflect the present taxonomic and country boundaries. Additionally, we apply a novel method to interpolate potential species–country combinations missing from the literature and point data by generating a list of species present in >50% of the surrounding countries. Results: Of the 6,322 globally recognized odonate species, taxonomically harmonized literature checklist records and quality-controlled point occurrence data address 6,076 and 4,170 species, respectively. Our compilation provides a total of 31,569 unique species–country combinations, with 23,239 uniquely provided by

literature checklist and 2,031 point occurrence data, respectively. Main Conclusions: This odonate country checklist dataset provides a resource for scientists and conservation practitioners to examine questions related to baseline odonate species richness, distributions, regional conservation, and gaps in taxonomic and spatial data coverage. The combined literature and point occurrence country-level information provide the most comprehensive data available to date on the global distribution of Odonata. Our results show that checklist and point occurrences are concordant in well-studied regions and that literature data are of complementary value in tropical and species-rich countries." (Authors)] Address: Sandall, Emily, Center for Biodiversity and Global Change, Yale University, New Haven, Connecticut, USA. Email: sandall.emily@gmail.com

20234. Santos, L.R.; Rodrigues, M.E. (2022): Land uses for pasture and cacao cultivation modify the Odonata assemblages in Atlantic Forest Areas. Diversity 2022, 14, 672. https://doi.org/10.3390/d14080672: 14 pp. (in English) ["Tropical forests such as the Atlantic Forest are under constant threats from the impact of human activities, mostly being caused by the loss of native forest areas for other land uses. This study aimed to evaluate the effect of changes in land use for pasture and cacao cultivation on the richness and composition of Odonata assemblages in comparison to native forest areas. We also evaluated the species as possible indicators of these different land uses. In total, 64 streams were sampled in southern Bahia, Brazil. A total of 84 species were recorded. The results indicated that changes in land use modify the richness and composition of Odonata assemblages. Regarding composition, our results indicated a difference among the assemblages in the three land use areas and that the native areas maintain more stable assemblages. According to the indicator species analysis, 13 species were recorded as possible bioindicators for different land uses. Changes in aquatic ecosystems and their surroundings caused by different land uses a select group of different species groups, modifying Odonata diversity among these areas. Notably, land uses that maintain a certain integrity of the environment, as in the case of cacao cultivation, are the best alternatives for conserving Odonata biodiversity in comparison with pasture." (Authors)] Address: Rodrigues, M.E., Graduate Program in Tropical Aquatic Systems (“PPGSAT”), Dept of Biological Sciences, Santa Cruz State University (UESC), Ilheus 45662-900, Bahia, Brazil. Email: merodrigues@uesc.br

20235. Saul, A. (2022): Effects of PFOS on the behavior, growth, emergence, and predation susceptibility of larval mosquitoes (Culex quinquefasciatus). M.Sc. thesis, Bowling Green State University, Biological Sciences: 60 pp. (in English) ["Perfluorooctanesulfonic acid (PFOS) is a member of a group of synthetic chemicals called PFAS, or per-/polyfluoroalkyl substances. These chemicals are commonly used in the creation of non-stick cookware, fire-extinguishing foams, and waterproof coatings due to their heat, water, and oil resistance. PFAS chemicals are very persistent in the environment, but not much is known about their direct effects on aquatic invertebrates and their ecosystems. In this thesis, I examined the survival, behavior, development, and predation susceptibility of mosquito larvae Culex quinquefasciatus exposed to various concentrations of PFOS, ranging from 0 to 600 µg/L. PFOS exposure resulted in reduced larval survival, with 50% larval death in 48 hours occurring at a concentration of 310 µg/L PFOS. Mosquito larvae exposed to PFOS experienced significantly reduced developmental success and reached adulthood at a slower rate compared to control larvae. Exposure to PFOS over time also resulted in delays in reaction to prodding stimuli, which were meant to simulate a predator attack. The durations of the subsequent reactions were significantly longer in mosquito larvae exposed to PFOS over time. Larvae exposed to PFOS also spent more time at the bottom of the water column, rather than at the surface where respiration takes place. Exposing mosquito larvae to PFOS prior to immersion with predators did not result in any differences in larval predation by unexposed damselfly naiads (genus Ischnura). Overall, PFOS does impact mosquito larvae survival, behavior, and development. This could be the case for other aquatic invertebrates as well, leading to significant food web implications." (Author)] Address: not stated

20236. Schifani, E. (2022): First report of underwater oviposition by the island bluetail damselfly, Ischnura genei (Zygoptera, Coenagrionidae). Natural History Sciences, Milano: 73-75. (in English) ["Among odonates that exhibit endophytic oviposition, a few, mostly damselflies, are known to be able to perform underwater oviposition. Among them, just a few species do so very frequently. Here I report the first observation of underwater oviposition for the damselfly Ischnura genei, which becomes the eighth species of its genus known to adopt this strategy after I. asiatica, I. aurora, I. elegans, I. graellsii, I. hastata, I. nursei, and I. verticalis. The reasons why these species or other odonates choose this particular mode of oviposition on rare occasions are not yet known, although a number of possible costs and benefits have been proposed." (Authors)] Address: Schifani, E., Dept of Chemistry, Life Sciences & Environmental Sustainability, University of Parma, Parco Area delle Scienze, 11/a, 43124 Parma, Italy. Email: enrico.schifani@unipr.it

20237. Sedvall, E.; Fick, J.; Pettersson, C.; Hedeland, M. (2022): Pharmaceuticals are identified in insects in River Fyris – A study with both tandem quadrupole and quadrupole-time-of-flight mass spectrometry. Environmental Advances 8, July 2022, 100194: 8 pp. (in English) ["Highlights: • 33 different pharmaceuticals were detected in insects in River Fyris, Uppsala, Sweden. The most common drug classes were antidepressants, psycholeptics and antihistamines. The determined internal concentrations were up to 260 ng/g. Both UHPLC-tandem quadrupole MS/MS and UHPLC-qToF-MS/MS were used. Abstract: The internal concentrations of active pharmaceutical compounds in insects/macroinvertebrates in River Fyris, Uppsala, Sweden, have for the first time been investigated. Specimen of backswimmer, caddisfly larva, damselfly larva, mayfly larva and water louse were caught in the river downstream a wastewater treatment plant. After homogenization and extraction, analysis was carried out with Ultra-High Performance Liquid Chromatography – Electrospray – Tandem Mass Spectrometry (UHPLC-ESI-MS/MS) using both a tandem quadrupole (QqQ) and a quadrupole-time-of-flight (qToF) mass spectrometer. A combined qualitative/quantitative screening method for 89 pharmaceutical compounds in the selective reaction monitoring mode was applied to the samples using the QqQ instrument. Thirty-three different drugs were detected and quantified in the macroinvertebrate samples, covering a wide range of pharmacological classes, the most common being antidepressants, psycholeptics and antihistamines. Drug concentrations up to 260 ng/g (for tetracycline) were determined. A subset of thirteen compounds were selected for a complementary qualitative UHPLC-qToF-MS/MS analysis. This way, the confidence in the substance identifications was significantly strengthened by the availability of full scan high-resolution spectra and accurate

mass measurements. This is the first study demonstrating the uptake of pharmaceuticals in water-living macroinvertebrates in Sweden. Since these organisms are in the lower part of the food chain, pharmaceuticals might accumulate in predators leading to ecotoxicological effect at higher trophic levels. Macroinvertebrates might be promising indicator organisms for pharmaceutical pollution. ...The invertebrates collected were backswimmers (Notonecta sp.), damselfly larvae (Zygoptera sp.), caddisfly larvae (Trichoptera sp.), mayfly larvae (Ephemeroptera sp.) and water louse (Asellus sp.)." (Authors)] Address: Hedeland, M., Uppsala Univ., Dept of Medicinal Chemistry, Analytical Pharmaceutical Chemistry, Uppsala, Sweden. Email: mikael.hedeland@-ilk.uu.se

20238. Shapoval, N.A.; Shapoval, G.N.; Shapoval, A.P. (2022): New, rare and vagrant damselflies and dragonflies (Insecta: Odonata) in the Kaliningrad Oblast, north-western Russia. Acta Biologica Sibirica 8: 261-279. (in English) ["The paper presents new remarkable records of selected rare and uncommon Odonata species found in the Kaliningrad Oblast based primarily on our surveys conducted since 2007. Two species, Erythromma viridulum (Charpentier, 1840) and Anax ephippiger (Burmeister, 1839) are new to the region. The total number of Odonata species currently known for the territory of the Kaliningrad Oblast amounted to 66. Among them, 61 species have been recorded on the Courish (Curonian) Spit of the Baltic Sea." (Authors)] Address: Shapoval, N.A., Dept of Karyosystematics, Zoological Institute of the Russian Academy of Sciences, 1 Universitetskaya nab., 199034, St. Petersburg, Russia. Email: Nazar A. Shapoval (nazaret@bk.ru)

20239. Shela, S.; Athiyya, N.A.A.; Ratih, K.A.; Yaquta, M.J.; Dwi, A.R. (2022): Diversity and abudance of dragonflies (Odonata: Anisoptera) at Watu Gajah Tuban Field. Bio Sains Jurnal Ilmiah Biologi 1(2): 1-11. (in Indonesian, with English summary) ["Odonata is an order with the highest level of diversity and abundance among others Arthropoda phyla, but have not been identified. Dragonflies like green open area habitats, especially grass. This research aimed to analyze the diversity and abundance of dragonfly insects (Odonata: Anisoptera) in Watu Gajah Field, Semanding District, Tuban Regency. Watu Gajah Field is a green open space that supports the survival of insects, on of them is dragonflies. The climatic conditions of Watu Gajah Field with an average temperature of 290C, an altitude of 40 meters above sea level, wind speed of 13 km/h, rainfall of 1.9 mm, humidity of 70.33%, and luminous intensity of 4259.33 lux. This research using the jelajah method (cruising methods) using insect nets and hand sampling technique at 3 point areas. Based on the research results were obtained 6 species of dragonflies. Data analysis was performed using the relative abundance formula, the Shannon-Winner diversity index, and the Shimpson dominance index. The results of the calculation of the dragonfly diversity index are classified as low, namely 1.57 and the dominance index of 0.226 is included in the medium category. Watu Gajah Field is an ideal habitat suitable for the survival of dragonflies (Odonata: Anisoptera)." (Authors)] Address: Dwi Anggorowati Rahayu, Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Surabaya Jl. Ketintang, Kec. Gayungan, Kota Surabaya, Jawa Timur, 60231, Indonesia. Email: dwirahayu@unesa.ac.id

20240. Shipley, R.; Twining, C.W.; Mathieu-Resuge, M.; Parmar P.T.; Kainz, M.; Martin-Creuzburg, D.; Weber, C.; Winkler, D.W.; Graham, C.H.; Matthews, B. (2022): Climate change shifts the timing of nutritional flux from aquatic insects. Current Biology 32(6): 1342-1349. (in English) [oas 64a; "Highlights: • Aquatic insect emergence is advancing much more rapidly than bird breeding timing. • Aquatic insects have more n-3 LCPUFAs than terrestrial insects. • The seasonal availability of key fatty acids is thus shifting with climate change. • Birds are increasingly at risk of experiencing nutritional phenological mismatch. Summary: Climate change can decouple resource supply from consumer demand, with the potential to create phenological mismatches driving negative consequences on fitness. However, the underlying ecological mechanisms of phenological mismatches between consumers and their resources have not been fully explored. Here, we use long-term records of aquatic and terrestrial insect biomass and egg-hatching times of several co-occurring insectivorous species to investigate temporal mismatches between the availability of and demand for nutrients that are essential for offspring development. We found that insects with aquatic larvae reach peak biomass earlier in the season than those with terrestrial larvae and that the relative availability of omega-3 long-chain polyunsaturated fatty acids (n-3 LCPUFAs) to consumers is almost entirely dependent on the phenology of aquatic insect emergence. This is due to the 4- to 34-fold greater n-3 LCPUFA concentration difference in insects emerging from aquatic as opposed to terrestrial habitats. From a long-sampled site (25 years) undergoing minimal land use conversion, we found that both aquatic and terrestrial insect phenologies have advanced substantially faster than those of insectivorous birds, shifting the timing of peak availability of n-3 LCPUFAs for birds during reproduction. For species that require n-3 LCPUFAs directly from diet, highly nutritious aquatic insects cannot simply be replaced by terrestrial insects, creating nutritional phenological mismatches. Our research findings reveal and highlight the increasing necessity of specifically investigating how nutritional phenology, rather than only overall resource availability, is changing for consumers in response to climate change." (Authors)] Address: Shipley, R., Dept of Fish Ecology & Evolution, Swiss Federal Institute of Aquatic Science, Kastanienbaum, Switzerland

