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1996

23690. Benazzouz, B.; El Agbani, M.A.; Guesse, P. (1996): Etude de la croissance des larves d'*Ischnura graellsii* (Rambur, 1842) (Odonata, Coenagrionidae) élevées au laboratoire. Bull. Inst. Sei., Rabat 20: 123-129. (in French, with Arabian and English summaries) ["Larval growth of *I. graellsii* is studied from laboratory reared specimens. Head capsule, prementum, metathoracic femora, metathoracic wing buds and caudal lamellae were used to analyse of the absolute growth, relative growth and of growth rate for the five growing types. The larval development of *I. graellsii* present two distinct growth phases." (Authors)] Address: Benazzouz, B., Université Ibn Tofail, Faculté des Sciences, Département de Biologie, B.P. 133, Kénitra 14000, Maroc

23691. Mills, A.P.; Rutter, J.F.; Rosenberg, L.J. (1996): Weather associated with spring and summer migrations of rice pests and other insects in south-eastern and eastern Asia. Bulletin of Entomological Research 86: 683-694. (in English) ["Trajectory analysis of the windfields at 10 m and 1.5 km was used to determine the direction and extent of windborne movements of insects trapped in spring and summer in south-eastern and eastern Asia for the period 1968 to 1985. Approximately 2500 trajectories, depicting the movements of airborne particles, were constructed where temperatures were high enough ($q=10^{\circ}\text{C}$) to allow flight and where wind speeds ($q=5\text{ kmh}^{-1}$) were expected to lead to downwind displacements. Trap catches were dominated (97%) by delphacid species (e.g. *Nilaparvata lugens* and *Sogatella furcifera*), with Cicadellidae (1.1%) and Diptera (0.7%) as the next most numerous. Very few Lepidoptera were reported. Most trajectories were less than or equal to 40 h in duration. The previously recognized northwards migration along a broad front in prevailing Summer Monsoon and Trade winds was confirmed, as was the important role of frontal depressions in the windborne migration of insects in temperate areas. Nearly 50% of the trajectories were constructed in mobile weather systems which both disturbed and strengthened the prevailing winds and led to pronounced differences in the direction and distance of sources for insects caught at any catching site. Similarly, fluctuations in position of quasi-stationary fronts induced considerable mixing of populations from different sources and influenced the northern extent of each phase of rice pest migration. The results supported earlier findings that migrations occurred between the tropics and temperate areas during the spring and summer, but also indicated that migrations within the tropics at this time of year were a more frequent occurrence than had been considered previously. ... Data were

collected from published and unpublished reports of insect catches in net and light traps between 3° and 44°N and 111° and 139°E ." (Authors) The study includes data on "Libellulidae"] Address: L.J. Rosenberg, L.J., Natural Resources Inst., Central Avenue, Chatham Maritime, Kent, ME4 4TB, UK.

23692. Onishi, T. (1996): [The insect fauna of the Red-tailed Dragonfly and its surroundings in Toyo City] *Nannophya pygmaea* in the surroundings of Toyo City, and co-occurring insects (dragonflies and butterflies). Ehime Prefectural Museum of Natural Science Research Report 1: 57-63. (in Japanese) ["*Nannophya pygmaea* is the smallest species of dragonfly in Japan It was first collected in Ehime Prefecture in 1912 (Kusunoki, 1976), but its habitat is limited to wetlands on flat land and hills, so its distribution within the prefecture is extremely localized. At the same time, with the current progress of development, there is a risk that the wetlands where the species lives will disappear due to land development, etc. Therefore, as a means of future conservation, we investigated the habitat and its surroundings, and reported on the occurrence and distribution of this species, as well as the insect fauna." (Author/Google translate) In addition the following species were recorded too: *Indolestes peregrinus*, *Mnais pruinosa pruinosa*, *Lyriothemis pachygastra*, *Orthetrum triangulare melania*, and *Pantala flavescens*] Address: Onishi, T., Ehime Prefectural Museum of Nature and Science 2133-2 Ojoin, Niihama City, Ehime Prefecture 792, Japan

23693. Samways, M.J. (1996): Insects in the urban environment: Pest pressures versus conservation concern. Proceedings of the Second International Conference on Urban Pests. K.B. Wildey (editor): 129-133. (in English) ["Spatial scale, from global and regional, through landscape down to habitat and microhabitat is a critical concept for both understanding pest- and threatened-insect biology. At the finer scale, there are some distinct influences and impacts on insect populations, some of these (e.g. open water butts, unburied organic matter) encourage population surges of a few species to become pests. Others (e.g. electric lights, fast-moving traffic) are a blanket mortality factor for many species. However, not all aspects of urbanization are harmful to biodiversity, especially where there is ecological landscaping. Furthermore, there is no evidence that urban pest control alone has a major adverse impact on biodiversity. Landscape degradation and habitat destruction has far greater effect. With appropriate IPM, coupled with ecological landscaping, much, but not all, biodiversity will be protected, global climate change aside." (Author) A reference to *Crocothemis erythraea* is made.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private

Bag X1, ZA-7602, Matieland, South Africa. E-mail: sam-ways@sun.ac.za

23694. Ubukata, H.; Wakatsuki, K. (1996): [A case of death during emergence of *Epiophlebia superstes* (Selys) in Kushirocho, Hokkaido]. *Sylvicola* 14: 48. (in Japanese) [Verbatim/google translate: "Within the Kushiro area, the distribution of the ancient dragonfly *Epiophlebia superstes* is known from only three locations. Of these, the tributary of the Obirashike River in Kushiro Town (Kimura, 1984) is the eastern limit of this species' distribution on the Pacific coast of eastern Hokkaido. This species has not been rediscovered from Obirashike since then, but on June 21, 1996, during an insect survey along the tributary, Wakatsuki discovered the exoskeleton of a dragonfly larva, and Ubukata, who accompanied him, immediately identified it as an ancient dragonfly. The exoskeleton was resting 40 cm above the ground on the petiole of a butterbur plant standing upright on the side of a forest road, less than 1 m horizontally and vertically from the stream. After bringing the exoskeleton back and examining it closely, Ubukata determined that it was a male and the following: 1) A 2.5 mm diameter hole appears to be hollow, stretching from the center of the tergite of the fifth and sixth abdominal segments to the right. This hole has expanded so far that the entire right half of the tergite of the fifth abdominal segment is gone, and furthermore, the tergite of the fourth abdominal segment is missing by a width of 1.2 mm from its right edge. 2) Of the parts that should split open during emergence, only the dorsal line of the prothorax and synthorax and the boundary between the base of the left elytra and the synthorax have split; the boundary between the occipital occipitalis and the prothorax, and the boundary between the base of the right elytra and the synthorax have not split. From the above, it is believed that this is not a normal emergence shell, and that a final-stage larva that had probably positioned itself to emerge had part of its abdomen torn open by ants or other predators and its insides eaten away before it emerged. Although it is not possible to say for certain whether it was ants that were preyed upon, there are reports of emerging larvae of the dragonfly (UBUKATA, 1973) and the blue-and-white dragonfly (KIAUTA, 1971) being preyed upon by ants, resulting in death or emerging in a circular shape."] Address: Ubukata, H., Hokkaido Univ. Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

1997

23695. Izquierdo, I.; Martín, C.; París, M.; Santos, C. (1997): La composición de entomología del Museo Nacional de Ciencias Naturales (CSIC). *Graellsia* 53: 49-85. (in Spanish, with English summary) ["The entomological collection of the Spanish Museo Nacional de Ciencias Naturales of Madrid (CSIC). The present paper gives information on the volume and taxonomic and faunistic composition of the Entomology Collection of the Museo Nacional de Ciencias Naturales (MNCN) in Madrid, Spain. An abstract of the inventory, including number of specimens and genera, number of type specimens and taxa represented by them, revisors, consultants, etc. is displayed. Different aspects of the facilities for consulting the collection and contact ways are commented. Several catalogues and publications on the housed materials in the Entomology Collection are listed as an Appendix." (Authors) Verbatim/Google translation: Inventory and computerisation: Dry material is preserved, the inventory of which was carried out in 1986, and material in alcohol of which there is no inventory. Number of specimens: This collection has 6,670 dry-mounted specimens and 36 batches with larvae

in alcohol. Arrangement and composition of the material: The dry material, already studied, consists of 5,121 specimens organised into three geographical collections: Iberian (including Canary Islands), Palearctic and non-Palaearctic; the latter includes a large amount of material from Equatorial Guinea. Its composition in terms of number of genera and specimens is summarised in the following table. The data relating to the taxonomic composition are broken down in Table 11. In total, 134 genera of this order have been recorded. Of the alcohol batches, 30 correspond to Iberian material studied. Material pending study: There is a miscellany of 1,549 dry specimens pending study and separation: 528 Iberian, 22 Palearctic and 999 from other faunas. Six batches of larvae in alcohol are also unstudied. Taxa represented by type specimens (located up to 1997): 14 type specimens of 14 taxa described by three authors, A. Compte (9), R. Martín (4) and F. J. Ocharán (1), have been located. Observations: This collection contains important material studied and/or collected by R. Martín and M. E. Selys-Longchamps. The collection of Iberian material is currently being reviewed by A. Compte."] Address: Izquierdo, I., Museo Nacional de Ciencias Naturales. José Gutiérrez Abascal, 2. 28006 Madrid, Spain

1998

23696. Ramirez, A.; Pringle, C.M. (1998): Structure and production of a benthic assemblage in a neotropical stream. *Journal of the North American benthological society* 17(4): 443-463. (in English) ["The structure and production of a benthic insect assemblage were assessed over a 12-mo period in a neotropical stream draining the Caribbean slope of Costa Rica. Two stream habitats, riffles and pools, were sampled monthly. Benthic assemblage composition was similar to that reported for other areas in Central America and was dominated by the orders Ephemeroptera (*Tricorythodes*, *Leptohyphes*, *Thraulodes*, *Baetis*?), Coleoptera (*Elmidae*), and Diptera (mainly *Chironomidae*). Collector-gatherers were the dominant functional-feeding group and very few shredders were found. Annual habitat-weighted secondary production was highest for *Tricorythodes* (87.07 mg ash-free dry mass [AFDM] ($m^{-2} y^{-1}$) and *Chironomidae* (74.47 mg AFDM ($m^{-2} y^{-1}$)). Total habitat-weighted secondary production was 363.65 mg AFDM ($m^{-2} y^{-1}$). Riffles supported the highest abundance, biomass, and secondary production of benthic insects. This study provides the 1st estimates of secondary production for a neotropical stream. Abundance, biomass, and secondary production in the study stream were low in comparison to results obtained in subtropical and temperate regions. However, annual production to biomass (P/B) ratios were high (range 5-103), indicating rapid population turnover. Monthly assessment of assemblage structure showed that benthic abundance increased with the number of days since the last large rainstorm (>50 mm/24 h). In addition, habitat-weighted abundance was negatively correlated with stream discharge. The abundance of macroconsumers (e.g., fishes and benthic shrimps) that potentially reduce food resources and prey upon insects might in part be responsible for the low abundance, production, and proportion of insect shredders in the study stream. Results suggest that other organisms (i.e., macroconsumers, microbes) are filling the functional roles that are normally assumed by benthic insects in temperate regions. Therefore, energy is potentially flowing through pathways other than insects from primary producers and detritus to upper trophic levels. In addition, precipitation and subsequent high discharge are major factors determining the structure of benthic communities in the study stream. Our results support the

hypothesis that the structure and production of the benthic insect assemblage in this neotropical stream are the result of interactions between the physical environment (e.g., discharge and habitat type) and macroconsumers... Odonata was represented by a variety of taxa: Argia (Coenagrionidae), Palaemnema (Platystictidae), and Hetaerina (Calopterygidae) were the most commonly recorded genera. Abundance and biomass of Odonata were highly variable, and were slightly higher in riffles than in pools. Odonata abundance and biomass peaked in February, March, and September in riffles." (Authors)] Address: Ramirez, A., Institute of Ecology, University of Georgia, Athens, Georgia 30602 USA. Email: aramirez@arches.uga.edu