20241. Silva, G. (2022): Species diversity and barcoding of macroinvertebrates from the San Antonio River. Student Research Symposium 2022. 1. https://digitalcommons.tamusa.edu/srs2022/1: 19 pp. (in English) ["Macroinvertebrates are important biological indicators of health and ecological change within aquatic ecosystems. Macroinvertebrate diversity of the San Antonio (SA) River Watershed (Texas), which traverses rural and urban regions (Bexar County, TX), remains understudied compared to vertebrate counterparts of economic and conservation importance. The SA River hosts a diversity of crustaceans (crayfish), insects (beetles, dragonflies), annelids (leeches), and unidentified larvae at intermediate developmental stages. To improve ecological records of the SA River, an integrative approach is used to establish a reference macroinvertebrate species inventory and a genetic barcoding database (mitochondrial COI and/or 16S rRNA) for the SA River Mission Reach restored site. These data will improve the identification of (i) species of varying developmental stages to adult forms; (ii) cryptic species; and (iii) key biological indicators. Establishing baseline data will also facilitate the identification of not easily detectable changes in macroinvertebrate diversity potentially attributed to urban disturbance or climate change." (Author)] Address: not stated

20242. Silva-Hurtado, J.S.; Márquez, J. (2022): Colección

de odonatos (Insecta: Odonata) del Centro de Investigaciones Biológicas de la Universidad Autónoma del Estado de Hidalgo, México (COD-UAEH). Dugesiana 29(2): 163-169. (in Spanish, with English summary) ["Odonates constitute an order of paleopteran insects important to ecosystems because their role as generalist predators and some of their species are considered bioindicators of the environmental quality. The establishment, maintenance and growth of scientific collections that include this group may encourage their research. To this end, we are making public the creation of the odonates collection (COD-UAEH) of the Biological Research Center of the Autonomous University of the State of Hidalgo is announced. This collection contains 1,180 adult individuals belonging to ten families, 43 genera and 104 species collected in different states of the country, but mainly in the states of Hidalgo and Puebla. The incorporation of immature states has not been undertaken yet. 54% of the specimens belong to the Anisoptera suborder, which is represented by the families Aeshnidae, Cordulegastridae, Gomphidae and Libellulidae, for 26 genera and 56 species. The remaining 46% belong to the suborder Zygoptera, which includes the families Calopterygidae, Coenagrionidae, Heteragrionidae, Lestidae, Thaumatoneuridae and Platystictidae, with 17 genera and 48 species. Every specimen included in the collection has been identified to the taxonomic level of species. It is worth mentioning that the collection contains the record of a female belonging to the Megaloprepus caerulatus (Drury, 1782) species, as well as a montage in cardboard of the extended wings build to make an easier photograph taking and the wing venation comparison required for the identification of genera." (Authors)] Address: Silva-Hurtado, J.D., Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, km 4.5 carretera Pachuca-Tulancingo, s.n., Ciudad del Conocimiento, Col. Carboneras, 42184, Mineral de la Reforma, Hidalgo, México. Email: jodsilhur@gmail.com,

20243. Singh, A.; Chandra, G. (2022): Larvicidal, pupicidal, repellence and smoke toxic efficacies of Nicotiana plumbaginifolia leaves against Culex vishnui mosquito. International Journal of Tropical Insect Science 42: 1187-1195 . (in English) ["Objectives of the study was to evaluate larvicidal, pupicidal, repellence activities of Nicotiana plumbaginifolia leaf extracts (crude and solvents) and toxicity of smoke originated form dry leaves against rice field mosquito, Culex vishnui, vector of Japanese encephalitis. Larvicidal property of most effective extract was evaluated against third instar Cx. vishnui larvae under simulated semi-field condition. Crude extract of leaves exhibited remarkable larvicidal property. Amongst three used solvent extractives of leaves, ethyl acetate extractive showed best result in larvicidal test. In larvicidal bioassay, ethyl acetate extractive exhibited lowest LC50 and LC90 values, which were 7.237 ppm and 18.964 ppm respectively against the 1st instar larvae after 72 h of exposure. In pupicidal bioassay, LC50 and LC90 values were 111.20 ppm and 176.96 ppm respectively after 24 h of exposure. Remarkable (99.33%) repellency was found in 6% concentration of ethyl acetate extractive after 150 min of exposure. Smoke of N. plumbaginifolia dry leaves exhibited significant toxicity. Results of semi-field condition depicted that ethyl acetate extract was also highly effective under semi-field condition having highest mortality rate of 95.33 ± 0.33% at 500 ppm concentration against third instar Cx. vishnui larvae after 72 h exposure. The name of the isolated bioactive compound was “1-hexyl-2-nitrocyclohexane”. However, the non-target organisms like, Damselfly nymph (Ischnura spp.: Odonata) and nymph of Hemipteran bug, Diplonychus spp. were found to be least toxic to the extracts. N. plumbaginifolia leaf has remarkable larvicidal, pupicidal, repellency and smoke toxic potentialities against Cx. vishnui." (Authors)] Address: Chandra, G., Microbiology and Nanotechnology Research Units, Parasitology Laboratory, Dept of Zoology, The University of Burdwan, Golapbag, Burdwan, West Bengal, 713104, India

20244. Singh, D. (2022): Field Guide to the Dragonflies & Damselflies of Northwest India. Messrs Bishen Singh Mahendra Pal Singh, Publishers & Distributors of Scientific Books, 23 A Connaught Place, Dehra Dun 248001(Uttarakhand), India. Email: <bsmpsbooks@gmail.com: x, 518 pp- ["The book is a first of its kind, lavishly illustrated, and beautifully designed field guide which provides the first comprehensive overview of Odonata of the northwestern part of India, comprising two main geographic regions: the Himalayan range and the Gangetic Plain, as well as the west the arid zones of the Great Indian Desert or the Thar Desert. This Field Guide covers the states of Jammu-Kashmir, Himachal Pradesh, Punjab, Uttarakhand, Haryana, Delhi, Uttar Pradesh, and Rajasthan. 162 species of damselflies (Zygoptera) and dragonflies (Anisoptera) are, described and illustrated in this Field Guide. The book includes in-depth details of general knowledge of dragonflies like anatomy, life history, behavior, habitat, and an outline of the geography, ecology, and biogeography of Northwest India. An illustrated identification key to the species has been provided and is kept as simple as possible to help find the right family, genus, and species, supported by numerous drawings to show the meaning of the technical terms mentioned in the text. The description of each family provides an introduction giving brief information about the worldwide distribution, and the status of that family within present Indian borders, followed by a basic overview of the general characteristics. The species account provides a general statement of a first impression of a species at a glance in the field, field characters; sometimes hand characters (illustrated in the identification keys), habits and behavior, and habitat followed by a distribution (range, India, Northwest India), status and flight period. Distribution maps are shown for all species based on studied literature and authors’ field observations. Photographs show a male, female, and variations for most species and point out the main numbered characters to observe in the field. Illustrated throughout in color over 500 colorful photos are neatly placed in this book. Common English names for families and species and scientific names have been provided. Threats and Conservation of Indian Odonata have been addressed in detail, Dragonfly watching tips, an extensive Glossary, Literature, a Checklist of damselflies and dragonflies of Northwest India and an index to English and scientific names have also been provided in the field guide. This book is comprehensive yet easy to use by beginners and experts alike. The book would surely help in raising local awareness about this group of freshwater species and will contribute to better protection and management of freshwater ecosystems: x, 518 pp (with over 500 colorful photos), ISBN: 978-81-943323-2-9, Abhimanyu Gahlot" (Publisher)] Address: Messrs Bishen Singh Mahendra Pal Singh, Publishers & Distributors of Scientific Books, 23 A Connaught Place, Dehra Dun 248001(Uttarakhand), India. Email: <bsmpsbooks@gmail.com

20245. Sivtseva, L.V.; Zykov, E.N. (2022): First record of the dragonfly Leucorrhinia albifrons (Burmeister, 1839) (Odonata: Libellulidae) in Yakutia. Amurian Zoological Journal 14(3): 389-392. (in Russian, with English summary) ["L. albifrons, the dragonfly species from the family Libellulidae

of the European and Baikal range, is recorded for the first time in Yakutia. E.N. Zykov collected the only male of this species on 7 July on the shore of Lake Schuchie in the northern outskirts of Lensk (60°44'11.24"N, 114°57'38.68"E). L. albifrons is a rare species with a mosaic distribution and ecological optimum in Europe. It occurs in forests of the European part of Russia and the Urals; in Siberia the range gradually narrows to the Baikal Lake. This paper provides a morphological description and illustrations of the general view, head, anal appendages, and secondary genitalia." (Authors)] Address: Sivtseva, Lena, Institute for Biological Problems of Cryolithozone SB RAS, Lenina Prospekt, 41, 677980, Yakutsk, Russia. E-mail: sivtseva_l@mail.ru

20246. Sniegula, S.; Hnatyna, O. (2022): Record of Cordulegaster bidentata (SELYS, 1843) (Odonata: Cordulegastridae) in the Magura National Park. Odonatrix 1810 (2022): 2 pp. (in Polish, with English summary) ["An adult female of C. bidentata was recorded on 30.07.2022 on the River Wisloka, a potential breeding site, near the village of Rozstajne in the western part of the Magura National Park (SE Poland). This is the first record of this species within the borders of this national park." (Authors] Address: Sniegula, S., Instytut Ochrony Przyrody Polskiej Akademii Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: sniegula@iop.krakow.pl

20247. Sniegula, S.; Ryhla, A., Golab, M.J.; Antol, A.J.; Bernard, R.; Czechowski, P.; Daraz, B.; Dubicka, A., Dumanski, J.; Goc, M.; Góral, N.; Jedro, G.; Jedro, M.; Mikolajczuk, P.; Miszta, A., Orzechowski, R.; Raczynski, M.; Szymanski, J.; Tanczuk, A.; Tonczyk, G. (2022): Dragonflies (Odonata) of the former Soviet military training ground Borne Sulinowo and the 21st Central Air Force Training Range in Nadarzyce, found during the 17th Symposium of the Odonatological Section of the Polish Entomological Society (June 10-13, 2021). Odonatrix 182: 12 pp. (in Polish, with English summary) ["In June 2021, the participants of the 17th Symposium of the Odonatological Section of the Polish Entomological Society conducted field observations at the former Soviet military training ground Borne Sulinowo and the 21st Central Air Force Training Range in Nadarzyce. The area of the Soviet military training ground (ca. 18 000 ha) has been open to the public since 1992, whereas the Air Force Training Range could only be examined on the basis of an authorization. In total 11 sites, including lotic and lentic habitats, were visited. Within the time span of three days, 29 odonate species were recorded. Six of these species are protected by national law and/or placed on Polish and EU red lists. At least one of these protected and endangered species was observed in each of the studied sites. This indicates above-average odonatofauna diversity as well as unfragmented, high natural quality of water bodies and wetland habitats in the studied area. The protected and/or endangered rheobiontic (Ophiogomphus cecilia), rheophilous (Orthetrum coerulescens), tyrphophilous (Nehalennia speciosa, Leucorrhinia pectoralis) and limnophilous (Leucorrhinia albifrons, L. caudalis) species find favourable conditions here, this indicating a large variety of habitats. The presented records confirm the great potential of military areas as places characterized by high biodiversity." (Authors)] Address: Sniegula, S., Instytut Ochrony Przyrody Polskiej Akademii Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, e-mail: sniegula@iop.krakow.pl

20248. Späth, J. (2022): Damsel in distress – metabolomics as a novel tool to investigate the effects of wastewater exposure on damselfly larvae. Doctoral thesis, Umeå University: 52 pp. (in English, with Swedish summary) [oas 64a; "Aquatic organisms, such as aquatic invertebrates, are exposed to anthropogenic pollutants through their environment. These pollutants, despite their low levels, can adversely affect exposed individuals or even entire ecosystems, especially when present in complex mixtures. The aim of this thesis was to assess the effects of a specific group of complex mixtures of pollutants, wastewater effluent, on damselfly larvae, a common, ecologically relevant invertebrate species. Metabolomics, i.e., the comprehensive analysis of an organism's metabolites, was explored as a tool to show the sub-lethal effects of wastewater effluent exposure. A set of multi-platform mass spectrometry-based metabolomics methods was developed. These methods were used to measure and identify which damselfly metabolites are responsive to wastewater exposure and thus could potentially be used as early warning tools for anthropogenic pollution. In addition, key behavioural traits of damselfly larvae were assessed after wastewater exposure to investigate whether a change of metabolites would also be reflected at a higher level of biological organisation. The effects of wastewater effluents treated with different treatment methods on the fatty acid metabolites (oxylipins) of exposed damselfly larvae were assessed (paper I). Oxylipins were affected by wastewater exposure and these effects depended on the degree of wastewater treatment. Using a similar set-up, the effect-based removal of a conventional wastewater treatment plant and an additional ozonation step was evaluated on-site at a wastewater treatment facility (paper II). Oxylipins were affected by the exposure in this study, however fewer effects were observed when compared to the previous paper. In a separate series of experiments, damselflies were lab-reared to different developmental stages and a subset of the larvae were exposed to wastewater effluent. In these larvae, oxylipins (paper III) as well as other metabolites (paper IV) were measured to establish metabolite baseline levels and developmental variations as well as variation in their responses to the exposure. Metabolite variations as well as the metabolites affected by the exposure depended greatly on the life stage of the damselflies. In another study, damselfly larvae were exposed to dilutions of conventionally treated effluent and behavioural alterations and metabolite profiles were investigated in the larvae (paper V). Individual metabolites as well as behavioural traits important for damselfly survival and reproduction were altered by exposure to undiluted effluent; however, few effects were observed in the diluted effluents. In conclusion, both metabolomic endpoints and behavioural traits measured on the damselfly larvae were responsive to wastewater effluent exposure. The metabolites affected by exposure mainly play a role in fatty acid metabolism, including oxylipins, and in amino acid metabolism. The individual metabolites that were affected differed across the studies. These observed variations might be due to differences in exposure conditions or differences in larval stages across the studies. The studies presented in this thesis pave the way for metabolomics to be used as a novel tool to monitor sub-lethal effects of anthropogenic pollution in the environment. However, more research is needed on, for example, the ecological implications of the affected metabolites for both the individual and the population before it can be implemented in environmental risk assessments."] (Author)] Address: Späth, Jana, Department of Chemistry, Umeå University, KB.C6, Linnaeus väg 10, 90187 Umeå, Sweden. Email: jana.spath@umu.se

20249. Späth, J.; Brodin, T.; Falås, P.; Niinipuu, M.; Lindberg, R.; Fick, J.-; Nording, M. (2022): Effects of conventionally treated and ozonated wastewater on the damselfly larva oxylipidome in response to on-site exposure. Chemosphere 309(1): 7 pp. (in English) ["Highlights: • Average ozonation removal efficiency of 67% at an ozone dose of 0.49 g O3/g DOC. Oxylipins 12(13)-EpODE and 15(16)-EpODE were reduced in larvae exposed to conventionally treated wastewater. 5(16)-EpODE was also reduced in larvae exposed to ozonated wastewater. Abstract: Pharmaceutical residues discharged through insufficiently treated or untreated wastewater enter aquatic environments, where they may adversely impact organisms such as aquatic invertebrates. Ozonation, an advanced wastewater treatment technique, has been successfully implemented to enhance the removal of a broad range of pharmaceuticals, however diverse byproducts and transformation products that are formed during the ozonation process make it difficult to predict how ozonated wastewater may affect aquatic biota. The aim of this study was to investigate effects on fatty acid metabolites, oxylipins, in a common invertebrate species, damselfly larvae, after on-site exposure to conventional wastewater treatment plant (WWTP) effluent and additionally ozonated effluent at a full-scale WWTP. Subsequent ozonation of the conventionally treated wastewater was assessed in terms of i) removal of pharmaceuticals and ii) potential sublethal effects on the oxylipidome. Northern damselfly (Coenagrion hastulatum) larvae were exposed for six days in the treatment plant facility to either conventional WWTP effluent or ozonated effluent and the effects on pharmaceutical levels and oxylipin levels were compared with those from tap water control exposure. Ozonation removed pharmaceuticals at an average removal efficiency of 67% (ozone dose of 0.49 g O3/g DOC). Of 38 pharmaceuticals detected in the effluent, 16 were removed to levels below the limit of quantification by ozonation. Levels of two oxylipins, 12(13)-EpODE and 15(16)-EpODE, were reduced in larvae exposed to the conventionally treated wastewater in comparison to the tap water control. 15(16)-EpODE was reduced in the larvae exposed to ozonated effluent in comparison to the tap water control. One oxylipin, 8-HETE, was significantly lower in larvae exposed to conventional WWTP effluent compared to ozonated effluent. In conclusion, the study provides proof-of-principle that damselfly larvae can be used on-site to test the impact of differentially treated wastewater." (Authors)] Address: Späth, Jana, Dept Chemistry, Umeå University, SE 90187, Umeå, Sweden. Email: jana_spaeth@live.de

20250. Spigolonia, Z.A.; Bernardy, J.V.; Brasil, L.S.; Dias-Silva, K.; Vieira, T.B.; De Marco, P. (2022): Odonata Concordance amongst aquatic taxa in Brazilian savanna streams. International Journal of Odonatology 25: 80-88. (in English) ["Environmental management is one of the most important activities in ecological conservation at present. Faced with various socioeconomic impacts (e.g., urbanization, agriculture, and logging), practical and effective ways to analyze and determine how biodiversity is affected by these anthropogenic activities are essential. Utilizing niche theory helps to understand how similar groups of organisms respond to environmental changes based on the assumption that organisms with some niche overlap (i.e., similar resources) will respond similarly to these changes. Members of the order Odonata are frequently used as biological indicators due to their low survey costs, relatively easy taxonomic identification, and sensibility to environmental changes. In this study, using the PROTEST method, we analyze the cross-taxon congruence between Odonata and two aquatic organisms in Brazilian savanna streams: Gerromorpha and fishes. Although congruence was found between aquatic insects (~ 45%), this result changed when we only considered the species' genera: no congruence for the aquatic insects was found, but instead we found a congruence between Odonata and fishes (~ 44%). Since Odonata showed congruence with the other groups in different taxonomical resolutions and it is a relatively easy and cheap group to collect and identify, we suggest that Odonata could be used as an indicator of disturbance for this set of organisms and hence serve as an alternative method to traditional environmental management techniques." (Authors)] Address: Brasil, L.S., Instituto de Ciências Biológicas e da Saúde, Universidade Federal de Mato Grosso, Postal Code 78.698-000 – Pontal do Araguaia, Mato Grosso, Brazil. Email: leandro.brasil@ufmt.br

20251. Srayko, S.H. (2022): Seasonal migration of water boatmen (Hemiptera: Corixidae) as a wetland-river ecosystem linkage. Ph.D. thesis, Dept of Biology, University of Saskatchewan, Saskatoon: XVI + 187 pp. (in English) ["Organisms that undertake seasonal migrations can act as important ecosystem linkages by subsidizing food webs. Such transfers of material mean that even food webs which seem isolated may be closely connected. One such linkage that has largely gone unstudied is the seasonal migration of a family of aquatic insects, water boatmen, or corixids (Hemiptera: Corixidae) that fly from geographically isolated wetlands into large rivers in the Prairie Pothole Region (PPR) of North America every fall, to overwinter. This thesis provides further documentation of the phenomenon of corixid migration in the North American prairies, while also investigating the ecological importance and drivers of this movement across the landscape. First, I quantified and recorded the shifts in abundance and species composition of corixids in wetland and river ecosystems in different seasons. I found that these migrations can lead to drastically increased riverine corixid densities as high as ~3,000 individuals/m2 within areas of standing or slow-moving water, with ~500 g of corixid material entering every meter of water immediately adjacent to the banks of rivers, where landings are concentrated. This movement shifts the corixid species assemblage in rivers to one dominated by wetland-breeding species, namely Callicorixa audeni, Sigara bicoloripennis, and Sigara decoratella. Stomach content analyses of riverine fishes revealed that goldeye (Hiodon alosoides), mooneye (Hiodon tergisus), longnose sucker (Catostomus catostomus), and white sucker (Catostomus commersoni) make heavy use of this forage subsidy, with corixids occurring in 97% to 100% of these fishes and accounting for 38% to 97% of stomach contents by weight during the corixid migration period in fall. This could have implications for the productivity and overwintering survival of corixid feeding fish, with the potential for cascading effects in riverine food webs. Across the landscape, I estimated that seasonal migrations could result in ~1500 metric tons of corixids entering the North and South Saskatchewan rivers (~12,000 river km) within Saskatchewan, and ~12,000 tons of biomass moving between wetlands and rivers across the entire PPR. Next, by studying changing patterns in abundance and evidence of flight into rivers, I designated different corixid species from my study area as being predominantly migratory (62% of encountered species), acting as cyclic colonizers between wetlands and rivers, or non-migratory residents of either habitat type (27% of encountered species). This information allows for the identification of the corixid assemblage that is driving the seasonal flux between the two habitat types, and helps to fill a knowledge gap which exists on

the migratory abilities of corixids at the species level. Third, I examined the use of the stable isotope ratio of sulfur, d34S, as a tracer of corixid movement and the incorporation of these insects as a dietary subsidy by riverine fish. I found that both corixids and other invertebrate taxa originating from wetland ecosystems exhibited lower d34S values, with wetland taxa averaging -10.5 ± 5.8‰ overall, as opposed to riverine taxa at -4.1 ± 4.1‰, allowing the use of d34S as a tracer of insects out of wetlands. Specifically, d34S values of invertebrates from the South Saskatchewan River (-5. 1 ± 4.1‰) were more 34S depleted than those from the North Saskatchewan River (-1.4 ± 2.8‰). In the fall season, the corixid-feeding fish species goldeye, mooneye, and longnose sucker exhibited lower d34S values in fast-turnover liver tissue than non-corixid feeding species, shorthead redhorse, northern pike, and walleye, with mixing models indicating that ~17 to 94% of liver tissue may be derived from wetland sources during this season. However, goldeye was the only species to exhibit a significant seasonal reduction in liver d34S values in fall compared to summer. These findings indicate that d34S has utility in tracing flows of energy between wetland and riverine food webs. Finally, I examined the overwintering strategy of corixids that do not migrate to rivers in the fall, documenting the little understood ability of these insects to survive in wetlands that freeze solid. I found that while multiple corixid species were present in wetlands at ice-over, those embedded within the ice were almost entirely composed of two non-migratory species, Cymatia americana and Dasycorixa hybrida, of which only the former revived after thawing. These findings indicate that migratory species are likely incapable of survival within the ice, driving the need to leave shallow waters in fall. The percent of C. americana that revived after being experimentally thawed out from the ice ranged from 4% to 10% in both winters of this study. The majority of corixids were grouped together within air pockets, which could enable them to limit direct contact with the surrounding ice. Other invertebrate taxa were also found overwintering within the ice, including adults and larvae of crawling water beetles (Coleoptera: Haliplidae) and adults of predaceous diving beetles (Dytiscidae) within air pockets alongside the corixids or on their own, as well as damselfly nymphs (Odonata: Coenagrionidae), caddisfly larvae (Trichoptera: Phryganeidae, Leptoceridae), midge larvae (Diptera: Chironomidae), and snails (Gastropoda: Physidae, Planorbidae) that appeared to be encased in solid ice. Taken together, this thesis has demonstrated an extensive cross-boundary flux that occurs between spatially separated wetland and river ecosystems, highlighting a need for conservation to ensure that this connection is maintained. By examining migratory patterns, I have identified which species drive this flux, which may allow for increased protection of habitats that these corixids require. d34S was shown to have the potential to trace insect movement and consumer use between isotopically distinct freshwater systems in the prairies. The study of corixids overwintering in ice represents a little understood survival mechanism of aquatic invertebrates in shallow wetlands, knowledge of which could help predict how the abundance of these organisms might change in the face of altered overwintering conditions due to global warming. The seasonal flights of corixids between wetlands and rivers may represent one of the world's great insect migrations, which has largely gone unnoticed, but could have important implications for ecosystem functioning and conservation in the North American prairies." (Author)] Address: not stated