1999

23697. Kosugi, A. (1999): Records of some insects collected in Kagoshima Prefecture. *Sylvicola* 17: 28. (in Japanese) ["Date of collection: August 10, 1999 Place of collection: Okusawa Water Source Pond, Otaru City. Somatochlora uchidai, 1 ♂; Sympetrum frequens, 1 ♂] Address: Kosugi, A., 10-1-14 Tottori Kita, Kushiro City, 084-0907, Japan

23698. Kosugi, A. (1999): Records of some insects collected in Kagoshima Prefecture. *Sylvicola* 17: 29. (in Japanese) [August 17, 1999. Collection location: Around Izumi City, Kagoshima Prefecture: ♀ of *Calopteryx atrata*] Address: Kosugi, A., 10-1-14 Tottori Kita, Kushiro City, 084-0907, Japan

2000

23699. Huryn, A.D.; Wallace, J.B. (2000): Life history and production of stream insects. *Annu. Rev. Entomol.* 45: 83-110. (in English) ["Studies of the production of stream insects are now numerous, and general factors controlling the secondary production of stream communities are becoming evident. In this review we focus on how life-history attributes influence the production dynamics of stream insects and other macroinvertebrates. Annual production of macroinvertebrate communities in streams world-wide ranges from approximately 10⁰ to 10³ g dry mass m⁻². High levels are reported for communities dominated by filter feeders in temperate streams. Filter feeding enables the accrual and support of high biomass, which drives the very highest production. Frequently disturbed communities in warm-temperate streams are also highly productive. Biomass accrual by macroinvertebrates is limited in these streams, and production is driven by rapid growth rates rather than high biomass. The lowest production, reported for macroinvertebrate communities of cool-temperate and arctic streams, is due to the constraints of low seasonal temperatures and nutrient or food limitation. Geographical bias, paucity of community-wide studies, and limited knowledge of the effects of biotic interactions limit current understanding of mechanisms controlling stream productivity." (Authors) The review includes references to Odonata.] Address: Huryn, A.D., Dept of Biological Sciences, Univ. of Maine, Orono, Maine 04469-5722, USA. Email: huryn@maine.maine.edu

23700. Groot, A.T.; Dicke, M. (2002): Insect-resistant transgenic plants in a multi-trophic context. *The Plant Journal* 31(4): 387-406. (in English) ["So far, genetic engineering of plants in the context of insect pest control has involved insertion of genes that code for toxins, and may be characterized as the incorporation of biopesticides into classical plant breeding. In the context of pesticide usage in pest control,

natural enemies of herbivores have received increasing attention, because carnivorous arthropods are an important component of insect pest control. However, in plant breeding programmes, natural enemies of herbivores have largely been ignored, although there are many examples that show that plant breeding affects the effectiveness of biological control. Negative influences of modified plant characteristics on carnivorous arthropods may induce population growth of new, even more harmful pest species that had no pest status prior to the pesticide treatment. Sustainable pest management will only be possible when negative effects on non-target, beneficial arthropods are minimized. In this review, we summarize the effects of insect-resistant crops and insect-resistant transgenic crops, especially Bt crops, from a food web perspective. As food web components, we distinguish target herbivores, non-target herbivores, pollinators, parasitoids and predators. Below-ground organisms such as Collembola, nematodes and earthworms should also be included in risk assessment studies, but have received little attention. The toxins produced in Bt plants retain their toxicity when bound to the soil, so accumulation of these toxins is likely to occur. Earthworms ingest the bound toxins but are not affected by them. However, earthworms may function as intermediaries through which the toxins are passed on to other trophic levels. In studies where effects of insect-resistant (Bt) plants on natural enemies were considered, positive, negative and no effects have been found. So far, most studies have concentrated on natural enemies of target herbivores. However, Bt toxins are structurally rearranged when they bind to midgut receptors, so that they are likely to lose their toxicity inside target herbivores. What happens to the toxins in non-target herbivores, and whether these herbivores may act as intermediaries through which the toxins may be passed on to the natural enemies, remains to be studied." (Authors) Effects of Bt on biological control agents include a reference to *Erythemis simplicicollis*.] Address: Dicke, M., Lab. Entomology, Wageningen University, P.O. Box 8031, NL-6700 EH Wageningen, The Netherlands; E-mail: marcel.dicke@wur.nl

2004

23701. Finger, A.G. (2004): Dietary exposure of Morelet's crocodile to organochlorine contaminants. MSc thesis, Environmental toxicology, Texas Tech University: 120 pp. (in English) [Belize; in Appendix 1 "Odonata" are listed as summer diet of Morelet's crocodiles {*Crocodylus moreletii*}.] Address: <https://ttu-ir.tdl.org/server/api/core/bitstreams/4c4ea260-3023-4342-8c83-1103b98d3983/content>

2005

23702. Endersby, I. (2005): A new dragonfly species for Victoria and nomenclatural changes to the Gomphidae: a consequence of research by Günther Theischinger. *Victorian Entomologist* 35(1): 2-4. (in English) [*Austroepigomphus praeurtus* (Selys 1858) is added to the list Victoria (Australia) odonate species.] Address: Author deceased

23703. Holmen, M.; Jensen, K.; Jepsen, M (2005): Arter 2004. NOVANA-overvågning i Frederiksborg Amt. Udgiver: Frederiksborg Amt, Teknik & Miljø, Landskabsafdelingen Dugvælsesår: 2005: 55 pp. (in Danish) [Denmark "*Aeshna viridis*: During the monitoring, *A. viridis* was detected at 7 of the 8 surveyed sites. The sites are distributed over 7 10x10 square kilometre UTM squares: 10km_619_71, 10km_622_69, 10km_622_70, 10km_620_69, 10km_619_70, 10km_620_71

and 10km_618_70. Frederiksborg County also has information about finds of the species in 2004 at another 5 probable breeding sites within the same UTM squares. It is possible that breeding sites for *A. viridis* could be found in even more places in the county, as there are several lakes and UTM squares with the plant crab claw, where its presence has not been investigated. Overall, it is estimated that the green mosaic dragonfly breeds fairly stably in the county. In some places, the populations are probably declining as overgrowth displaces the crab claw populations. In other places, it is recovering as a result of the planting of crayfish claw and the care/creation of small lakes with the plant. The monitoring fieldwork took place under optimal weather conditions in 2004. The counting of males, females and larval hides had to be adapted to the technical instructions according to the practical possibilities of accessibility at the sites. A reduction in time compared to the technical instructions was considered sufficient for the fieldwork. *Leucorrhinia pectoralis*: During the actual monitoring, *Leucorrhinia pectoralis* was detected at 2 of the 7 surveyed sites. The sites are located in the same 10x10 sq km UTM square: 10km_619_71. One is located in EC habitat area no. 123, but the other is outside the habitat area. Frederiksborg County also has information on the discovery of the species in 2004 at another 1 of the monitoring sites within the same UTM square, but in EC habitat area no. 121. On the other hand, the species was not found again in 2004 at the surveyed sites in the EC habitat areas no. 117 and 119, where the species is also included in the designation basis. It is possible that breeding sites for *L. pectoralis* could be found in other parts of the county, as there are areas where its presence has not been thoroughly investigated. Overall, it is estimated that *L. pectoralis* still breeds in a small number of places in the county. It has probably disappeared from several of the older sites, but nature management efforts in recent years have probably had a positive impact on population size and numbers. The monitoring fieldwork in 2004 took place under weather conditions that made it difficult to organise the fieldwork and at the same time probably had a negative impact on the species' population and breeding activity. In relation to the technical instructions, the counting of imagines and larval hides had to be adapted to the practical accessibility of the areas. At several smaller sites, a reduced amount of time was considered sufficient for fieldwork, but at one large site, the amount of time had to be increased. On the other hand, a fairly large amount of time was spent on the selection of monitoring sites." (Authors/DeepL)] Address: Frederiksborg Amt, Teknik & Miljø, Landskabsafdelingen

2006

23704. Eggers, T.O. (2006): Auswirkungen anthropogener Strukturen auf die Makrozoobenthoszönose von Schifffahrtsstraßen - Vergleich einer freifließenden Wasserstraße (Mittlere Elbe) mit einem Schifffahrtskanal (Mittellandkanal) und ihre Bedeutung für Neozoen. PhD thesis, Fakultät für Lebenswissenschaften, Technische Universität Carolo-Wilhelmina zu Braunschweig: 190 pp. (in German, with English summary) ["5.6 Odonata in the Middle Elbe When sampling the macrozoobenthos in the groyne fields with reed vegetation (Bf 110-115) in early summer 2001, a large number of dragonfly imagines were found. The sampling revealed larvae of *Gomphus flavipes* and *Platycnemis pennipes*. Collections of exuviae also prove that *G. flavipes* and *Sympetrum vulgatum* are native to the area under investigation. The native habitat of *P. pennipes* is also probable, but has not yet been proven by exuviae. Imaginal catches in the bank area showed that a relatively high number of *Ischnura*

elegans also live on the edge of the Elbe. Individual specimens of *Calopteryx splendens* and a red-coloured *Sympetrum* sp. were also found. (probably *S. vulgatum*). At the time of this observation, large parts of the riverbank reeds were still under water up to 20 cm. Even if it cannot be clearly proven that these animals originate from the Elbe or from surrounding waters, these observations show that the banks of the Elbe are a potential habitat and could be populated. In contrast to the frequently detected *G. flavipes*, the species mentioned above require pronounced aquatic macrophyte populations. These are needed both for laying eggs and for hatching. The larval habitats are not open sandy areas, as are dominant in the groyne fields, but rather shallow water areas with plants. *P. pennipes* is considered the least demanding of the species mentioned. Here, dead wood is sufficient for laying eggs. The larvae live on soil substrate covered with enemy tritus (Martens 1996). An even more frequent occurrence of this damselfly is therefore most likely to be expected in the section of the Elbe studied. In order to promote the other species, shallow water areas with calm currents and a pronounced reed or aquatic plant vegetation should also be promoted in the future. In this context, it should be noted that a large number of *Persicaria amphibia* populations were found during sampling in early summer 2001, primarily in the upstream area of the groyne root, i.e. near the sampling points cBu-li and dBu-li (Fig. 2.2). It is precisely these hydrophyte populations that are deficient in the Elbe riverbank area, so that in future attention should also be paid to promoting and increasing aquatic plant populations." (Author)] Address: https://leopard.tu-braunschweig.de/servlets/MCRFileNodeServlet/dbbs_derivate_0000313-9/Eggers2006Dissertation.pdf

2007

23705. Pfeiffer, B.; Hanisek, G. (2006): Ovipositing behavior of *Stylurus scudderii* Selys. *Argia* 18(3): 17-19. (in English) ["During separate field investigations in August of 2006 we coincidentally observed *S. scudderii* exhibiting similar ovipositing behaviors on rivers and streams in Vermont and Connecticut. Unlike males, which were obvious and territorial, females would make brief, stealthy egg-laying excursions and then retreat to perches on nearby vegetation or presumably at some distance. These observations may help fill a gap in knowledge of this Gomphidae species. Moreover, the Vermont field observations include males patrolling flooded gravel roads at three sites." (Authors)] Address: Pfeiffer, B, bryan@VermontBirdTours.com

23706. LaCombe, L. (2007): Dragonflies. The Nutshell. Burr Ock Woods Conservation Nature Center Newsletter 21(7): 1. (in English) [General on dragonflies with some reference to folklore.] Address: not stated

2008

23707. Deliry, C. (coord.) (2008): Atlas illustré des libellules de la région Rhône-Alpes. ISBN: 978-2-914817-27-1: 408 pp. (in French) ["This regional atlas is the result of the work of passionate members of the *Sympetrum* association (Groupe de Recherche et de Protection des Libellules). 110,000 items of data have been collected. This illustrated atlas of dragonflies in the Rhône-Alpes region presents each species in the form of a detailed monograph (distribution, biology, ecology, etc.). It describes the different habitats in the Rhône-Alpes region where dragonflies live. In the first part, a general presentation reviews 20 years of surveys."]