20252. Stih, A.; Koren, T. (2022): Dragonfly fauna (Insecta: Odonata) of the Brijuni National Park, Croatia. Natura Croatica 31(1): 19-30. (in English, with Croatian summary) ["The first systematic survey of the dragonfly fauna of the Brijuni National Park was carried out during the late spring and summer of 2016. A total of 13 species was recorded at two localities on the island of Veliki Brijun, 11 of them for the first time in the area. From the literature, one additional species was documented for the Park, amounting to a total of 14 Odonata species. The most common species was Sympetrum meridionale while the rarest was Anax parthenope. Zoogeographical analysis showed the domination of the Holo-Mediterranean zoogeographical element. Four recorded species are listed in the Red book of Croatian Dragonflies, indicating the conservation value of the investigated habitats. Both of the wetland habitats surveyed, Brijuni Pond, and the saline lakes, proved to be very important habitats for the island's Odonata. Therefore, it is essential to protect those habitats and their biota by planning and conducting restoration activities in the near future." (Authors)] Address: Štih, Ana, Association Hyla, Lipovac I no. 7, HR-10000 Zagreb, Croatia. Email: ana.stih2@gmail.com

20253. Suárez, B.; Barrios, M.; Teixeira de Mello, F. (2022): Macroinvertebrates' response to different land use in lowland streams from Uruguay: use of artificial substrates for biomonitoring. Neotropical Biodiversity 8(1): 136-146. (in English) ["The use of macroinvertebrates as indicators of water quality is an effective and low-cost tool, which is widely implemented in biomonitoring programmes. Certain taxa are characteristic of impaired watercourses (e.g. Oligochaeta, Chironomidae and Amphipoda), while others are characteristic of good-quality watercourses (e.g. Ephemeroptera, Plecoptera and Trichoptera; EPT). In this work, we evaluated the response of the macroinvertebrate assemblages to different land uses. For this purpose, artificial substrate colonization experiments were conducted in streams including urban (U, n = 3), intensive agriculture and dairy production (AD, n = 4) and extensive cattle ranching (CR, n = 4) land uses. Because in Uruguay pristine ecosystems are practically non-existent and streams of low order streams associated with extensive cattle production represent the lowest deterioration water quality condition, CR sites were used as control reference streams. Physicochemical water parameters were measured. For macroinvertebrate sampling, 10 artificial substrates were installed in each stream. A total of 110 artificial substrates were analysed. Each sample/site consisted of a plastic mesh bag of 1.2 cm opening, which were filled with 160 cm^3 (including 73.3 ± 5.8 cm^3 interstitial water) of stones sieved between 1.3 and 1.5 cm. During the summer of 2018 (February), devices were left in streams for 15 days for communities to colonize them. U and AD land use represented the stressors with the highest impact on the attributes and composition of the macroinvertebrate communities. Abundance of EPT was higher in CR, meanwhile Caenogastropoda dominated in AD, and Amphipoda in U sites. Macroinvertebrate groups to order level classification were able to effectively discriminate between different land uses. The use of artificial substrate also demonstrated to be efficient method for monitoring macroinvertebrate community. We did not find a correlation between the physicochemical water parameters and the macroinvertebrate community. In this context, we propose a rapid and cost-effective biomonitoring approach, capable of estimating the degree of impact of different land uses." (Authors)] Address: Teixeira de Mello, F. Depto de Ecología y Gestión Ambiental, Centro Universitario Regional del Este (CURE), Universidad de la República, Maldonado, Uruguay. Email: frantei@fcien.edu.uy

20254. Suárez-Tovar, C.M.; Guillermo-Ferreira, R.; Cooper, I.A.; Cezário, R.R.; Córdoba-Aguilar, A. (2022): Dragon colors: the nature and function of Odonata (dragonfly and damselfly) coloration. Journal of Zoology 317(1): 1-9. (in English) ["Adult odonates (dragonflies and damselflies) exhibit a great diversity of colors which vary remarkably between species, between individuals within species, and throughout the individual's lifetime in some species. Here, we provide a summary of what is known about color recognition, and production of color including pigmentary absorption, structural reflectance, and fluorescence, in odonates. We also review the current understanding of the function of color in adult odonates, such as in signals during mate choice, in species recognition, and in predator avoidance, as well as in physiological adaptations to abiotic conditions. Finally, we provide some directions for future research: eye and pterostigma color, coloration at different life stages, UV color, phylogenetic analysis of color evolution, color and hot climate patterns, and standardization of color recordings. Given how easily they can be marked and tracked, odonates are exemplary animals for field and laboratory research. Therefore, unraveling the physiology, evolution, and ecology of odonate color can provide significant advances, in general, to understand insect color." (Authors)] Address: Cezário, R.R., Lestes Lab, Federal University of Triângulo Mineiro, Uberaba, Brazil. Email: rcezariobio@gmai.com

20255. Suárez-Tovar, C.M.; Castillo-Pérez, U.; Sandoval-García, I.A.; Schondube, J.; Cano-Santana, Z.; Córdoba-Aguilar, A. (2022): Resilient dragons: Exploring Odonata communities in an urbanization gradient. Ecological Indicators 141, August 2022, 109134: 11 pp. (in English) ["Highlights: • Cities are novel ecosystems that generate selective pressure on living organisms. Dragonflies and damselflies inhabit cities all over the world. We studied dragonfly and damselfly communities along an urbanization gradient in Central Mexico. Damselfly species richness and abundance are affected by urbanization. Dragonflies seem resilient to urban conditions. Abstract: Cities function as ecological systems composed of a geosphere, a biosphere and an anthroposphere, interacting with each other and generating various selection pressures on urban organisms. Odonates (damselflies and dragonflies) are frequent inhabitants of urban areas, showing no clear or unique responses to urbanization. Thus, we defined an urbanization gradient using a habitat integrity index (HII) calculated for 19 sites in central Mexico, and investigated: a) changes in species richness and abundance along the urbanization gradient; and, b) the relationship between presence of waste of anthropic origin, chemical conditions of water, macrophyte cover, and odonate species richness, abundance and community composition. We analyzed the data for the whole odonate community, as well as for dragonfly and damselfly communities separately in each site. We found higher damselfly species richness and abundance in sites with low urbanization than in sites with high urbanization, and no differences in dragonfly communities along the gradient. We found a positive relationship between dragonfly species richness and abundance and waste percentage and macrophyte cover, and a negative relationship with dissolved solids in water. Our results indicated that odonate communities were fairly tolerant to urbanization and dragonflies were less affected than damselflies. However, we suggest that during design and restructuring of cities, the care and conservation of water bodies and all the life forms that inhabit there, be considered." (Authors)] Address: Córdoba-Aguilar, A., Depto Ecol. Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

20256. Suhonen, J.; Ilvonen, J.J.; Korkeamäki, E.; Nokkala, C.; Salmela, J. (2022): Using functional traits and phylogeny to understand local extinction risk in dragonflies and damselflies (Odonata). Ecology & Evolution 12(3) e8648: 12 pp. (in English) ["Understanding the risk of local extinction of a species is vital in conservation biology, especially now when anthropogenic disturbances and global warming are severely changing natural habitats. Local extinction risk depends on species traits, such as its geographical range size, fresh body mass, dispersal ability, length of flying period, life history variation, and how specialized it is regarding its breeding habitat. We used a phylogenetic approach because closely related species are not independent observations in the statistical tests. Our field data contained the local extinction risk of 31 odonate species from Central Finland. Species relatedness (i.e., phylogenetic signal) did not affect local extinction risk, length of flying period, nor the geographical range size of a species. However, we found that closely related species were similar in hind wing length, length of larval period, and habitat of larvae. Both phylogenetically corrected (PGLS) and uncorrected (GLM) analysis indicated that the geographical range size of species was negatively related to local extinction risk. Contrary to expectations, habitat specialist species did not have higher local extinction rates than habitat generalist species nor was it affected by the relatedness of species. As predicted, species' long larval period increased, and long wings decreased the local extinction risk when evolutionary relatedness was controlled. Our results suggest that a relatively narrow geographical range size is an accurate estimate for a local extinction risk of an odonate species, but the species with long life history and large habitat niche width of adults increased local extinction risk. Because the results were so similar between PGLS and GLM methods, it seems that using a phylogenetic approach does not improve predicting local extinctions." (Authors)] Address: Suhonen, J., Dept Biol., Univ. of Turku, FI-20014 Turku, Finland. Email: juksuh@utu.fi

20257. Suhonen, J.; Paasivirta, L.; Rantala, M.J.; Jukka, S.; Suutari, E. (2022): Macroinvertebrate species occupancy frequency distribution patterns in eutrophic lakes. Aquatic Ecology 56: 201-212 . (in English) ["Metacommunity models describe species occupancy frequency distribution (hereinafter 'SOFD'). Our goal is to present how the differences in eight macroinvertebrate orders dispersal ability affect SOFD patterns. A total of 293 species from eight macroinvertebrate orders were observed in 14 eutrophic lakes in southern Finland. Species occupancy ranged from 1 to 14. About 30% (89 out of 293) of the species were found in only one lake, yielding a surprisingly high number of rare species. So, there were few widely distributed common species and numerous rare species with a restricted distribution. Combined data from eight macroinvertebrate orders supported the bimodal truncated SOFD pattern. Similarly, the low dispersal ability orders, watermites and mayflies, fitted the bimodal truncated SOFD pattern. However, bimodal symmetric SOFD pattern also fitted relatively well to Odonata with high dispersal ability. It seems that differences in dispersal ability among different macroinvertebrate orders may partly explain observed differences. Moreover, our results supported slightly more a niche-based model rather than a metapopulation dynamics model in eutrophic lakes littoral macroinvertebrate metacommunities. Our results highlight that the dispersal ability is important trait for

species conservation in patchily distributed habitat." (Authors)] Address: Suhonen, J., Dept of Biology, University of Turku, 20014 Turku, Finland. E-mail: juksuh@utu.fi

20258. Sumanapala, A.; Ranasinghe, T. (2022): First record of Lestes concinnus (Zygoptera: Lestidae) from Sri Lanka with observations on its natural history. Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa" 65 (1): 129-139. (in English) ["Lestes concinnus is a widespread species in tropical Asia and Oceania. It is a species known to have variable colour patterns ranging between pale and dark phenotypes which have earlier been recognized as distinct species. Lestes concinnus has never been known from Sri Lanka before. We report observations of both phenotypes of the species and intermediate morphs of Lestes concinnus from coastal habitats with dry reed patches in the northern part of the country, adding it to the Odonata fauna of Sri Lanka. With multiple field observations examined, we also provide comments on its identification and natural history in the country." (Authors)] Address: Sumanapala, A., Dept of Zoology and Environment Sciences, University of Colombo, Colombo, Sri Lanka. Email: apsumanapala@gmail.com

20259. Sumanapala, A.P.; Ranasinghe, T.; Pushpalal, M. G.S. (2022): Rediscovery of Macromia flinti with observations on the female and new locality records (Odonata: Macromiidae). Notulae odonatologicae 9(9): 419-428. (in English) ["Macromia flinti Lieftinck, 1977, is an endemic dragonfly in Sri Lanka and one of the rarest known odonates in the country. Originally described based on a single specimen collected in 1970, it had not been reported in the past 50 years and thus was considered a globally Critically Endangered Species (IUCN), possibly even extinct. Here we report the rediscovery of the species based on a female specimen observed in the hand and multiple other field observations recorded with photographs. We also provide a summary of all known observations, the first photographs of the species in life and a description of the female, as well as notes on the species identification, its distribution, and natural history." (Authors)] Address: Sumanapala, A., Dept of Zoology and Environment Sciences, University of Colombo, Colombo, Sri Lanka. Email: apsumanapala@gmail.com

20260. Sumanapala, A.P.; Ranasinghe, T.; Sumanapala, D. (2022): Rediscovery of Anisogomphus ceylonicus (Odonata: Gomphidae) based on its larva. Taprobanica 11: 35-37. (in English) ["Anisogomphus ceylonicus (Hagen in Selys, 1878) is one of the rarest of the Sri Lankan Odonata. It was first discovered from Ramboda over 140 years ago based on a female specimen, which was originally described as Gomphus ceylonicus and later assigned to the genus Heliogomphus by F. C. Fraser. Almost a century later, Lieftinck (1971) collected an immature male and its exuvia of a clubtail dragonfly from Rambukpath Oya, 10 miles northwest of Hatton in 1962 and described as Anisogomphus solitaris. However, Bedjanic & van der Poorten (2013) recognized that H. ceylonicus is conspecific with A. solitaris, and thus reassigned it to the genus Anisogomphus. Since the discovery of the species, only these two records have ever been documented, despite odonatological surveys and numerous biodiversity explorations conducted on the island." (Authors)] Address: Sumanapala, A.P., Dept of Zoology & Environment Sciences, University of Colombo, Sri Lanka. E-mail: apsumanapala@gmail.com