(Publisher/DeepL.) Address: BIOTOPE, 22, boulevard Marchal Foch, BP 58, 34140 Mèze, France. www.biotope.fr

23708. Gade, G. (2008): Book Reviews: Dragonflies and Damselflies of South Africa by M.J. Samways. Pensoft, Sofia and Moscow. 297 pp. Price: C39.00 ISBN 978 954 642 330 6. *African Entomology* 16(2): 315. (in English) [review] Address: Gade, G., Dept Zoology, Univ. of Cape Town Cape Town, Southafrica. Email: gerd.gade@uct.ac.za

23709. Kovacs, T.; Godunko, R.J. (2008): Faunistical records of larvae of Ephemeroptera, Odonata and Plecoptera from the Zakarpats'ka Region, Ukraine. *Folia historica naturalia musei matraensis* 32: 87-91. (in English) [Records of the following species are documented: *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Orthetrum brunneum*.] Address: Kovacs, T., Mátra Museum., Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

23710. Oldenettel, J.R. (2008): *Brachymesia herbida* (Tawny Pennant) in New Mexico. *Argia* 20(4): 21-22. (in English) [Bitter Lake National Wildlife Refuge, southeastern New Mexico, USA, 17-VIII-2008] Address: Jerry R. Oldenettel, 499 Farm-market Road, Socorro, NM, 87801, USA. Email: borealowl@aol.com

23711. Schmidt-Halewicz, S. (2008): *Gewässerpädagogik mit einer Grundschule begleitend zu einer Bachrenaturierung*. *NNA-Berichte* 19/2: 54-62. (in German) ["In 2003 and 2004, an educational project was carried out with a primary school and kindergarten to accompany the renaturation of the Markelfinger Mühlbach (city of Radolfzell on Lake Constance). The approximately 100 children experienced and learned a lot about the stream and its inhabitants in the context of around 40 outdoor teaching units. In particular, a water-ecological collection of soil organisms in the stream, which was repeated at three comparison sites over the entire period, was able to demonstrate that the goal of increasing the structural diversity in the water body had been achieved after just one winter. As part of the project, teachers and educators learned enough about the stream to open the door to a sponsorship within the school." (Author/google translate) Larvae of six odonate species were sampled.] Address: Schmidt-Halewicz, Sabine, LimSa Gewässerbüro, Joseph-Belli-Weg 5, 78467 Konstanz, Germany. E-Mail: Schmidt-Halewicz@limsa.de

2009

23712. Nesemann, H.F. (2009): Aquatic benthic macroinvertebrates' biological diversity and their use in habitat quality assessment at the Himalayan hot spots of Ganges River basin. PhD Thesis. Kathmandu University: xv + 204 pp. (in English) ["The present study focuses on the Benthic Macroinvertebrate Fauna of natural running waters and semi-natural stagnant waters of Himalayan region and Lowlands in the Ganges River Basin. Habitat quality assessment using three different biotic scores was applied for 32 sampling sites of running waters and 26 sampling sites of stagnant waters. Benthic Macroinvertebrates were used as bio-indicators. Calculation of water quality was done based on a recently established five-class system, to describe the degree of organic pollution. Sampling localities are covering all longitudinal biocoenotic zones and lateral zones to include the traditionally well defined types of running and stagnant waters of altitudinal range from 54- to 2480 m asl. The im-

pect of natural organic load was studied to describe the variation of Ecological quality classes within different eco-regions. Ecological quality was defined as a result of the water quality class together with the eco-morphology status of the water body. Class I (Excellent) is present only in spring-near headwaters of forested areas or in running waters coming from higher elevations between 490 to 2500 m asl. Class II (Good) and III (Moderate) is the normal reference condition for lowlands and the Gangetic plains. Wetlands, oxbow-lakes and "old" ponds have usually class II or III, independent from the grade of forests due to natural organic load accumulated during monsoon flood. Water quality undergoes seasonal changes from III (moderate) in pre-monsoon to II (good) during and after monsoon. The highest diversity with >30-42 identified taxa per sampling site (Class I) was found in the Rhithron zone of densely forested parts of Nepal, followed with >20-30 identified taxa by the Metapotamon zone (Class II, III) of large rivers in the Gangetic Plains of India. In stagnant water bodies the maximum diversity reaches >30-76 identified taxa (Class II, III) in Nepal and Maharashtra between 197-1170 m asl, whereas the floodplain wetland diversity reaches only 27 taxa (Class III). The proposed use of selected Insect-groups as bio-indicators for Lowlands and Middle Mountains includes colored illustrated catalogue of Odonata, Heteroptera, and Blattodea. 12 families with 31 taxa of Odonata nymphs, 14 families with 27 taxa of Heteroptera nymphs and adults, one family with two taxa of Blattodea nymphs and adults are described and figured with identification characters and ecological habitat observations. This will be the first key based on material mainly from Nepal and India for the Ganges River Basin." (Author) On pages 140-164 many odonate larvae are figured, in most cases on the family level. A total number of 67 larvae of *Epiophlebia laidlawi* were investigated. Nine different size classes can be distinguished by morphological characters and different color pattern of the dorsal side.] Address: <https://d-nb.info/114936646X/34>

2011

23713. Hager, B.; Shields, W. (2011): Use of lakes by *Cordulegaster maculata* (Twin-spotted Spiketail). *Argia* 23 (3): 29. (in English) ["At Cranberry Lake, St. Lawrence County, New York, on 16 June 2009, we found an exuvia of *C. maculata* on one of the docks at the Cranberry Lake Biological Station on Barber Point. Like Bob, we assumed that the larva had originated from a nearby brook (Sucker Brook), the mouth of which was located roughly 240 meters upstream of the exuvia, and probably was swept into the bay during the high water following snowmelt. However, on the following day, we observed a single *C. maculata* ovipositing within 2 meters of where we had found the exuvia. She spent several minutes laying eggs in the shallow water of the bay in a spot where emergent grasses arose. At one point during oviposition she was chased by a male, but returned to continue laying eggs. For the next couple of days, we saw further *C. maculata* activity at this spot—both oviposition and patrols." (Authors)] Address: Hager, Barbara, Cazenovia College, NY, USA. Email: bhager@caznovia.edu

23714. Krotzer, S. (2011): *Argia plana* (Springwater Dancer), a new species record for Alabama. *Argia* 23 (3): 13. (in English) ["On 9 September 2011, I visited Ruffner Mountain Nature Preserve, located within the metropolitan area of Birmingham, Alabama. While there, I walked through a constructed wetland area, created approximately three years ago by altering the flow of an artesian well through a forest

clearing to create a series of three small ponds. While walking along a boardwalk where the spring water from the artesian well flowed through a heavily vegetated grassy area before emptying into the first pond, I noticed a large, brilliant blue *Argia* basking in the sun along the boardwalk at ca. 0830 CDT. It was clearly not any of the *Argia* species known to occur in Alabama, so I netted the specimen for closer examination and determined that it was *A. plana*, Springwater Dancer. During the following 90 minutes I observed 8-10 additional males and 3 females in the same general area. Voucher specimens and photographs were also obtained. By ca. 1030 CDT, temperatures had risen considerably and all individuals had disappeared from the boardwalk, presumably to the thick Vegetation surrounding the small spring inflow. The only other species of odonates seen at this area were *Argia fumipennis*, *Ischnura posita*, and *Plathemis lydia*. *Argia plana*, though common in parts of the southwestern and central United States, is not known to occur east of Missouri or Arkansas. This record represents a significant range extension to the east, and is the first known occurrence of the species east of the Mississippi River. While it is possible that this population could have resulted from an accidental introduction, it does not seem likely. A similar disjunct distributional pattern exists for another odonate species, *Somatochlora hineana*; there is one historical record from northeast Alabama, with the nearest known populations occurring in Missouri."] Address: Krotzer, S., 2238 Haysop Church Road, Centreville, AL 35042, USA. Email: rskrotze@southernco.com

2012

23715. Clarke, D. (2012): Cumbria Dragonfly records and the national Atlas project. *The Carlisle Naturalist* 20(1): 8-9. (in English) [Verbatim: Cumbria Dragonfly records and the national Atlas project 2012 will be the last field recording year of a major project run by the British Dragonfly Society to map Britain's dragonflies for the period 2000-2012. Many more records are still needed from our area. Commoner species are just as important as rarer ones and anyone with a garden pond can help by noting what occurs. Records of emergence are even better, since they prove breeding. Larvae or cast skins are another possibility: undamaged specimens of the latter can be sent to me for identification. The map (figure 1) shows where records are most needed, though inevitably it is not fully up to date. (It is based on data held by the British Dragonfly Society in early April 2012.) Nonetheless, the map is a fair indication of which 10 Km squares are most in need of recording attention: the squares which are numbered being of high priority – with category 1 being highest. Updated versions of this map will be posted on the BDS website from time to time. Squares marked here as 1 or 2 will appear as red and amber squares respectively on the website maps; any squares appearing there in green in this 'traffic light' colour coding system will have received adequate coverage. Please check www.british-dragonflies.org.uk/content/national-dragonfly-atlas. I can be contacted on david.clarke19@virgin.net, or at the address below. Please be aware that records received after December 2012 may be too late for inclusion.] Address: David Clarke, Burnfoot, Cumwhiton, Brampton, CA8 9EX

23716. Torralba-Burrial, A.; Ocharan, F.J.; Anadón, A. (2012): La subcolección de Odonatos (BOS-Odo) de la Universidad de Oviedo: transfiriendo a la sociedad los datos del patrimonio natural albergado. XV Congreso Ibérico de Entomología. 2 a 6 de Setembro 2012, Angra do Heroísmo, Sociedade

Portuguesa de Entomología: 78. (in Spanish) [Verbatim/Google translate: Biodiversity collections, whether of arthropods, other animals or herbaria, whether public or private, contain important data on the present and past distribution of these representatives of our natural heritage. Although the dissemination of such data is common in the form of specific publications or reports, the truth is that systems are needed that allow this knowledge to be transmitted quickly and easily to meet the needs of natural environment managers in public administrations, environmental service companies, the rest of the scientific community and society in general. In this sense, the dissemination of these biodiversity data housed through databases accessible on the Internet greatly facilitates this transfer of knowledge. It is precisely within the framework of the Global Biodiversity International Facility (GBIF), a set of interconnected and coherent international databases, that most of the Odonata subcollection (BOS-Odo) of the Arthropod Collection of the Department of Organismal and Systems Biology of the University of Oviedo has been computerized, through projects of the National R&D&I Plan (MICINN-08-CGL2008-04614-E, PTA2010-4108-1) and co-financing by PCTI Asturias (COF11-38). In addition to facilitating access from the national and international GBIF portals to the biodiversity data associated with the subcollection (more than 15,000 records), a website has been developed that frames and puts the data of the BOS-Odo subcollection into perspective, facilitating individual consultation by species or as a whole, in the same way that it compiles the publications in which funds housed in the subcollection have been treated or used.] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

2013

23717. Karube, H. (2013): Survey of the Vietnamese Chlorogomphidae (Odonata), with special reference to grouping. *Tombo* 55: 13-43. (in English) ["Seventeen taxa of the family Chlorogomphidae were recorded from Vietnam. A full list is provided. The following new subgenera were established: in the genus *Watanabeopetalia* *Matsumotopetalia* subgen. nov. (type species *ojsan* sp. nov.), in the genus *Chlorogomphus*: *Nubatamachlorus* subgen. nov. (type species *nakamurai*), *Vietnamchlorus* subgen. nov. (type species *albo-marginatus*), *Petaliorogomphus* subgen. nov. (type species *takakuwai*). *W.* (M.) *ojsan* sp. nov., *C.* (Neorogomphus) *caloptera* sp. nov., *C.* (Nu.) *aritari* sp. nov., *C.* (Orogomphus) *pi-aocensis* sp. nov., *C.* (Sinorogomphus) *nasutus hamalaineni* subsp. nov. are described and figured *Cas* is the first male of *C.* (S.) *vietnamensis*. *W.* (M.) *usignata*, *C.* (S.) *nasutus nasutus*, *C.* (S.) *tunti* are recorded from Vietnam for the first time." (Author)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

2015

23718. Barve, V.V. (2015): Discovering and developing primary biodiversity data from social networking sites. Dissertation, Geography, University of Kansas: VIII, 90 pp. (in English) ["An ever-increasing need exists for fine-scale biodiversity occurrence records for a broad variety of research applications in biodiversity and science more generally. Even though large-scale data aggregators like GBIF serve such data in large quantities, major gaps and biases still exist,

both in taxonomic coverage and in spatial coverage. To address these gaps, in this dissertation, I explored social networking sites (SNS) as a rich potential source of additional biodiversity occurrence records. In my first chapter, I explored the idea of discovering, extracting, and organizing massive numbers of biodiversity occurrence records now available on SNSs. I presented a proof-of-concept with Flickr as the SNS and Snowy Owls (*Bubo scandiacus*) and Monarch Butterflies (*Danaus plexippus*) as target species. The methods presented in this chapter can easily be used for any other SNS, region, or species group. These approaches are broadly applicable to animal and plant groups that are photographed, and that can be identified from photographs with some degree of confidence (e.g., birds, butterflies, cetaceans, orchids, dragonflies, amphibians, and plants). SNS thus offer a rich new source of biodiversity data. To understand the strengths and weaknesses of biodiversity data, we need effective tools by which to explore and visualize these data. I developed a suite of such tools in an R package called *bdvis*, which is described in chapter two. The package allows users to explore spatial, temporal, and taxonomic dimensions of biodiversity data sets to highlight gaps and identify strengths. In the third chapter, I explored Flickr further as a source of biodiversity data for the birds of the world, to assess the potential of augmenting the largest portal to biodiversity occurrence data, i.e., the Global Biodiversity Information Facility (GBIF). GBIF provides access to ~190 x 10⁶ bird records, compared to ~7 x 10⁶ that I could discover from Flickr, out of which only ~1.3 x 10⁶ were geotagged. However, the Flickr data showed the potential to add to knowledge about birds in terms of geographic, taxonomic, and temporal dimensions, as Flickr data tended to be complementary to the GBIF-derived information. Finally, I developed a case study to investigate the quantity of records existing, and the quality of identifications by users on Flickr. I developed a detailed case study of Indian swallowtail butterflies, and implemented a crowdsourcing platform to recruit identification expertise and apply it to butterfly photographs from the SNS. Results were encouraging, with >93% correct identities for records of this family of butterflies from across India." (Author)] Address: <https://kuscholarworks.ku.edu/server/api/core/bitstreams/75d85a26-46b6-4bf1-b682-c75171f1e531/content>

2016

- 23719.** Bota-Sierra, C.A.; Maufray, B.; Palacino-Rodríguez, F.; Hoffmann, J.; Tennessen, K.; Rache, L.; Tognelli, M.F. (2016): Estado de conservación de las libélulas de los Andes Tropicales. In: Tognelli, M.F., Lasso, C.A., Bota-Sierra, C.A., Jiménez-Segura, L.F. & Cox, N.A. (Eds.), Estado de Conservación y Distribución de la Biodiversidad de Agua Dulce en los Andes Tropicales. UICN Gland, Suiza, Cambridge & Arlington: 67-86. (in Spanish) [Colombia, Ecuador, Peru, Bolivia "5.5 Conclusions and recommendations for conservation: 5.5.1 Exploration and taxonomic studies: This is the starting point for conservation and it is clear that there is a deficit in the area, evidenced by 78 species without sufficient data for evaluation, three of the four countries in the area in resident researchers, about 80 species collected but not yet described (and probably threatened), absence of up-to-date species lists, many groups without recent taxonomic revisions, and much of the territory without group sampling. For this reason, explorations are proposed with the objective of clarifying the status of the species that are in the DD category and, likewise, completing the sampling of the areas in which they have been reported. Although there is a wide sampling of aquatic macroinvertebrates, mainly due to environmental impact studies, the taxonomic resolution of these is very low, barely reaching the family level in most cases, due to the limited time and resources invested in these projects. but also largely because information on larvae is scarce and difficult to use. Therefore, it is recommended to emphasize the study of immature stages and the production of practical taxonomic keys. It would also be very useful to increase the quality of environmental impact studies to include adults and develop indices for the region, similar to the one proposed by Simaika and Samways (2009) for South Africa. It is strongly recommended that workshops, meetings, courses, symposiums and/or regional conferences be held to motivate the study of this group of insects and link the general society with these insects and their conservation problems. Publications are an essential tool for decision-making and conservation planning. However, attracting resources for basic science is quite complicated, so the realization and publication of basic science and dissemination studies, necessary for the development of dentistry in the region, are quite difficult to carry out. It is recommended to promote basic scientific and informative literature, lists, descriptions, reports, taxonomic reviews that will be the basis for any ecological, evolutionary study and/or for future evaluations of the risk of extinction of species.... 5.5.2 Monitoring: To date there is no constant monitoring of any community, species or population of Odonata in the region. It is extremely important to start this type of work, particularly for the species that are reported under some category of threat in this report. ... 5.5.3 Protected areas: When evaluating the 216 endemic species of the area, only 88 (40.7%) were identified as present in some protected area or private reserve, which may be the result of two factors: the first is the low number of studies carried out in protected areas, finding more than half of these without a single report of the order Odonata; the second is the low number of protected areas in the study area, particularly in areas with high anthropic pressure." (Authors/Google translate)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología (INECOL A.C.), Xalapa, Mexico. Email: cornelio.bota@posgrado.ecologia.edu.mx
- 23720.** Egorov, L.V.; Borisova, N.V.; Dimitriev, A.V. (2016): Some data concerning the invertebrate fauna of the nature reserve "Prisursky". Report 3. Scientific works of the state nature reserve "Prisursky" 31: 115-125. (in Russian, with English summary) ["Invertebrates were collected for the field season in 2014-2015 at the National Nature Reserve «Prisursky» and its buffer zone. 23 invertebrate species were discovered for the first time in this reserve's fauna. There is the annotated list of 124 species of invertebrates belonging to 55 families of 3 types in this article." (Authors) The list includes *Calopteryx virgo*.] Address: Borisova, N.V. Russia, Cheboksary, FSBI "Prisursky State Reserve", Chuvash Branch of the Russian Entomological Society, Russia. E-mail: nat-borisova18@yandex.ru
- 23721.** Heilmeyer, H.; Achtziger, R.; Günther, A.; Richert, E.; Wiche, O. (2016): 20 Jahre ökologische Forschung und Lehre an der TU Bergakademie Freiberg – eine Analyse der studentischen Arbeiten (1996-2016) - 20 years of ecological research and teaching at TU Bergakademie Freiberg – an analysis of students' theses (1996-2016). Freiberg Ecology online 1: 4-20. (in German, with English summary) ["In this chapter the 267 student theses (69 study theses, 65 diploma theses, 69 bachelor theses, 44 master theses, 20 dissertations) which were conducted within the Biology / Ecology unit of the Institute of Biosciences and the Interdisciplinary Environmental Research Center (IÖZ) from 1996

to 2016 were analysed by several criteria. According to the specialization of the biology / ecology unit, 75 % of the theses were conducted in the curricula "Geoecology", followed by "Applied Natural Science" with 14 %. About three thirds of the studies refer to plants and/or vegetation (47 %), animals or animal assemblages (24 %) or a combination of both (6 %); the rest were other disciplines or experimental studies. Within the 79 zoological studies, 35 fall upon vertebrates (mainly birds, bats, amphibians, reptiles) and 42 upon invertebrates with 33 studies on some insect groups (Auchenorrhyncha, true bugs, dragonflies). Regarding the main ecological research topics, most studies refer to community ecology (31 %) and ecophysiology (27 %), followed by population biology of selected species (14 %), landscape ecology (13 %) and ecotoxicology (12 %). 70 % of the theses were conducted in terrestrial ecosystems, 22 % in limnic (freshwater) ecosystems, and 3 % in marine environments. Out of the 170 theses that could be assigned to a specific habitat or landscape type, about one third was conducted in post-mining landscapes, followed by standing (15 %) and running waters (9 %), floodplain landscapes (8 %), settlements (7 %), and grassland bio-topes (6,5 %). 120 of the 267 theses were supervised or conducted in cooperation with different partners (research institutions, authorities, companies etc.)." (Authors)] Address: Heilmeier, H., TU Bergakademie Freiberg, Institut für Biowissenschaften / Interdisziplinäres Ökologisches Zentrum (IÖZ), AG Biologie / Ökologie, Leipziger Straße 29, 09599 Freiberg, Germany. EMail: hermann.heilmeier@ioez.tu-freiberg.de