20261. Swain, P.K.; Dora, S.P.; Batulla, S.M.; Chintada, S.; Barik, A.K. (2022): Effect of wing flexibility on the aerodynamic performance of a robotic dragonfly. Archive of Applied Mechanics 92: 1149-1156. (in English) ["To investigate the effect of wing covering and the wing rib over the aerodynamic efficiency, a micro aerial vehicle (MAV) like dragonfly with a two paired wing modell is developed and tested in a wind-tunnel with various composite wings. Four different composite forms of wings, namely R-Rigid, SR-Semi Rigid, F-Flexible and HF-Highly Flexible are considered. Results demonstrated that the leading edge rib has an important role in the selection of wing than cord rib. Low aerodynamic performance is observed with R and HF wings, however, SR wing with leading edge rib of 0.8 mm and wing skin thickness of 127 µm exhibits greater aerodynamic efficiency." (Authors)] Address: Dora, S.P., Dept of Mechanical Engineering, GIT, GITAM (Deemed to be University), Vishakhapatnam, Andhra Pradesh, India

20262. Szabó, L.J.; Vajda, C.; Szalay, P.E.; Kis, O.; Miskolczi, M.; Dévai, G. (2022): Change of morphometric and allometric patterns on wings of banded demoiselle (Calopteryx splendens) males in case of ecologically different watercourse types. Acta Zoologica Academiae Scientiarum Hungaricae 68(1): 99-118. (in English) ["In the nature, larvae living in watercourses are exposed to a complex system of environmental influences. It is known that different watercourse types (creeks, brooks, streams, little rivers and medial rivers) provide different conditions for larval development (water depth, flow rate, temperature, oxygen content, substrate type, nutrient supply, etc.). These conditions can vary significantly between watercourse types, but be very similar within types. In this work, we examined the body sizes and wing morphometric characteristics of males of Calopteryx splendens reared from different watercourse types (brook, stream, creek, little river, medial river). Although there were no significant differences in body size among watercourse types, we found significant differences in the wing features. We found the most differences between the individuals reared from streams and creeks and between the individuals reared from stream and medial river. Our results show that the individuals reared from different watercourse types were clearly separated on the two wings. The results also suggest that there are significant differences in the number and pattern of allometric features on the wings of individuals reared from different watercourse types." (Authors)] Address: Szabó, L.J., Dept of Hydrobiology, University of Debrecen, H-4032 Debrecen, Egyetem tér 1, Hungary. E-mails: szlj55@gmail.com

20263. Taleb, L.A.; Zebsa, R.; Khelifa, R. (2022): Discovery of Pyrrhosoma cf. nymphula (Odonata: Coenagrionidae) in Algeria. Notulae odonatologicae 9(9): 455-460. (in English) ["Although odonates of Algeria have been studied for more than 170 years, some habitats such as highland streams have been largely overlooked. Here, we report the first record of Pyrrhosoma cf. nymphula in the Kabylia region in a stream running through an oak forest at 1 200 m a.s.l., Algeria. The locality is 400 km from the nearest known population in Tunisia and 650 km from another population Morocco, suggesting a very patchy distribution at higher elevations for the species in North Africa. This new record increases the number of the Algerian odonates to 64 species. In addition, eight other species of Odonata were recorded, three of them range extensions. Further surveys of mountain streams in North Africa are needed to fully determine the distribution of rare odonates, including P. cf. nymphula." (Authors)] Address: Khelifa, R., Biodiversity Research Center, Univ. of British Columbia, 2212 Main Mall, Vancouver.

B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

20264. Tamm, J. (2022): Weitere Beobachtungen zum Bachwechsel und Verhalten von Cordulegaster bidentata im Vordertaunus (Odonata: Cordulegastridae). Libellen in Hessen 15: 59-78. (in German, with English summary) ["Further observations on stream hopping and behaviour in a population of C. bidentata living at forest streams in Taunus mountains, Germany.- At 15 small forest streams in the Taunus mountains, Hesse, Central Germany, the spatial performance of a population of C. bidentata was studied in 2021 using 53 colour marked adult males. 711 males passing above 12 of these streams were counted during 9 counting days, among them 93 marked ones (13 %). In spite of sparse reappearance of marked males, 15 ones were observed again after marking (28 %). Five of them appeared on streams in the surroundings, where they had not been marked. Maximum range between the places of marking and reobserving was 635 m. Altogether 6 cases of stream hopping show that this behaviour may be regular in C. bidentata males. A considerable part of marked males only occurred sporadically at the streams. One can conclude that in general a remarkable share of male C. bidentata does not take part in patrolling flight activities along the streams regularly. Moreover, remarkable changes in abundance of the species were found at 3 streams compared to previous studies in the area." (Author)] Address: Tamm, J., 34131 Kassel, Germany. E-Mail: jochen.tamm@t-online.de

20265. ten Thoren, S.; Holtkamp, M.; ten Thoren, B. (2022): Faunistische Erfassung auf Schloss Ippenburg 2021 Avifauna, Libellen, Tagfalter. Auftraggeber: Freifrau Viktoria von dem Bussche, Schloss Ippenburg, Schlossstr. 1, 49152 Bad Essen: 62 pp. (in German) ["With 18 dragonfly species, a comparable number of species as in 2018 were recorded in the study area. The presence of 10 species on the ground is considered very probable. It is striking that only a small number of pairs were observed in 2021 (approx. 25) compared to the number of dragonfly pairs observed in 2018 (approx. 200). The reasons are mainly assumed to be changed, suboptimal weather conditions. The species spectrum reflects a richly structured water landscape, which presented itself in optimal "dragonfly" conditions in the study year. However, these are almost exclusively ubiquitous species, species that do not make any special demands on their habitat and can inhabit a wide variety of aquatic landscapes. Nevertheless, it remains to be said that there is a high diversity of species that colonise the water mosaic around Ippenburg Castle in particular. The diversity of dragonflies enriches the structurally rich habitat and as such is also dependent on it. Preserving this interplay should be one of the goals of conservation measures. Recommendations for stabilising the populations are given." (Authors/DeepL)] Address: BioConsult, Dulings Breite 6-10, 49191 Belm, Germany

20266. Theischinger, G.; Polhemus, D.A.; Richards, S.J. (2022): Nososticta digimu sp. nov., a new damselfly from Papua New Guinea (Odonata: Platycnemididae). Odonatologica 51(1-2): 167-174. (in English) ["Nososticta digimu sp. nov., is described from Southern Highlands Province, Papua New Guinea, and its affinities are discussed. It belongs to a group of Nososticta in which the male synthorax exhibits discrete patches of blue, and the tip of the male abdomen is blue. The new species differs from its congeners exhibiting these characters either by lacking a transverse blue frontal bar from eye to eye or by its much larger blue antehumeral patch that extends anterior to the mesokatepisternum. Nososticta digimu sp. nov. represents the 85th species of the genus and is currently known only from a single location in the Digimu River catchment. The supra-specific term Nososticta conifera complex is introduced." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

20267. Tiple, A.; Bhende, R.; Dandge, P. (2022): Dragonflies and damselflies (Odonata: Insecta) of the Seloo city, Wardha, Maharashtra, Central India. Arthropods 11(1): 56-64. (in English) ["Odonata species diversity was studied in the Seloo city from 2011 to 2021. Its geographical location is 20083'73''N; 78070'70''E; 265 m. A total of 62 species of odonates belonging to 2 suborders and 8 families were recorded. The highest number of odonates belong to the family Libellulidae (30 species) followed by Coenagrionidae (13 species), Aeshnidae (5 species), Gomphidae (4 species), Platycnemididae (3 species) and Lestidae (4 species), Macromiidae (2 species) and Chlorocyphidae (1 species). Of the total, 30 species were abundant or very common, 16 were common, 6 were not rare, 7 rare and 3 very rare. Among all, 3 species were Data Deficient, Indothemis carnatica (Fabricius, 1798) are listed as Near Threatened and 57 were least concern in IUCN red-list of threatened species. The observations support the value of the Seloo city area in providing valuable resources for Odonata." (Authors)] Address: Tiple, A., PG Dept of Zoology, Vidyabharti College, Seloo, Wardha 442 104, India. Email: ashishdtiple@gmail.com

20268. Tiple, A.D.; Sharma, V.; Padwad, S.V. (2022): Dragonflies and damselflies (Insecta: Odonata) of Jabalpur, Madhya Pradesh, India. Journal of Threatened Taxa 14(3): 20740-20746. (in English) ["The present study was carried out to reveal the odonate diversity in Jabalpur city and its surrounding area in Madhya Pradesh, central India. During the study period of 2008–2019 a total of 75 species of odonates belonging to two suborders and nine families were recorded. Twenty-one new species were recorded for Jabalpur district and four for Madhya Pradesh; 37% (28) species were abundant or very common, 19% (14) were common, 16% (12) were frequent, 24% (18) rare, and 4% (3) very rare. The maximum number of odonates were found in family Libellulidae (n = 32), followed by Coenagrionidae (n = 17), Gomphidae (n = 9), Platycenemididae (n = 6), Aeshnidae (n = 5), Lestidae (n = 3), Macromiidae (n = 2), and Chlorocyphidae (n = 1). Of 75 species recorded from Jabalpur city, 72 come under the IUCN Red List. Among them, Indothemis carnatica come under Near Threatened (NT) category, 65 species come under Least Concern (LC) Category, six species under Data Deficient (DD), and three species remain not assessed. The study supports the value of the city area in providing habitat for Odonata." (Authors)] Address: Tiple, A.D., P.G. Dept of Zoology, Vidyabharti College, Seloo, Wardha, Maharashtra 442104, India

20269. Tippett, R.; Underhill, L. G. (2022): Dragonflies and damselflies of the KhoiSan Karoo Conservancy. Biodiversity Observations 12: 54-59. (in English) ["This guide to the dragonflies and damselflies of the KhoiSan Karoo Conservancy provides a provisional list of the first 19 species to be recorded here. It is designed to be used as a guide for visitors. To help with the identification of species, it provides links to the species texts in the online atlas of the Dragonflies and Damselflies of South Africa, Lesotho and Eswatini,

where there is comprehensive information based on annotated photographs." (Authors)] Address: Tippett, R., Biodiversity and Development Institute, 25 Old Farm Road, Rondebosch 7700, South Africa

20270. Tippett, R.; Willemse, S.; Underhill, L.G. (2022): Dragonflies and damselflies of the Lower Olifants river valley: Citrusdal to the sea. Biodiversity Observations 12: 71-85. (in English) ["This paper contains a list of the 38 species of Odonata recorded to date on the section of the Olifants River between Citrusdal and the sea at Papendorp. It is designed to be used as a guide for residents and visitors. To help with the identification of species, links to the species texts in the online Atlas of the Dragonflies and Damselflies of South Africa, Lesotho and Eswatini are provided. These contain comprehensive species information and annotated photographs. We also set out priorities for further observations." (Authors)] Address: Tippett, R., Biodiversity & Development Institute, 25 Old Farm Road, Rondebosch 7700, South Africa

20271. Tituskin, J.R.; Waddell, S.M.; Mabry, K.E. (2022): Species-specific responses to warming alter community composition. Ecological Entomology 47(3): 284-295. (in English) ["1. Species are responding to global climate change in varied and nuanced ways. However, how species-specific responses to climate change= affect interactions among species remains poorly understood. It is important to understand species interactions under potential climate change scenarios because those interactions can in turn alter community dynamics. 2. In this study, we conducted two complementary experiments to examine how simulated warming might alter larval intraguild predation (IGP) rates and resulting adult assemblage composition in three species of North American dragonflies: Pachydiplax longipennis, Plathemis lydia and Libellula luctuosa. 3. First, using both P. longipennis and L. luctuosa, we isolated interspecific and intraspecific pairs of larval dragonflies of different size differentials to determine how the size and species identity might influence IGP rates. 4. In tandem, we conducted a year-long mesocosm experiment with all three species to assess how simulated warming and heat waves influenced the resulting adult dragonfly assemblages. 5. IGP trials revealed that P. longipennis individuals were much more likely to engage in IGP than L. luctuosa, regardless of size differential. In the mesocosm experiment, emerging adult assemblages were dominated by P. longipennis individuals, a pattern that was most pronounced in the control treatment. 6. Our results indicate that while P. longipennis may be the competitively dominant species under current ambient conditions, warming may alter this dynamic and lessen the dominance of this species on the resulting assemblage composition." (Authors)] Address: Tituskin, Julia, Dept of Biology, New Mexico State University, Las Cruces, NM 88003, USA. Email: tituskinjuliar@gmail.com