23722. Monteiro Júnior, C. (2016): Padrões de estruturação de adultos de libélulas em uma área de proteção e seu entorno na Amazônia oriental. M.Sc. Thesis, Instituto de Ciências Biológicas, Universidade Federal do Pará: 113 pp. (in Spanish or English) ["Structural patterns of dragonfly adults in a protected area and its surroundings in eastern Amazonia: Dragonflies adult structuring patterns in a protected area and its surroundings in the eastern Amazon: In Brazil is the most protected areas (PA) in the world, and mostly located in the Amazon. Currently, the Amazon biome has 73% of APs Brazil or 111 million hectares, 37% full and 63% use of sustainable use. Despite the large number, biodiversity does not have its assured conservation, since the population increases every year, as well as demands for goods and services that result in modifications of the ecosystems that are often outside or even inside the PAs. So our main objective is to study the Odonata adult structuring patterns in a protected area and its surroundings. For this, the thesis is divided into three chapters held in streams in the eastern Amazon. In the first chapter, our hypothesis was to test whether we would find a greater diversity of species of dragonflies in AP due to greater complexity of habitats. In the second chapter, we tested the hypothesis that there would be high beta diversity due to the high replacement species that is expected to find. In the third chapter, we tested the hypothesis that Odonata would be a weak to moderate substitute for other groups, because of the inherent characteristics of the group, as the great mobility. The study was carried out in 30 streams, 17 located within a protected and 13 in the surrounding area. The results of the first chapter were the largest diversity of Odonata found in the environment, compared with the AP. There were also differences in the species composition of the two environments, and differences between environmental variables between areas. Thus, the combination of the protected area and the surroundings, with a low level of disturbance retains a broad range of specialist species Odonata than just a single area. In the second chapter, there was a high beta diversity in

Odonata both the AP and in the environment, possibly explained by the niche breadth combined with the spatial structure of the environment. In addition, we found that the specific requirement of the species happens associated with a natural variation in the environment, since there was large beta diversity and high turnover in both environments. Even with some environmental change, it was not big or strong enough to exclude all species and therefore they can survive in this environment. In the third chapter, we tested the correlation between adult Odonata with other aquatic groups such as fish, Ephemeroptera and Trichoptera combined (ET) and chironomids in streams of the Eastern Amazon. There was a correlation between species richness and consistency of Odonata of adults with fish and ET, though the strength of these correlations were moderate to low. So we discussed that adult Odonata are a moderate to weak group substitute for other aquatic organisms in streams of the eastern Amazon. Thus, we suggest caution in the use of a single taxon as a substitute for others and for conservation planning, the best would be to use a wide range of taxa, reflecting holistically aquatic biodiversity. Finally, both areas of protection becomes important to maintain the pool of own species of each environment, with our major challenge in the future is to find a way to identify the disturbance levels that would be acceptable to avoid over-exploitation of resources in these areas." (Authors)] Address: Monteiro-Júnior, C.S., Lab. Ecol. e Conservação, Univ. Federal do Pará, Inst. de Ciências Biol., Rua Augusto Correia, No. 1 Bairro Guama, CEP 66.075-110 Belém, Pará, Brazil. E-mail: csmonteirojr@gmail.com

2017

23723. Jaworski, N.; Joest, R. (2017): Schlupfverlauf und Habitatwahl der Gemeinen Keiljungfer (*Gomphus vulgatissimus*) an der Lippe. ABU info 39-40: 27-33. (in German) ["The hatching process and habitat selection of *G. vulgatissimus* was investigated by collecting exuviae from 15 restored and 15 non-restored sections of the River Lippe in the district of Soest (Nordrhein-Westfalen, Germany). The hatching phenology was typical for a spring species. In non-renaturalised sections, 94 exuviae were found, distributed across almost all sampling sites. On renaturalised sections, 65 exuviae were found, although the distribution among the sampling sites varied greatly. On south-facing banks, the species hatched in slightly higher densities and avoided heavily shaded sections. Higher hatching densities were found on slopes with reduced flow velocity and at sites with eddies and eddies. The structure of the riverbed was decisive for the hatching density. The species favoured sandy-muddy areas interspersed with coarse detritus. The rock piles of the non-renaturalised areas were colonised if sufficient finer substrates had been deposited between the stones. Gravel or crushed stone were rarely found in the Lippe and no influence on the hatching density could be determined. However, the species avoided cohesive substrates such as loam, clay and marl." (Author/DeepL)] Address: Joest, R., Biologische Station Soest, Bad Sassendorf-Lohne. E-mail: r.joest@abu-naturschutz.de

23724. Tüzün, N.; Müller, S.; Koch, K.; Stoks, R. (2017): Pesticide-induced changes in personality depend on the urbanization level. *Animal Behaviour* 134: 45-55. (in English) ["Highlights: •Urban and rural individuals differ in their behavioural responses to contamination. •We repeatedly measured activity and boldness before and after a pesticide exposure. •Repeatability of behaviours did not change with

pesticide or urbanization level. •A behavioural syndrome appeared after pesticide exposure in rural individuals. Globally increasing urbanization causes major anthropogenic changes in ecosystems, drastically altering phenotypes of organisms. Increased contamination is a well-known result of urbanization, and its effect on behaviour has been extensively studied. Yet, animal personality, consistent behavioural variation between individuals, has rarely been investigated in the context of anthropogenic contaminants. Changes in personalities may affect the viability of populations, and even alter community dynamics. We investigated the effects of exposure to a sublethal dose of the commonly used pesticide esfenvalerate on two personality traits, activity and boldness, and compared these effects between replicated rural and urban populations using larvae of *Coenagrion puella*. We tested for effects on behaviour at three distinct levels: the average levels of behaviours, the consistency of behaviours (repeatability), and the structure of the behavioural correlations (behavioural syndrome). We found that the pesticide treatment changed the average activity and the behavioural covariation (activity and boldness), but not the behavioural repeatability. Importantly, these pesticide-induced patterns depended strongly on urbanization level. The average activity reduction due to pesticide exposure was only present in urban individuals. Moreover, while a behavioural correlation between activity and boldness in rural larvae appeared only after the pesticide treatment, this activity–boldness syndrome was consistently present in the urban larvae. These differential responses of urban and rural populations may be explained by the apparently more efficient coping mechanism with contaminants of urban populations, as well as the generally more stressful urban habitats. These results highlight the importance of measuring behavioural expressions at various levels when assessing contaminant effects, and not just the means. Further, we suggest that pollution may play an important role in understanding the evolution and maintenance of animal personalities in natural populations." (Authors)] Address: Tüzün, N., Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Leuven, Belgium

2018

23725. Baerdemaeker, A. de; Boer, R. de (2018): Een spectaculaire invasie van witsnuitlibellen. *Straatgras* 30(1): 23. (in Dutch) ["If, as a Rotterdam dragonfly lover, you want to see a white-nosed dragonfly (*Leucorrhinia spec.*), you have to go to the Achterhoek, Limburg, or the Veluwe. At least, that was the case until recently. In 2018, that changed in spectacular fashion. White-nosed dragonflies have discovered the western Netherlands this summer and seem to be popping up everywhere. This is also noticeable in Rijnmond region and the rest of South Holland. What is going on here? Vulnerable *Leucorrhinias* are vulnerable dragonflies that we know mainly from the best nature reserves in Europe. In the Netherlands, we know of five species, all of which have a white nose, and which rarely turn up in South Holland. *Leucorrhinia dubia* and *L. rubicunda* are the most common in the Netherlands. They are specialists of acidic fens on higher sandy soils. The three other species are scarce in our country. They are protected at European level: *Leucorrhinia caudalis*, *L. pectoralis* and *L. albifrons* are listed in the European Habitats Directive. They are critical species that occur on still water of good quality with rich (underwater) vegetation. They are critical species that occur on still water of good quality with rich (underwater) vegetation. *L. pectoralis* seems to be the most widespread of all the *Leucorrhinia* species this year. It was noted throughout the

province, with an emphasis on the dune areas. Within the municipal boundaries of Rotterdam, *L. pectoralis* were observed in Hoek van Holland, Groot-IJsselmonde, and the Schiebroek park. Just outside the city, it also turned up, including in Rhoon and Ridderkerk. At the latter location, it was even observed depositing eggs. The greatest spectacle came from *L. caudalis*. For a long time, this species was absent in the Netherlands, until a wandering male in Limburg put an end to that in 2006. In 2010, a reproducing population settled in the Weerribben (Van Grunsven 2018). In South Holland, *L. caudalis* was never recorded before 2017 (Reemer 2002). In that year, a specimen was found in a residential area in Zoetermeer (Vos 2017). The picture completely reversed in 2018. Territorial males have been identified in several places in South Holland: in Ridderkerk, Wassenaar, the Biesbosch and the Nieuwkoopse Plassen, they were sitting on the floating leaves of water lily and yellow plump. *Leucorrhinia dubia* is not the end of the party. *L. dubia* also made its appearance in the region. On 16 May 2018, a female was seen at a pond along the A15, near Rhoon. On 26 May, a male was photographed in the dune area near Monster and on the 30th, another one in the Kapittelduinen near Hoek van Holland. The latter is the first and only case of this species in the municipality of Rotterdam. We don't know how this invasion came about. Maybe that will come one day. In any case, it is a startling sight, all those rare whitethroats in the region. What we find strange is that *L. rubicunda* seems to be completely absent from the Rotterdam region, while it is participating elsewhere in the province. Perhaps we are not paying close enough attention." (Verbatim/DeepL)] Address: André de Baerdemaeker [ecoloog, Bureau Stadsnatuur; debaerdemaeker@bureau-stadsnatuur.nl]

23726. Borisova, N.V.; Martynov, E. P. (2018): Materials on the fauna of dragonflies (Odonata) of the Chuvash Republic. Scientific works of the national park "Chavas Varmane" 6: 55-66. (in Russian) ["Based on literary and original data of the authors, an annotated list of 50 species of dragonflies from 8 families discovered in 1956-2016 on the territory of the Chuvashia Republic is provided." (Authors)] Address: Borisova, N.V. Russia, Cheboksary, FSBI "Prisursky State Reserve", Chuvash Branch of the Russian Entomological Society, Russia. E-mail: nat-borisova18@yandex.ru

23727. Holmen, M. (2018): Stor kærguldsmed (*Leucorrhinia pectoralis*). Forekomst i habitatområder 1995-2018. <https://mst.dk/media/5rnpu3no/stor-kaerguldsmed.pdf>: 53 pp. (in Danish) [Documentation of Danish records of *L. pectoralis* between 1995-2018.] Address: <https://mst.dk/media/5rnpu3no/stor-kaerguldsmed.pdf>

23728. Ilie, A. L.; Marinescu, M. (2018): New researches regarding the dragon-flies (Insecta, Odonata) from the Tinca area (Bihor county, Romania). *Annals of the University of Oradea, Fascicle: Ecotoxicology, Animal Husbandry and Food Science and Technology* 17/B: 245-248. (in English) [Between 2009-2018, 49 odonate species were identified. The list of species includes *Nehalennia speciosa*, *Ophiogomphus cecilia*, *Aeshna grandis*, *A. juncea*, *Leucorrhinia pectoralis*, *Cordulegaster boltonii*, and *Sympetrum flaveolum*.] Address: Ilie, A. L., Nicolae Jiga Theoretical High School, 36A Republicii St., Tinca, Romania. E-mail: aurelian_ilie@yahoo.fr

23729. Jung, S.-W.; Kim, Y.H.; Kim, H.-M.; Kim, S.-H. (2018): Biodiversity and characteristic communities structure of freshwater ecosystems in the western area of DMZ, Korea. *Korean Journal of Environment and Ecology* 32(6):

603-617. ["This study surveyed the diversity and community characteristics of benthic macroinvertebrates and freshwater fish, which are the main animal classifications in a hydro ecosystem, from May to September 2017 in the western plains of the Demilitarized Zone (DMZ). The results showed a total of 125 species of benthic macroinvertebrates belonging to 66 families, 19 orders, and four phyla in the streams and wetlands. Among benthic macroinvertebrates, Coleoptera (27 spp.: 21.60%) was the largest group in terms of species richness followed by Odonata (26 spp.: 20.80%), non-Insecta (22 spp.: 17.60%), and Hemiptera (11 spp.: 8.80%) occupying in the lentic area. Of the feeding function groups (FFGs), predators (51 spp.: 56.67%) showed a relatively larger presence, indicating the dominance of hygrophilous invertebrates that usually inhabit the freshwater wetlands or ponds. Of the habitat oriented groups (HOGs), climbers (33 spp.: 24.44%) and burrowers (17 spp.: 12.59%) were the dominant groups. This observation is typical in a slow flowing habitat and can lead to the disturbance of the ecosystem due to cannibalism among predators. Cannibalism can be caused by stress induced by various population and environmental factors. For the ecosystem services benchmark (ESB) value, site 13 appeared to be the highest with 82 marks while other sites showed relatively lower rates and indices (III water quality class with a-mesosaprobic). The analysis result of stability factors showed that almost all sites were evaluated to be the I characteristic group with high resilience and resistance or the III characteristic group that was sensitive to environmental disturbance and formed uneven and unstable communities. Of the freshwater fishes, 46 species (3,405 individuals) belonging to 39 families and 18 orders were identified in all the investigated sites. Among them, Cyprinidae (30 spp.: 65.2%) was the largest group, and *Zacco koreanus* was identified as the dominant species (728 individuals, 21.4%). The survey of freshwater fish communities found both stable communities (sites 7 and 13) with low dominant index (0.39) and high diversity index (2.29) and unstable communities (sites 2, 3, 8, and 10) in opposite tendency. This survey found five Korean endemic species, 17 species belonging to the export controlled species, two endangered species level II (*Lethocerus deyrollei* and *Cybister chinensis*), and rare species (*Dytiscus marginalis czerskii*) among benthic macroinvertebrates. The survey also found an invasive species, *Ampullarius insularis*, which was distributed throughout the whole area and thus can continuously disturb the ecosystem in the western plain area in the DMZ. Of freshwater fish, one natural monument (*Hemibarbus mylodon*) and three endangered species level II (*Acheilognathus signifer*, *Gobiobotia macrocephalus*, and *G. brevibarba*) were observed. The survey also found four introduced species (*Pomacea canaliculate*, *Carassius cuvieri*, *Lepomis macrochirus*, *Micropterus salmoides*) in the western DMZ area, indicating the need for the protection and conservation measures." (Authors)] Address: Kim, S.-H., National Institute of Ecology, Seocheon 33657, Korea. Email: ksh0814@nie.re.kr

23730. Stille, M.; Stille, B. (2018): The Dragonflies of Corfu. International Dragonfly Fund - Report 116: 237 pp. (in English) ["Many odonatologists have visited Corfu over the years and species have regularly been added to the list of resident dragonflies, but only a few of these additions can be counted as recent arrivals. In 1983 only 23 species were reported, compared to the in total 43 reported and the 39 found here today. An additional three species, *Sympetrum flaveolum*, *Enallagma cyathigerum* and *Lestes macrostigma* were reported from the island in the early 1900s, but these have not been found since and may well have disappeared. A fourth species, *Ceragrion georgifreyi*, was reported in 1971, but

the area where it was found has been much altered in recent years and we have not been able to find it there or anywhere else on the island. However, as it prefers habitats such as seepages and small streams it may still exist in areas that are difficult to find or hard to reach, but it is also possible that it has disappeared due to habitat loss. The later additions to the island's dragonfly fauna, *Trithemis annulata* in 1994, *Selysiothemis nigra* in 2009 and *Lindenia tetraphylla* in 2014 are all heat-loving species with migratory tendencies that most probably have colonised the island recently. The first is an aggressive species that has spread to many waters on the island, while the other two are confined to a reservoir in the south. *S. nigra* population seems to be well established, but it is still too early to tell if the same is true for the Bladetail. One of the goals of this book has been to find out how different species are distributed on the island, and to get a first indication of species incidence. Corfu has a high dragonfly species richness (many species present), but the number of species varies considerably between localities or habitats and some species have high incidence, i.e. are found in many localities, while others are restricted to a few. This is expected since many species have different requirements, and some are more tolerant and more generalistic in their choice of habitat, while others are much more restricted or specialized. As can be seen from Appendix II, the incidence for the different species varies between one and 33 localities. *Platycnemis pennipes* is, by far, the most common species with both high incidence (found at 33 (45 %) of the 74 localities) and high abundance, i.e. many individuals are found at each locality. This species was considered abundant already back in 1983 and it is most probably favoured by the rich occurrence of bramble and similar types of vegetation found growing all over the island. On Corfu, this species seems to prefer waters with richly vegetated banks situated in areas with shrubbery nearby, but it also occurs in quite deeply shaded areas (note that all references to abundance are only rough estimates and that no actual counting of imagines has, as of yet, been undertaken). *Orthetrum coerulescens* is the second most common species and it is found in relatively open habitats and in both running and standing waters. It is abundant and often co-occurs with species such as *O. brunneum* and *Libellula fulva*, to mention but a few. Both species are abundant when found. *Calopteryx virgo* is another common species with high incidence and so are *Ischnura elegans* and *Crocothemis erythraea*, but the latter is less abundant. Among the Darters *Sympetrum striolatum* lives up to its name being the most common. It occurs in great abundance during autumn and quickly colonizes waters where vegetation has been cleared so that sun and light can reach the water surface. Six species are found at five (7%) localities or less, and of these *Anax ephippiger* is a migratory species that has only been recorded by us once, and it is doubtful if it reproduces on the island. *Lindenia tetraphylla* and *Selysiothemis nigra* are recent arrivals and the latter is abundant and seems to have become well established at the Moschopoulou Reservoir in the south of Corfu. *L. tetraphylla* occurs at the same water but is much less abundant, only five to ten individuals have been observed at each survey. *Sympecma fusca* is a widespread species throughout Europe and can be found in nearby Albania and on the Greek mainland. It was reported from Corfu in 1939 but was considered to have disappeared. However, we have found it, but at another location than that from where it was originally reported. It is possible that this species is present in other places on the island but has been overlooked since it is very inconspicuous, both in colour and behaviour. It flies low in the vegetation, which turns yellow and dry quite early in the season, and the dragonfly can therefore be difficult to spot. *Coenagrion scitulum* was not reported from Corfu until 2012 when it was observed at two localities,

Gaidarana in central Corfu and the Moschopoulou Reservoir near Kavos in the south. It was found in very low abundance when first encountered, as has been the case when we resurveyed the same localities. We have so far not encountered it at any of the other surveyed waters. *C. scitulum* has a patchy distribution in Europe and it prefers sunny, standing or slow flowing waters rich in aquatic vegetation and these habitats are not common on Corfu anymore. The adults we have encountered flew quite a distance from the water and it is possible that they spread out over nearby areas to hunt. They may also be difficult to find if you do not survey the area at the right time, i.e. either when they first emerge or when they mate. This may well be a rare and threatened species on Corfu, but the areas around Gaidarana and Gavrolimni have to be more thoroughly surveyed to be able to establish their status. *Coenagrion puella* is another uncommon species that has only been reported from the Fonissa River. This species also occurs in low abundance and a larger stretch of this long river and its tributaries (The Melissoudi River system) need to be surveyed in many different areas to be able to assess its status. *C. puella* reproduces in a variety of waters in Europe but prefers waters with aquatic vegetation. *C. pulchellum* is much scarcer in Europe than *C. puella*, but on Corfu the opposite seems to be the case and it has both a higher incidence (four localities, 5%) as well as a higher abundance. This species is especially abundant in the Ropa River in areas close to the golfcourse, but dredging and clearing of vegetation on the river banks have been carried out in the summer of 2017, and it is too early to tell if this will affect this and other dragonflies in the area negatively. *Erythromma lindenii*, *Caliaeschna microstigma* and *E. viridulum* are other species with low incidence, but with either moderate or high abundance when encountered. It is, at least theoretically, possible that some of these species may be found in additional places since there are potentially suitable waters still to be surveyed. *Calopteryx splendens* was believed to have disappeared from Corfu when the island's dragonfly fauna was reviewed in 2010. It had then not been reported since 1965 and only from one locality in the south. We have encountered this species at three localities and at two of these it co-occurs with its close relative, *Calopteryx virgo*, which is Corfu's third most common dragonfly and also the most abundant of the two. Furthermore, *C. virgo* is more shade-tolerant and therefore able to breed in larger stretches of the rivers, while *C. splendens* needs more open or somewhat wider parts of the river to thrive. It is possible that it used to be more common in areas closer to the mouth of some of the rivers, but that these areas either have become too developed or too polluted for the dragonflies to be able to breed there. *Pyrrhosoma elisabethae* is listed as a Critically Endangered species in the European and the EU27 Red Lists and as Endangered in the Mediterranean one. It was reported from the Perama area in 1978 and 1981, but it has not been found there again in later conducted surveys. It has also been reported from other localities where it later seems to have disappeared. We have recorded it at six localities so far, all small runlets with richly vegetated banks shaded by trees, but these localities also have adjacent semi-shaded meadows where the dragonfly can be found hunting in the vegetation. To be able to survey this species, the time of its emergence must be pinpointed and areas adjacent to or beyond the breeding waters examined. *Gomphus schneiderii*, *Onychogomphus forcipatus* and *Somatochlora meridionalis* are examples of dragonflies that have been found at new localities as more surveys have been conducted. The abundance of *O. forcipatus* is moderate, while the other two species only have been encountered a few at the time in each of the localities. All of the above species fly in shaded areas, but *O. forcipatus* utilizes more open