20272. Trapero Quintana, A.D.; Torres Cambas, Y.; Reyes Tur, B.; Cordero Rivera, A. (2022): Diversidad de las libélulas de Cuba. Anales de la Academia de Ciencias de Cuba 12(2): 5 pp. (in ASpanish, with English summary) ["Dragonflies are hemimetabolous predatory insects, which belong to the order Odonata with approximately 6,000 species, grouped into two suborders. The objectives of this study were to characterize and update the systematics of the order Odonata, its geographical and temporary distribution; to characterize, besides, their genetic diversity, ecology of populations, and both adult and larvae assemblies, emergency pattern from exuvias, as well as to describe aspects of their reproductive ecology, in diverse habitats of the Cuban archipelago for conservation purposes. Specimens and data were collected in 50 locations in Cuba, from 1995 to the present with aerial and aquatic nets. Four sites in Santiago de Cuba were selected to study the larvae, exuviae and the emergency pattern. The climate variables were recorded during the low-rain and rainy periods. The specimens were processed in the laboratories of the universities of Havana and Oriente; the extraction of DNA was completed in Vigo. Tests of normality, Pearson correlation, principal components, Maximum Likelihood and estimation of ecological niche were used. The Cuban fauna of odonates includes 88 species, in six families, 41 genera and six of them are endemic. The larvae of three species are described and dichotomous keys were elaborated for larvae and adults from Cuba and the Antilles. The geographical distribution of dragonflies in Cuba was updated and, by using genetic data and population ecology, a proposal for conservation strategies for Hypolestes is presented. Permanent rivers and lagoons favor dragonfly assemblies with high equitability. To record the maximum number of species, it was estimated that 30 weekly samples of exuvia collection are needed. Five groups of larvae were created using morphology and functional attributes, and it was found that the emergence pattern was broad and unsynchronized, due to the presence of accidental and multivoltine species. The phylogenetic analyses revealed four Antillean lineages for Hypolestes, with inferences of the effect of climate change, flight period, longevity and environmental assessment as bioindicators of aquatic ecosystems." (Authors)] Address: Trapero Quintana, A.D., Depto de Biología Animal y Humana, Facultad de Biología, Universidad de La Habana. La Habana, Cuba. Email: adrian.trapero@fbio.uh.cu; trapero76@gmail.com

20273. Trapero Quintana, A.D.; Soto Borrero, M. (2022): Odonatos de la colección del Museo de Historia Natural Charles Ramsden de la Torre. Revista Cubana de Ciencias Biológicas 10(1): 1-9. (in Spanish, with English summary) ["Odonates are hemimetabolous insects that play an important role in aquatic ecosystems. They are an indispensable group in entomological collections, such as those of the Charles Ramsden de la Torre Museum of Natural History at the Universidad de Oriente. The objective of this work is to inventory the Cuban specimens of the Odonata order deposited in the collection of the Charles Ramsden Museum of Natural History, through the quantification and review of the total number of dragonfly individuals and the data on their labels. With this information, tables and graphs were made that illustrate the richness of said collection, which has a total of 530 specimens, belonging to 57 species of 33 genera and seven families of the Anisoptera and Zygoptera suborders. Libellulidae was the best represented family followed by Coenagrionidae, in correspondence with the diversity and abundance that they exhibit worldwide. Four of the six Cuban endemics are present. Pastor Alayo was the entomologist with the greatest contribution to the group's collection, being appointed curator of the museum and an active collector of all orders of insects in localities of the eastern region, fundamentally. The state of conservation of the collection is optimal and with a promising future." (Authors)] Address: Trapero Quintana, A., Depto de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

20274. Trisna, P.A.W.; Watiniasih, N.L.; Ginantra, I.K. (2022): Diversity of dragonflies around the Ayung River. Simbiosis X (1): 64-74. (in Indonesian, with English summary) ["This research was conducted from february to April

2020 in three different areas, including in Penikit Village, Petang, Sayan Village, Ubud, and in Padang Galak Village, Sanur using sweeping techniques. This study aims to determine the diversity of dragonflies along the Ayung river. The analyzes carried out include analyzing the Shannon-Wiener diversity index (H'), evenness index (E), dominance index (D) sympons, frequency of presence and water quality of the Ayung River. The results showed as many as 11 species of dragonflies. The most common individuals found were Orthetrum Sabina (23 individuals), while the lowest individuals were from the Libellulidae family as many as 5 individuals. Most species and individuals were found at the Sayan location with 11 species with a total of 124 individuals (H'=2.24, E=0.93, D=0.19), followed by 6 species in the Petang location with a total of 27 individuals (H' =1.60, E=0.89, D=0.30), while the lowest was the Sanur location with 4 species with a total of 15 individuals (H'=0.94, E=0.69, D=0.67). Diversity of dragonflies in the Ayung River is classified as moderate (H'=2.36), the evenness index of species at the Petang and Sayan locations is in the almost evenly distributed category. Petang (0.89) and Sayan (0.93), while the Sanur location was in the fairly even category (0.69). The highest frequency of presence in Orthetrum sabina species was 89% with frequent or absolute presence categories. The BOD and DO values in the Ayung River do not meet the requirements of water quality standards, while COD meets the requirements based on PP No. 82 of 2001." (Authors)] Address: Putu Ayu Wulan Trisna, Ni Luh Watiniasih dan I Ketut Ginantra, Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Udayana, Bukit, Jimbaran, Kabupaten Badung – Bali. Email: putuwulan308@gmail.com

20275. Tyagi, B.K. (2022): Odonatological conferences/symposia. Bradinopyga 6(9): 118-122. (in English) [Announcements of symposia in Slovenia, Cyprus and India.] Address: Tyagi, B.K. Email: abktyagi@gmail.com

20276. Verma, P.; Thaokar, N.; Andrew, R. (2022): Hatching in Coromandel Marsh Dart Damselfly Ceriagrion coromandelianum (Fabricius) (Zygoptera: Coenagrionidae): process and influence of the oviposition substrate. Journal of Threatened Taxa 14(4): 20840-20847. (in English) ["Coromandel Marsh Dart Damselfly Ceriagrion coromandelianum (Fabricius) breeds in stagnant pools, small garden tanks and ornamental cement ponds containing submerged and/or floating vegetation. Eggs were collected to observe two aspects of larval development: (1) The hatching rate of eggs deposited in different vegetation (Nymphaea nouchali, Lemna paucicostata, Hydrilla verticillata). Although C. coromandelianum prefers to oviposit in the broad leaves of N. nouchali, the highest rate of hatching was found in H. verticillata (95.8%) followed by N. nouchali (87.6%) and L. paucicostata (81.3%). Hatching commenced on Day 5 and was completed by Day 9. Maximum hatching (56%) was recorded on the sixth day of oviposition followed by the seventh day (20%) in all three substrates. (2) To document the process of hatching as follows: Around three minutes prior to hatching, the embryo exhibits cyclic pumping and pushing movements of the head (caused by the peristaltic movement of the mid- and hind- gut) of low intensity followed by high intensity and long pumping movements interspaced with smaller pulsating movements. Swelling of the head forces the apical chorion to split along the micropylar chute and like a lid, the apical tip topples over as a conical cap. This allows the prolarva to exit the egg. As it does so, it twists and the thorax swells breaking the prolarval sheath and releasing the first instar larva." (Authors)] Address: Verma, P., Centre for Higher Learning & Research in Zoology, Hislop College, Civil lines, Nagpur, Maharashtra 440 001, India. Email: payalrverma@gmail.com

20277. Vilela, D.S.; Lencioni, F.A.A.; Schmidt Furieri, K.; Santos, J.C. (2022): The rediscovery of Machadagrion garbei (Santos, 1961) (Odonata: Coenagrionidae) with notes on the hitherto unknown female. Zootaxa 5124(3): 391-396. (in English, with Portuguese summary) ["M. garbei was only known by the male holotype from Vila Nova, Bahia state, Brazil, and one male from Junqueira, Alagoas state, Brazil, collected in 1963. Over 50 years of its original description we report its rediscovery with specimens collected in Barra do Jacuípe, Camaçari County, Bahia state, Brazil, and Serra de Itabaiana, Sergipe state, Brazil. We provide illustrations and diagnosis from both sexes, including the description of the female." (Authors)] Address: Vilela, D.S., Universidade Estadual Paulista, Depto de Ciências Biológicas, Fac. de Ciências e Letras de Assis, Lab. de Biologia Aquática, Assis, SP, Brazil. Email: deeogoo@gmail.com

20278. Vilela, D.S.; Souza, M.M. (2022): A new species of Progomphus Selys, 1854 (Odonata: Anisoptera: Gomphidae) from Minas Gerais state, Southeastern Brazil. Zootaxa 5124(1): 69-74. (in English, with Portuguese summary) ["Progomphus teolitavius sp. nov. is described and diagnosed based on a specimen collected in a gallery forest of Cerrado from Barroso municipality, Minas Gerais state, Brazil (-21.2238, -43.9895, 1033 m, 30.iii.2021, G.S. Santos leg.). The new species can be distinguished from congeners [P. herrerae, P. basistictus, P. bidentatus] by its enlarged basal externolateral dilatation of cerci (which bears large teeth), and epiproct morphology." (Authors)] Address: Vilela, D.S., Laboratório de Biologia Aquática, Depto de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Universidade Estadual Paulista, Assis, São Paulo, Brasil. Email: deeogoo@gmail.com

20279. Vilela, D.S.; Rodrigues, M.E., Lencioni, F.A.A. (2022): Revealing the Odonatofauna of Northeastern Brazil: new Heteragrion Selys, 1862 (Odonata: Heteragrionidae) species from Bahia state. Zootaxa 5178(5): 493-500. (in English) ["Heteragrion roquei sp. nov. (Brazil, Bahia state, Municipality of Una, Fazenda Araruna, (-15.3146, -39.1621), 40 m, 19.ix.2019, M.E. Rodrigues leg., UESC) is described based on two males recently collected in Bahia state, Brazil. The new species is illustrated, diagnosed and compared with morphologically close congeners [Heteragrion triangulare, H. gracile], being separated from them mainly by cercus characters, such as the medial portion and both ventrobasal / dorsobasal expansions." (Authors)] Address: Vilela, D.S., Universidade Estadual Paulista, Depto de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Laboratório de Biologia Aquática, Assis, SP, Brazil. Email: deeogoo@gmail.com

20280. Vilenica, M.; Rebrina, F.; Ružanovic, L.; Gulin, V.; Brigic, A. (2022): Odonata assemblages as a tool to assess the conservation value of intermittent rivers in the Mediterranean. Insects 2022, 13, 584. https://doi.org/10.3390/insects13070584: 16 pp. (in English) ["Simple Summary: Intermittent rivers and are an important source of water in arid regions such as the Mediterranean. Water resources and riparian habitats in the Mediterranean regions are under diverse anthropogenic pressures, including the land-use change. We studied Odonata adults at four intermittent Mediterranean rivers in the Dinaric Western Balkans ecoregion, with the aim of inspecting the conservation value of

these habitats based on Odonata assemblages and in the context of the surrounding land-cover heterogeneity. We analyzed several diversity and conservation indices and recorded significant differences in Odonata species richness and Croatian Conservation Odonatological index among the studied rivers. Our findings showed that land use, as a long-term moderate anthropogenic impact, can enhance land-cover heterogeneity and in some cases even lead to increased Odonata diversity in the intermittent rivers in the Mediterranean. Abstract: Intermittent rivers, lotic habitats that cease to flow during the dry periods of the year, make up a large proportion of the world's inland waters and are an important source of water in arid regions such as the Mediterranean. Yet, water resources and riparian habitats in the Mediterranean regions are under diverse anthropogenic pressures, including land-use change. Odonata are widely used as a valuable tool for assessing freshwater ecosystems. Hence, with the aim of inspecting the conservation value of intermittent rivers in the Mediterranean based on the assemblages they support, we studied Odonata adults at four intermittent Mediterranean rivers in the Dinaric Western Balkans ecoregion with respect to the surrounding land-cover heterogeneity. We analyzed several diversity and conservation indices and recorded significant differences in Odonata species richness and Croatian Conservation Odonatological index among the studied rivers. Our findings showed that land use, as a long-term moderate anthropogenic impact, can enhance land-cover heterogeneity and in some cases even lead to increased Odonata diversity in intermittent rivers in the Mediterranean. Intermittent rivers provide habitat for several threatened Odonata species, suggesting the importance of Odonata in planning the conservation activities in these vulnerable ecosystems." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Trg Matice hrvatske 12, 44250 Petrinja, Croatia. Email: marina.vilenica@ufzg.hr

20281. Vinko, D.; Šalamun, A.; Bedjanic, M. (2022): On the odonates, odonatology and odonatologists in Slovenia. 6th European Congress on Odonatology, 27-30th June 2022, Kamnik, Slovenia, Book of Abstracts: 9-22. (in English) [" brief overview of odonatological research in Slovenia from its origins in the second half of the 17th century to the present is provided. The importance of pioneer odonatological activities by Prof. Boštjan Kiauta and his mentorship as well as support to the work by younger Slovene odonatologists are highlighted. A checklist of 73 recorded dragonfly species for the country is given, together with their common Slovenian names. Diversity of dragonflies and their habitats in Slovenia is presented, with an overview map of 8,605 localities with dragonfly records, map of number of recorded Odonata species per 5x5 km squares and examples of currently known distributions of Cordulegaster heros Theischinger, 1979 and Somatochlora meridionalis Nielsen, 1935. Scope and activities of the Slovene Dragonfly Society, founded in 1992 with the aim to increase popularity of dragonflies and to connect dragonfly enthusiasts in Slovenia, are also presented, highlighting the importance of the national odonatological database, which contains over 61,500 faunistic data and is maintained jointly by the Slovene Dragonfly Society and the Centre for Cartography of Fauna and Flora. Although the protection of threatened dragonfly species in Slovenia is satisfactorily covered in legislative terms, some species experience, in reality, serious decline and ongoing encroachment upon their habitats, while systematic, state funded monitoring is not carried out. The beginning of the 6th European Congress on Odonatology (ECOO 2022), to be held between June 27th and 30th June 2022 in Kamnik, Central Slovenia, is announced." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, SLOVENIA. Email: damjan.vinko@gmail.com

20282. Vitor, K.C.A.; Pagarigan, E.O.; Tagoon, M.D.T.; Garcia, M.M.; Bautista, M.G. (2022): Distribution and species richness of a dult Odonata in urban wetlands in Tagum City, Mindanao, Philippines. Philippine Journal of Science 151(6A): 2173-2182. (in English) ["Several studies on Philippine Odonata have focused mainly on the protected landscapes and forest reserves; however, little ecological research has been done in an urban setting. Species distribution, abundance, and diversity of Odonata in Tagum were conducted, where no previous records were available. Field sampling was conducted from July–October 2018 among various locations in Tagum City, Davao del Norte. Results showed a total of 1,239 individuals of identified Odonata composing nine species of Family Libellulidae and three species of Family Coenagrionidae. The dominant and most abundant species were Pantala flavescens, Diplacodes trivialis, and Orthetrum sabina. A relatively high Margalef's Index of species richness (R = 2.148) and moderate species diversity (H'= 1.935) were recorded in Botanical Park and a less even distribution was observed in all sites. Canonical correspondence analysis indicated that both temperature and humidity can affect the abundance of certain species within the community." (Authors)] Address: Vitor, Karyn, Dept of Arts and Sciences Education, University of Mindanao Tagum College, Tagum City, Davao del Norte 8100 Philippines. Email: iamkarynchrislene@gmail.com

20283. Vliegenthart, A. (2022): Opmerkelijk. Vlinders 1/2022: 32- (in Dutch) [Coenagrion scitulum on its way to the Wadden Islands: After the forked damselfly became established in 2007, the species has been expanding since 2010. By now, the species is widespread below and even above the major rivers. Via the dunes, C. scitulum now seems to be spreading (quickly?) to the north. How long will it take before it arrives in Den Helder? And will the transfer to Texel succeed?] Address: not stated

20284. Walia, G.K.; Singh, H. (2022): The Journal of Basic and Applied Zoology 83:47. A review on intraspecific karyomorphological variations of m chromosomes in family Libellulidae (Anisoptera: Odonata): 11 pp. (in English) ["Background: Family Libellulidae is one of the largest families of suborder Anisoptera (Odonata) including 1035 species of 144 genera throughout the world. Libellulids are distributed all around the globe, while some are cosmopolitan and some are endemic. Cytogenetic data pertains to 258 libellulid species and chromosome number varies from 2n = 6.47. Majority of the species possess 2n (male) = 25, which is the modal number of the family. The m chromosomes are considered as the fragments of autosomes and are present in 78% of studied libellulid species. Main body: Presently, 29 libellulid species have been catalogued based on various research articles related to cytogenetic studies regarding intraspecific chromosomal variations especially due to the m chromosomes within the same or different geographical populations of the species. Conclusions: Odonata possess holokinetic chromosomes and m chromosomes are the fragments of autosome. The break can occur at any time, at any place, which is responsible for variations in the size of m chromosomes. These variations also depend on the geographical distribution of the species which persists over generations by the action of natural selection and also play role in speciation." (Authors)] Address: Walia, Gurinder

Kaur, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab 147002, India. Email: gurinderkaur_walia@yahoo.co.in

20285. Wang, Z.J.; Melfi Jr., J.; Leonardo, A. (2022): Recovery mechanisms in the dragonfly righting reflex. Science 376(6594): 754-758. (in English) ["Following formidable flyers: Flying involves complicated maneuvers, not the least of which is the process of returning to an upright flying position after being flipped over in midair. Wang et al. used a combination of experiments and biophysical models to understand this process in dragonflies, which are adept insect flyers. The authors reveal that righting involves a series of signals beginning with the visual system through to wing pitch muscles. This approach revealed connections between neural signals and physical processes that could be used to study flight mechanics across species. —SNV. Abstract: Insects have evolved sophisticated reflexes to right themselves in mid-air. Their recovery mechanisms involve complex interactions among the physical senses, muscles, body, and wings, and they must obey the laws of flight. We sought to understand the key mechanisms involved in dragonfly righting reflexes and to develop physics-based models for understanding the control strategies of flight maneuvers. Using kinematic analyses, physical modeling, and three-dimensional flight simulations, we found that a dragonfly uses left-right wing pitch asymmetry to roll its body 180 degrees to recover from falling upside down in ~200 milliseconds. Experiments of dragonflies with blocked vision further revealed that this rolling maneuver is initiated by their ocelli and compound eyes. These results suggest a pathway from the dragonfly's visual system to the muscles regulating wing pitch that underly the recovery. The methods developed here offer quantitative tools for inferring insects' internal actions from their acrobatics, and are applicable to a broad class of natural and robotic flying systems." (Authors)] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

20286. Ware, J.; Kohli, M.K.; Mendoza, C.M.; Troast, D.; Jinguji, H.; Hobson, K.A.; Sahlén, G.; Anderson, R.C.; Suhlin, F. (2022): Evidence for widespread gene flow and migration in the Globe Skimmer dragonfly Pantala flavescens. International Journal of Odonatology 25: 43-55. (in English) ["The global population structure and dispersal patterns of P. flavescens are evaluated using a geographically extensive mitochondrial DNA dataset, a more limited samples of nuclear markers, wing isotopic (d²H) data and a literature review. No spatial or temporal haplotype structure was recovered between the samples. Isotope data suggest that most samples were immigrants at the collection locations. A literature review of migration events for the species confirms regular inter-and intra-continental migrations occur (the majority reported from Asia, Africa and Australasia), with individuals and swarms dispersing thousands of kilometers over land and oceans. Migrations coincide with prevailing winds and seasonal rains, which points to a mechanism we name the "pantropical Pantala conveyor belt", suggesting widespread gene flow is possible for an aquatic insect with excellent flying ability linked to rapid larval development." (Authors)] Address: Ware, Jessica, Division of Invertebrate Zoology, American Museum of Natural History, USA. Email: jware@amnh.org

20287. Wasscher, M.T.; Orr, A.G.; Dumont, H.J. (2022): In memoriam Bastiaan Kiauta (20th January 1937 – 26th March 2022). Odonatologica 51(1-2): 1-9. (in English) ["We provide recollections and memories connected with the life of Bastiaan Kiauta and his pivotal role in developing worldwide odonatology. Additions to his odonatological bibliography and to species named in his honour are appended." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

20288. Wilk, T. (2022): Scarce Chaser Libellula fulva (Odonata: Libellulidae): second record from the Polish part of the Carpathian Mountains. Odonatrix 1811: 3 pp. (in Polish, with English summary) [oas 64: "L. fulva is a moderately frequent species in Poland, its distribution being largely confined to the post-glacial landscape of northern Poland and the Lublin region. It becomes much scarcer and more localised towards the south and has hitherto been found just once in the mountainous regions of southern Poland. This paper discusses the second record of this species in the Polish part of the Carpathian Mountains: one teneral individual was observed in a gravel pit near the village of Podrzecze in the Dunajec Valley. The record greatly ex-tends the Scarce Chaser's known range in Poland, indicating that this may be slowly shifting southwards. Its presence in the mountainous areas of southern Poland could be linked with new artificial waterbodies that have formed in abandoned gravel or sand pits along Carpathian rivers." (Author)] Address: Wilk, T., Ogólnopolskie Towarzystwo Ochrony Ptaków, ul. Odrowła 24, 05-270 Marki, Poland. E-mail: tomaszwilk3@gmail.com

20289. Wilkinson (2022): Perching and roosting postures in adult Pyrrhosoma nymphula (Sulzer) (Large Red Damselfly). Journal of the British Dragonfly Society 38(1): 84-99. (in English) ["Although generally considered to be a species that rests with its wings held over its abdomen in a closedwing posture, the author has observed Pyrrhosoma nymphula with a diurnal propensity to rest with its wings spread in more half-open wing postures. Furthermore, in contrastto its daytime perching behaviour, late evening observations of roosting P. nymphula around a small urban garden pond have consistently revealed that adults habituallly adopt 'openwing' roosting postures, either half-open or fully open. Forewings may be pulled forwards up to 110° and may be depressed to approximately 5° above the horizontal plane (Fig. 1); hindwings pulled forwards to between 70° and 130° and depressed by as much as 15° below the horizontal plane. When first settling to roost for the night both sexes may settle with a typically 'closedwing' posture or one of a ränge of commonly utilised daytime half-open postures. However, a significant number subsequently adjust their position and open their wings to orientations approximately at right angles to the body. There is some evidence that the half-open wing posture orientations are adopted in both males and females earlier in the year, when temperatures are lower; later in the year, as temperatures rise, their behavioural repertoire expands to include more fully open roosting postures. The various hypotheses that have been proposed to explain the significance and function of closedwing versus openwing behaviour are discussed." (Author)] Address: Wilkinson, Shaun, 21 Eastfield Road, Western Park, Leicester LE3 6FE, UK

20290. Won, C.-G.; So, K.-S.; Kim, H.-C. (2022): A new odonatan (Stenophlebiidae) from the Lower Cretaceous Sinuiju Formation of North Phyongan Province, the Democratic People's Republic of Korea. Palaeoworld 31(1): 116-120. (in English) ["A new fossil species, Stenophlebia ryonsangensis n. sp. (Stenophlebiidae), collected from the

Lower Cretaceous non-marine Sinuiju Formation, North Phyongan Province, has the following forewing characters: preserved wing slender and longer than 47.1 mm; Cr long, with three cells below it, and well aligned with distal part of ScP; Sn shorter than Cr, one cell long; supplementary veinlet below Sn aligned with RP2 and about two cells long; base of IR1 five cells distal of base of RP2. This well preserved material is the first odonatan reported in the DPRK. Congeneric species has previously been found in the Lower Cretaceous Yixian Formation of western Liaoning Province, Northeast China, thus the new discovery of Stenophlebia ryonsangensis n. sp. may contribute to evaluating the distribution and migration of Stenophlebidae and may further indicate the close relationship of the fossil layer with the famous Jehol Biota in Northeast China." (Authors)] Address: So, K.-S., Dept of Paleontology, Faculty of Geology, Kim Il Sung University, Pyongyang, Democratic People's Republic of Korea. Email: ks.so@ryongnamsan.edu.kp