locations such as small sunny glades along an otherwise shaded river. *Somatochlora flavomaculata* has a patchy distribution in south-eastern Europe and this is also the case on Corfu. This species flies in the reed belt of small ponds or lakes and is never encountered in abundance. Many of the localities that were visited and surveyed by odonatologists between 1940 and 1980 have changed considerably over the last decades. The area surrounding the wetlands at the Chalikiopoulou Lagoon has been heavily developed and so has the nearby Perama area. The coastal wetlands at Gouvia and Ipsos have shrunk due to the rapidly increasing tourism and the construction of hotels and other tourist venues. The same applies to the long stretch of wetlands along the northern coast from Acharavi to Sidari. The Ropa Valley previously contained extensive wetlands, but it has been drained for cultivation on several occasions during the 19th century. Some areas of the island have not been surveyed until quite recently and it is therefore impossible to draw any conclusions on the previous status of the species found there today. The Corfu landscape is hugely influenced by human activities. Olive cultivation on a large scale was introduced by the Venetians in the 1700s and today olive groves cover large parts of the island. Drainage of wetlands and meadows has been carried out for centuries and open ditches and drainage canals are found in most of the valleys. Travellers have always been drawn to the island, but serious tourism did not begin until the 1960s and 70s. Today tourism is the main source of income and according to the Hellenic Statistical Authority (ELSTAT) about 1,4 million people visited the island in 2016, counting only people arriving via the airport (including both domestic and international passengers). In addition, approximately 800 000 embarking passengers (including Corfu residents) arrived on ferries, and of the approximately 600 000 cruise-ships passengers some 60% embarked. The resident population has also increased during the last 30 years and many areas, as mentioned above, are heavily developed today. The seasonal and the permanent increase of people have both not only led to the destruction of many dragonfly habitats, but has also put severe pressure on the island's water supply and garbage handling. The average annual precipitation on Corfu is high (around 1100 mm), but there is substantial variation between years. The effect of the increasing temperature on the water situation is unclear but may well be a negative factor due to e.g. higher water evaporation. Precipitation for December 2016 and 2017 was exceptionally low (3 mm) and in combination with the hot summer of 2017 this caused many of the small ponds and lakes, which normally contain water permanently, to dry out completely. Fortunately, the winter of 2017-18 has been wet so there is hope that the groundwater level will be restored and that there will be enough water for the dragonflies and other aquatic fauna to be able to breed successfully. This said, there is a serious and urgent need to take measures to preserve the island's water-supply and to decrease the amount of water consumption. Pollution of waters is another problem and even if there is no heavy industry on the island, waters get polluted by sewage from households and hotels. If large amount of waste water from olive-presses are allowed to drain directly into rivers and other waters, it may become a risk to the aquatic fauna, which may suffocate when oily water becomes trapped in stretches of the river where pools of standing water are formed. Agricultural pesticides and the occurrence of eutrophication are other occurring problems, as are infilling of small ponds and temporary wetlands by rubble and garbage. It is not only the pollution and loss of waters that have become a problem on Corfu, but also the constant increase in the amount of garbage accumulating on the island and the lack of a functioning and sustainable

disposal or recycling of household and hotel waste. The current, 30-year-old, garbage landfill, which has been declared illegal, is situated in the Onofrius Valley, a very sensitive area with several small lakes, ponds and wetlands. It is highly probable that the leakage from the landfill has negatively affected the quality of the waters in this area. Adding to the problem is the apparent lack of respect or regard for natural waters in general. Fly-tipping is common, and garbage is often disposed of in storm-drains, small rivers and ponds. Some small coastal wetlands are filled-in by seaweed that is removed from the beaches as the importance of those waters for the island's amphibious fauna is not understood and respected. Many of the small wetlands on the island are actually protected by Greek domestic legislation, a fact that does not seem to be generally known. Free access to clean water is something that many people take for granted, and water is often freely wasted without thinking about the consequences. In times of increasing temperature and tourism this behaviour is irresponsible, especially not on a small Mediterranean island. Corfu may be blessed with high winter rainfall, but if the consumption and pollution of water continue the situation may soon become severe, not only for the resident dragonflies and other aquatic fauna, but also for people and especially for those depending on tourism for their livelihood. This also relates to the garbage problem where a sustainable solution is critical and must be dealt with quickly, both for the sake of the island's fauna and for the sake of the people living here." (Authors)] Address: Email: nathist.corfu@gmail.com

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23731. Bonthuys, J. (2019): Dragonfly study provides new tool to determine freshwater health in Africa. *The Water Wheel March/April 2019*: 12-15. (in English) [<https://journals.co.za/doi/pdf/10.10520/EJC-14b98b4733>] Address: not stated

23732. Borisova, N.V.; Karolinskiy, E.A.; Egorov, L.V. (2019): *Orthetrum brunneum* (Fonsolombe, 1837) (Odonata: Libellulidae) - A new species for the fauna of Chivashia. *Scientific works of the state nature reserve "Prisursky"* 34: 82-85. (in Russian, with English summary) ["Material. Yalchik district, env. With. Eshmikeevo, YAU GPZ: 1) 55°01'30"N, 47°54'19"E, 19.VI.2019, stream at the foot of the steppe slope, 1 ♂, Egorov L.V.; 2) 55°01'35"N, 47°54'06"E, 22.VI.2019, p. Ende-binka (Surinsky) (Fig. 1–2), 2 ♀♀, 4 ♂♂, Borisova N.V.; same place, 3.VII.2019, 2 ♀♀, 11 ♂♂, 1 tandem, Borisova N.V.; *ibid.*, 27.VII.2019, 1 tandem, 2 ♂♂, Borisova N.V.] Address: Borisova N.V., Cheboksary, Federal State Budgetary Institution "Prisursky State Nature Reserve", Chuvash branch of the Russian Entomological Society, natborisova-18@yandex.ru

23733. Cherpitel, T.; Herbrecht, F.; Lehebel-Peron, J.-B. (2019): Déclinaison régionale du plan national d'actions en faveur des Odonates des Pays de la Loire. Mise à jour de la répartition des espèces. Bilan 2012-2017. Version 2. Rapport du GRECIA pour la DREAL Pays de la Loire: 14 pp. (in French) ["The version of the National Action Plan for Odonata (PNAO) in Pays de la Loire, written by GRECIA, the structure that is currently its facilitator, was validated by the Regional Scientific Council for Natural Heritage on November 20, 2012. As early as 2012, some anticipated actions had already been put in place, but the actual animation officially began in 2013. The document can be downloaded from the National Action Plan for Odonata website (<http://odonates.pnaopie.fr/>). Many actions concerning knowledge of the distribution of Odonata have been carried out by various

structures (see acknowledgements) and many observations have also been made by the regional volunteer naturalist network. The maps presented here are the result of this collective work. As a reminder, the regional version concerns 15 species, 9 of which are retained at the national level and 6 others, of regional interest, having been added. In order to draw up an initial assessment of the decline in Pays de la Loire, if only in terms of advances in knowledge, the species distribution maps have been updated, with the addition of the period 2012-2017." (Authors) <https://side.developpement-durable.gouv.fr/ACCIDR/doc/SYRACUSE/408910>] Address: Groupe d'Etude des Invertébrés Armoricaïns (GRECIA) (Antenne des Pays de la Loire – 5, rue du Général Leclerc - 44390 Nort-sur-ERDRE)

23734. Delsinne, T. (2019): Suivi des populations de *Coenagrion lunulatum* et *Leucorrhinia dubia* du Parc Naturel Régional Livradois-Forez 2018-2019. - Second volet du Plan Régional d'Actions en faveur des Odonates en Livradois-Forez. Rapport réalisé par la Société d'Histoire Naturelle Alcide-d'Orbigny pour le Parc Naturel Régional Livradois-Forez (PNRLF): 262 pp. (in French) ["*C. lunulatum*, and *L. dubia*, are two species of dragonflies linked to high altitude peaty environments. The first reproduces in ponds poor in fish and having a significant hydrophyte cover as well as developed helophyte belts. The second reproduces here in high marshes where there are continuously flooded peat bogs, with a preference for those which are partially recolonized by sphagnum moss. The national strongholds of the populations of these two species are in Auvergne and they both have an unfavorable Conservation Status on a regional and national scale. The region therefore has a strong responsibility with regard to their Conservation. As part of the Regional Action Plan (PRA) in favor of odonates, and following the identification of the stations of *Coenagrion lunulatum* and *Leucorrhinia dubia* within the Livradois-Forez Regional Nature Park, monitoring of the populations of these two species was carried out in 2018 and 2019. We thus carried out the following tasks: A. 2018 and 2019 monitoring of the two known sites of *C. lunulatum* (Etang de la Fargette and Lac de Malaguet), with a minimum of 3 passages per year. B. 2018 and 2019 monitoring of the three known breeding sites of *L. dubia* (Balayoux, Baracuchet and Pradoux peatlands). The Pialoux peat bog was also prospected but without discovering the species. Again, a minimum of 3 passages per year were carried out. C. Prospecting or discussion of 38 potential *C. lunulatum* sites in continuation of the effort initiated during the first part of the PRA. D. Proposal for conservation management measures. In total, 515 imago occurrence (presence) data were accumulated, relating to 44 species of dragonflies. Furthermore, 2523 exuviae were collected belonging to 13 species of Anisoptera, including 71% (1798) to *L. dubia*. The most frequently observed dragonfly species were *Pyrrhosoma nymphula*, *Coenagrion puella*, *Enallagma cyathigerum* and *Platycnemis pennipes* for Zygoptera, and *Libellula quadrimaculata*, *Cordulia aenea* and *Anax imperator* for Anisoptera. Our surveys confirmed the presence of a viable and reproductive population of *C. lunulatum* at Etang de la Fargette, with several dozen males (>80) and tandems observed at the peak of the flight period. On the other hand, *Fespece* was not found at Lake Malaguet. In 2018, our surveys in Livradois led to the discovery of *Fespece* at a new station, the Marchaud pond, with 2 to 4 males observed but without proof of autochthony. It is likely that this was a recent colonization by individuals dispersing from La Fargette, located 3.5 km from Marchaud. In 2019, Fetang was dry and *Fespece* was not found there. Monitoring carried out in 2018 and 2019 on the three *L. dubia*

peatlands confirmed the presence of the species and its good reproduction (observation of tandems, clutches, larvae, exuviae). The order of magnitude of the number of territorial males on each peat bog does not seem to vary greatly (a few dozen at most observed during a visit). On the other hand, the collection of exuviae highlights differences in productivity: Balayoux: 1036 exuviae, Baracuchet: 500 exuviae, Pradoux: 262 exuviae. These can be explained at least in part by the more or less significant presence of emerged and submerged sphagnum moss on the periphery of the holes used by the species. In Pradoux, the healing of the pits is almost complete and it is likely that the attractiveness of this peat bog is declining. Our surveys also made it possible to improve knowledge on the distribution of several little-known species from Livradois or Forez and our data suggest an expansion of the altitudinal range of species with Mediterranean affinity such as *Coenagrion scitulum*, *Anax parthenope* and *Sympetrum fonscolombii*. In addition, new sites were discovered for some heritage species such as *S. danae*, *S. flaveolum*, and especially, *Somatochlora arctica*. Indeed, the collection of exuviae made it possible to demonstrate the importance of the Pradoux and Pialoux peatlands for the reproduction of this latter species. Conversely, our observations indicate that *Coenagrion hastulatum* is rare and should be the subject of action. Conservation. The main threats identified for *C. lunulatum* are: - Isolation of the only known perennial population in Livradois (Etang de la Fargette). - Lack of sites with essential habitats for the species. - Intensive fish management of ponds and its consequences (disappearance of hydrophytes and helophytes, excessive predation, etc.). - Low number of stations in Forez Auvergne. - Low number of favorable friends within a single Station. - Relative isolation of stations, not favoring the exchange of individuals and functioning in the form of a viable metapopulation. - Unfavorable development of the gouilles at Pradoux (closure and landfall of peat pits via recolonization by sphagnum moss). In order to combat these threats, we recommend: (1) Ensure that current sites and their integrity are preserved. (2) Inform and raise awareness among all stakeholders linked to water (politicians, owners of ponds and peatlands, managers, users including fishermen, etc.) on the problems of these species and dragonflies in general. (3) Increase the number of stations likely to accommodate these species. For *Coenagrion lunulatum*, this mainly involves the establishment of a network of ponds with at most a light load and ecologically balanced fish populations, accompanied by a careful drying regime. For *Leucorrhinia dubia*, this involves the creation of new peat pits at strategic distances allowing, among other things, regular exchanges of individuals between existing stations. (4) Increase the number of bogs favorable to *L. dubia* within the three peat bogs currently hosting it. (5) Control populations and the effectiveness of restoration or habitat creation operations through regular odonatological monitoring." (Author/google translate)] Address: <http://groupeodonatauvergne.fr/wp-content/uploads/2021/01/Rapport-Odonates-PNRLF-16122019.pdf>