20291. Xia, G.; Zheng, D.; Krieg-Jacquier, R.; Fan, Q.; Chen, Y.; Nel, A. (2022): The oldest-known Lestidae (Odonata) from the late Eocene of Tibet: palaeoclimatic implications. Geological Magazine 159(4): 511-518. (in English) ["Terrestrial fossils from the Palaeogene of Tibet could help us to better understand the past climate and environment in this area. We herein report a new late Eocene non-marine fossil site from southern Nima Basin, central Tibet, SW China, including abundant insects and fishes. These fossils are similar to those from the late Eocene (~39.5–37 Ma) Lunpola–Nima sediment depo-centres in sharing the dominating aquatic bug Aquarius lunpolaensis and cyprinid fishes. Chalcolestes tibetensis sp. nov., the oldest representative of the modern family Lestidae, is described. Lestidae were previously only recorded in Western Europe, and the oldest records were from the uppermost Eocene of France and the UK. The present discovery demonstrates that Lestidae already had a broad distribution during the Eocene and probably originated much earlier. The recent representatives of Chalcolestes occur in the low-altitude ponds or lakes of Western Palaearctic. Together with the other freshwater fossils in this site, this new discovery indicates a humid climate and low altitude for the Nima Basin and nearby basins in the middle part of the Bangong Nujiang suture zone." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

20292. Xu, F.; Wang, J.; Hua, L. (2022): Multi-objective biomimetic optimization design of stiffeners for automotive door based on vein unit of dragonfly wing. Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science 236(9): 4551-4564. (in English) [oas 64a; "In this paper, a biomimetic optimizing design of the stiffeners layout of the automotive inner door panels is proposed based on vein unit of dragonfly wing. The distributions features of the dragonfly veins and similarity as stiffeners are analyzed, and then the excellent structural features of mechanical properties of the dragonfly veins are extracted to work as a biomimetic design. In order to research the distribution of the reinforced areas in the interior door panels under various operating conditions, the finite element model is established firstly. Secondly, gray relation theory combined with analytic hierarchy analysis are imposed to determine the weight value of each condition in multi-objective topology optimization to fully consider both objective and subjective factors, and topological optimization results indicate that the stiffeners of the inner door panel are biconically designed. Finally, the original finite element results of the inner door panels are compared with that after optimized with biomimetic stiffeners under the same operating conditions, and the result of the comparison verify the effectiveness of the biomimetic topology design. Specifically, for the dent-resistant and sinking condition, the strength of new door increases by 20.2% and 14.3%, respectively. Therefore, doors with biomimetic stiffeners have an increased resistance to deformation and vibration, while the mass is reduced by 2.7%. The results can provide valuable new ideas for the optimal biomimetic design of automotive door inner panel stiffeners." (Authors)] Address: Xu, F., Hubei Key Laboratory of Advanced Technology of Automotive Components, Wuhan University of Technology, Wuhan, China

20293. Yan, S.; Pan, S.; Hu, J.; Zhang, S.; Yu, L.; Wang, S.; Fang, J.; Chen, Z. (2022): Two new records of dragonfly species (Odonata: Macromiidae) in Anhui Province. Journal of Anhui University (Natural Science Edition) 46(04): 102-104. (in Chinese, with English summary) ["According to the systematic field investigation on the insect resources in Mount Huangshan Scenic Area during April to October in 2020, two dragonfly species, namely the Macromia malleifera and Macromia unca, were identified to be the new records in Anhui Province. The morphological characteristics of these two species were briefly described, and furthermore, photographs for their male and female adults were illustrated in present study. The results would provide important information for the further study of Macromiidae dragonflies in Anhui Province." (Authors)] Address: Yan, S., School of Resources and Envionmental Engineering, Anhui University, China. Email: yanshaofei999@163.com

20294. Yang, G.-h.; Orr, A.G.; Zhang, H.-m. (2022): First description of the larva of Archineura incarnata (Karsch, 1891) with notes on the biology (Odonata: Calopterygidae). Zootaxa 5134(3): 441-447. (in English) ["The final instar larva of the genus Archineura Kirby, 1894 is described for the first time, based on a specimen of the Chinese endemic species Archineura incarnata (Karsch, 1892) collected from Mt. Nankunshan, Guangdong Province, China. The larva is distinguished by several characters, including its moderately slender build combined with the distinctive extremely long legs, long, narrow, uniquely spined outer caudal appendages, a mask strongly expanded anteriorly with a relatively small median cleft, and robust spines at the apex of the labial palp. The mask is most similar to larvae of Echo Selys, 1853, Mnais Selys, 1853 and Psolodesmus McLachlan, 1870 which are considered its nearest relatives based on molecular analysis, but from which it differs in other characters. The biology of Archineura larvae is discussed briefly." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

20295. Yang, G.-h.; Orr, A.G.; Zhang, H.-m. (2022): Descriptions of the larvae of Huosoma Guan, Dumont, Yu, Han & Vierstraete, 2013 from China (Odonata: Coenagrionidae). Zootaxa 5134(3): 426-434. (in English) ["The final stadium larvae of Huosoma latiloba (Yu, Yang & Bu, 2008) and Huosoma tinctipenne (McLachlan, 1894) from Yunnan Province, China are described and illustrated for the first time, with diagnostic differences between the two species identified. While no morphological characters separating the adults of this genus, and the closely related western Palaearctic Pyrrhosoma Charpentier, 1840 have been found, the larvae of these two genera do show differences which are

discussed here." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

20296. Zaini, A.; Bunda, H.; Utami, N.H. (2022): Validitas dan keterbacaan booklet capung untuk mahasiswa pada mata kuliah zoologi invertebrata. Jurnal Pendidikan dan Ilmu Sosial 1(2): 63-73. (in Indonesian) ["The validity and readability of dragonfly booklets for students in invertebrate zoology course: Dragonfly is one type of insect which is a bioindicator in the environment. Insects can be found in rice fields, so that rice fields are one of the habitats for dragonflies to be found, so the presence of dragonflies in rice fields can increase an interesting learning resource for students to improve understanding of the diversity of the Odonatan order in invertebrate zoology courses. The aims of this study were (1) to analyze the diversity of dragonflies of the order Odonata found in the rice fields of Beringin Kencana village, Tabunganen sub-district. (2) Describe the validity of the booklet compiled from data on the diversity of dragonflies in the Beringin Kencana rice field area, Tabunganen Subdistrict as teaching material for invertebrate zoology courses. (3) Describe the readability test of a booklet compiled from data on the diversity of dragonflies in the Beringin Kencana rice field area, Tabunganen District as an invertebrate zoological enrichment. This research method uses the R&D model developed by Borg and Gall with the stages of development research using the steps, namely research and information collecting, planning, developing preliminary form of product, preliminary field testing, main product revision. Based on the research results, it is known that (1) there are 7 species of dragonflies, namely Orthetrum sabina, Neurothemis fluctuans, Brachytemis contaminata, Agriocnemis pygmaea, Ceriagrion cerinorubellum, Tholymis tillarga, and Ischnura senegalensis. (2) Based on the validity test the developed booklet was declared very valid by three expert lecturers with a validity score on the content aspect, namely 88.89%, in the language aspect, 88.89%, and in the presentation aspect, namely 94.44%. (3) The readability test by 6 students got a score of 86.76% so that the Booklet got very good criteria." (Authors) (Google translate)] Address: Zaini, A., Programn Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Lambung Mangkurat, Jalan Brigjen Hasan Basri, Banjarmasin, Indonesia

20297. Zajac, K.; Tarnawski, D.; Smolis, A.; Kadej, M.; Struœ, K.; Zajac, T. (2022): The green snaketail Ophiogomphus cecilia (Geoffroy in Fourcroy, 1785) in the Sudetes and new records of the species in Lower Silesia. Przyroda Sudetów 24: 95-102. (in Polish, with English summary) ["Ophiogomphus cecilia is a reobiont inhabiting mainly lowland and submontane rivers up to 400 m a.s.l. We present the first records of the species in the Polish part of the Sudetes, as well as new observations of the species from south-western Poland. In 2008-2018, the species was recorded at 11 localities in the Sudetes at an altitude of 335-740 m a.s.l.. In addition, 25 new localities were found in lower areas of Lower Silesia. The possible dispersal routes of the species into the mountain areas of the Sudetes are discussed." (Authors)] Address: Zajac, K., ul. Fabryczna 1a, 57-540 Ladek-Zdrój, Poland. Email: krzysiek.zajac3@gmail.com

20298. Zhang, V.M.; Martin, R.L.; Murray, R.L. (2022): Chronic road salt exposure across life stages and the interactive effects of warming and salinity in a semiaquatic insect. Environmental Entomology 51(2): 313-321. (in English) ["The salinization of freshwater habitats from winter road salt application is a growing concern. Understanding how taxa exposed to road salt run-off respond to this salinity exposure across life history transitions will be important for predicting the impacts of increasing salinity. We show that Leucorrhinia intacta dragonflies are robust to environmentally relevant levels of salt pollution across intrinsically stressful life history transitions (hatching, growth, and metamorphosis). Additionally, we observed no carry-over effects into adult dragonfly morphology. However, in a multiple-stressor setting, we see negative interactive effects of warming and salinity on activity, and we found that chronically warmed dragonfly larvae consumed fewer mosquitoes. Despite showing relatively high tolerance to salinity individually, we expect that decreased dragonfly performance in multiple-stressor environments could limit dragonflies' contribution to ecosystem services such as mosquito pest control in urban freshwater environments." (Authors)] Address: Murray, Rosalind, Evolutionary Biology, University of Toronto, 25 Willcocks St. M5S 3B2, Toronto, Ontario, Canada. Email: rosalind.murray@utoronto.ca

20299. Zulhariadi, M.; Irawan, R.D.; Zulfaeda, A.; Hidayani, N. (2022): Dragonflies diversity and land cover changes in the Batubolong River, West Lombok District. Biotropica 29(2): 112-123. (in English) ["West Lombok District is the second largest district in Lombok Islands. The diversity of dragonflies (Order Odonata) as a bioindicator of environmental quality has not been widely studied in the West Lombok region. This study aimed to determine the species diversity of dragonflies (Order Odonata) found in Batubolong River, West Lombok District and its relation to the occurring land cover changes. This study was carried out by using a descriptive explorative method, where the sampling technique was done by means of line transects. Maps of study and sampling locations as well as land cover changes were made using ArcGIS 10.4.1 software based on primary and secondary data. The results showed that there were 11 species of dragonflies with a Shannon-Wiener diversity index value (H') of 2.212 (medium diversity), a population density index (C) of 0.126 (low dominance), and a species evenness index (E) of 0.923 (high uniformity). Our study also found two rare species of dragonfly in Lombok Island i.e., 3 individuals of Nosoticta emphyla (Lieftinck, 1936) with 9% relative abundance and 1 individual of Drepanosticta berlandi (Lieftinck, 1939) with 3% relative abundance. The discovery of D. berlandi in Lombok is the third time after the findings in 1896 and the 19th century. Analysis of satellite data around the sampling area within the period 2013-2020 showed that there has been an increase in land cover of 6,149.29 m2. The increase in land cover changes may have caused the disappearance of several Odonata species in the sampling location." (Authors) Euphaea lara lombokensis (McLachlan, 1898), Pseudagrion pilidorsum declaratum (Lieftinck, 1936), Nosoticta emphyla (Lieftinck, 1936), Drepanosticta berlandi (Lieftinck, 1939), Orthetrum testaceum soembanum (Foerster, 1903), Neurothemis ramburii (Brauer, 1866), Trithemis festiva (Rambur, 1842), Orthetrum glaucum (Brauer, 1865), Agrionoptera insignis insignis (Rambur, 1842), Orthetrum sabina (Drury, 1773), Diplacodes trivialis (Rambur, 1842)] Address: Zulhariadi, M., Biology Education Dept, Faculty of Tarbiyah and Teaching, Universitas Islam Negeri Mataram, Mataram 83116, Indonesia. Email: zulhariadi@uinmataram.ac.id