23735. Garcia, T.D. (2019): Ecomorfologia e dieta como ferramentas ecológicas para análises da influência das condições ambientais nas assembleias de peixes de riachos neotropicais. MSc thesis, (mestrado em Ecologia de Ambientes Aquáticos Continentais) - Universidade Estadual de Maringá, Dep. de Biologia: 32 pp. (In Portuguese, with English summary) ["Ecomorphology and diet as ecological tools for analysis of the influence of environmental conditions on fish assemblages of neotropical streams: In the current scenario, streams are subjected to several negative effects

caused by the rapid expansion of urban centers. The use and occupation of the soil by humans alter the dynamics and functioning of these ecosystems, compromising their structure and modifying their ecological interactions. Thus, the objective was to evaluate if the environmental conditions resulting from human activities negatively affect the variability of ecomorphological traits of fish assemblages in urbanized and non-urbanized streams. Samplings were carried out in 10 neotropical streams (urbanized and non-urbanized), with the aid of electric fishing. A total of 22 linear morphological measures related to trunk, fins, head and mouth were used to calculate the ecomorphological indices. For quantification of alimentary contents, the volumetric method and frequency of occurrence were used, being combined in the alimentary index. Significant differences in the variability of ecomorphological features between urbanized and non-urbanized streams were observed. When evaluating the relationship between environmental variables and ecomorphological traits, we observed 16 significant correlations. The analyzed species consumed 22 types of food resources, being detritus, Trichoptera larvae, vegetable, fruits and seeds, larvae of Simuliidae and Chironomidae the most consumed items. Of these, larvae of Odonata, Coleoptera terrestre, Lepidoptera terrestre and Isoptera stood out as exclusive items in the diet of fish caught in non-urbanized environments." (Author)] Address: <https://aquadocs.org/handle/1834/15366>

23736. Gorb, S.N.; Gorb, E.V. (2019): Egg-laying job makes males hot: body temperature measurements in egg-laying tandems of the dragonfly *Sympetrum vulgatum* using IR camera. *Naturwissenschaften* 106(7-8):40. doi: 10.1007/s-00114-019-1639-4.: (in English) ["Tandem oviposition, where males guide females in contact, requires quite a substantial muscle activity from males and, therefore, stronger heat production within the male thorax compared to the female thorax. In the present study, an infrared camera equipped with a macrolens was applied in the field, in order to estimate temperature in different body regions of male and female *Sympetrum vulgatum* laying eggs in tandems. In both sexes, the thorax was considerably warmer than other body parts. The male thorax was on average 3–4 °C warmer than that of the female. These observations support previous data that *Sympetrum* males have a stronger muscular activity and heat production in tandem during the egg-laying process compared to females. The data provide additional evidence that this kind of contact guarding behavior during oviposition is rather costly for males. The tip of the male abdomen was much warmer than its own abdomen in the middle region. This result might be explained by possible heat transfer from the female head to the male abdomen through the contact between male abdominal appendages and the female head. An alternative explanation might be strong activity of the muscles controlling male anal appendages. Finally, this study also demonstrated a strong potential of IR cameras in field studies of dragonfly behavioral physiology." (Authors)] Address: Gorb, S.N., Dept of Functional Morphology and Biomechanics, Zoological Institute, Kiel University, Kiel, Germany

23737. Lee, D.J. (2019): The water-to-air respiratory transition of amphibiotic dragonflies. M.Sc. thesis, Department of Zoology, University of British Columbia: 63 pp. (in English) ["The transition from water-breathing to air-breathing is perhaps one of the greatest achievements in animal evolution, as it allowed them to colonize land and occupy new environmental niches. Numerous studies have investigated the respiratory adaptations that must have accompanied this respiratory transition in vertebrates and crustaceans,

and have reached the conclusion that water-breathing animals have adapted to low levels of blood CO₂ partial pressure (PCO₂) and HCO₃⁻ while air-breathers have adapted to high levels of PCO₂ and HCO₃⁻, and that all animals making this transition follow this trend. However, the insects originated on land as air-breathers, and certain lineages subsequently evolved water-breathing capacities to become aquatic. As a result, the insects must have faced and overcome different challenges during their invasion of water compared to vertebrates and crustaceans that were ancestrally water-breathing and secondarily became air-breathers. However almost nothing is known regarding the respiratory transition of insects, and it remains to be seen whether the conclusions based on vertebrates and crustaceans are applicable to insects. This thesis is the first to explicitly investigate the respiratory physiology of insects during the transition from water to air, in order to examine how similar or different it is to that of vertebrates and crustaceans making the same transition. By measuring the total CO₂ (TCO₂) content of dragonfly nymphs and adults, it was revealed that the magnitude of TCO₂ increase from water-breathing to air-breathing is very minor in these insects compared to that experienced by vertebrates and crustaceans. In addition, quantifying the acid-base status of dragonfly hemolymph showed that the change from water-breathing to air-breathing elicits modifications of the hemolymph chemistry that are not seen in vertebrates and crustaceans. The data presented in this thesis provide strong evidence that the respiratory transition of dragonflies from water to air is different from that observed in vertebrates and crustaceans, and questions the current consensus that all animals experience the same shift in blood PCO₂ and HCO₃⁻ during the transition from water to air." (Author) *Anax junius*, *Aeshna multicolor*, *Libellula quadrimaculata*, *L. forensis*] Address: <https://open.library.ubc.ca/media/download/pdf/24/1.0378037/4>

23738. Márquez, J.A.; Principe, R.E.; Berejnoi, D.E.; Rodríguez, J.S.; Bedano, J.E.; Molineri, C. (2019): Dragonflies and damselflies (Odonata) from Córdoba and San Luis provinces, Argentina. *Check List* 15(2): 327-337. (in English) ["19 geographical records for species of Odonata in 2 provinces of Argentina are documented. We provided records for 9 newly recorded species for Córdoba: *Lestes spatula*, *Andinagrion peterseni*, *Argentagrion ambiguum*, *Erythemis attala*, *Erythemis plebeja*, *Erythrodiplax media*, *Micrathyrina longifasciata*, *Micrathyrina hypodidyma*, and *Tramea cophysa*. In San Luis, we provided records for 10 newly recorded species: *Hetaerina rosea*, *Acanthagrion lancea*, *Ischnura fluviatilis*, *Oxyagrion rubidium*, *Castoraeschna decurvata*, *Rhionaeschna pallipes*, *Phyllocycla argentina*, *Erythrodiplax corallina*, *Perithemis mooma*, and *Planiplax erythropygia*. Among these records, we extend the geographic distribution of *A. peterseni* and *R. pallipes*, which are endemic to Argentina and recorded *P. erythropygia* for the first time in Chaco phyto-geographic province." (Authors)] Address: Márquez, J.A., CONICET, Consejo Nacional de Investigaciones Científicas y Técnicas, Departamento de Ciencias Naturales, Universidad Nacional de Río Cuarto. Ruta Nacional 36 Km 601 X5804BYA, AP N° 3, Río Cuarto, Córdoba, Argentina. E-mail: javier.marquez.zoologia@gmail.com

23739. Polovic, L. (2019): Makrozoobentos lokvi Dugog otoka - Benthic macroinvertebrates of the ponds on Dugi otok island. Graduation Thesis, Department of Biology, Faculty of Science, University of Zagreb: V + 47 pp. (in Croatian, with English summary) ["The aim of the study was to determine the dominant macroinvertebrate taxa, to determine the age structure of the species *Sympetrum fonscolombi*, and to

compare their size with the ecological factors at each site. In the spring and autumn of 2017 and summer 2018, I conducted a study of benthic macroinvertebrates of Mediterranean temporary ponds on Dugi otok Island. The most important factors in the community's structure are morphometry and physio-chemical conditions of the pond that vary seasonally including a possibility of drying. Plankton crustaceans (Crustacea) were the most abundant taxon among the macroinvertebrates, followed by Diptera. The most abundant predators were the Odonata. The richest benthic macroinvertebrate fauna was found in the pond marked as Lokva 1 at Dugopolje, probably because of the stability of environmental conditions. *S. fonscolombi* is the most common among dragonflies. By measuring their head capsule's width, I ranked them in 10 size classes and made an analysis of their age structure which corresponds to the multivoltine life cycle of *Sympetrum* dragonflies.] Address: <https://repositorij.pmf.unizg.hr/islandora/object/pmf:5929/datastream/PDF/download>

23740. Rivas-Torres, A.; Outomuro, D.; Lorenzo-Carbala, M.O.; Cordero-Rivera, A. (2019): The evolution and diversity of intra-male sperm translocation in Odonata: a unique behaviour in animals. *Behavioral Ecology and Sociobiology* 73: 54. <https://doi.org/10.1007/s00265-019-2660-5>: (in English) ["Behavioural diversity is a basic component of biodiversity, with implications in ecological interactions at the intra- and interspecific levels. The reproductive behaviour of Odonata is unique among insects and conditioned by the anatomical separation between the male's reproductive organs and the intromittent organ. Prior to mating, males must translocate sperm from the genital pore in the ninth abdominal segment to the seminal vesicle located ventrally in the second abdominal segment. This behaviour, exclusive to odonates, is known as intra-male sperm translocation (ST). Here, we review the literature on ST and use phylogenetic comparative analyses to investigate the evolution of ST within the Odonata. Information on ST was compiled for 176 species, with the commonest variant being ST once per mating, after tandem formation (66%). Other variants found were ST involving precopulatory genital touching (10%), ST by the male alone before tandem (16%) or after copulation (5%), and repetition of ST during the same copulation (3%). The precopulatory genital touching might have evolved to detect female receptivity. ST before tandem formation might be favoured when mating opportunities are scarce and copulations are brief. ST after mating might be favoured if males need to be ready to copulate fast. Finally, repeated ST could have evolved through postcopulatory sexual selection in males with limited sperm removal ability, as a means to improve their sperm competition. The most plausible scenario for the evolution of ST is that the ancestors of the Odonata produced a spermatophore and attached it to the body, leading towards the evolution of the secondary genitalia in males. Our study emphasises the role of behavioural diversity to understand behavioural evolution. Significance statement: Unique behaviours are exclusive of a few individuals, populations and/or species. The intra-male sperm translocation (ST) of dragonflies and damselflies is a unique behaviour in animals: before mating, males need to transfer sperm from the primary to the secondary genitalia, which are anatomically separated. Thus, the viability and quality of sperm (i.e. fertility) will depend on the timing of ST relative to copulation. Our literature review found a variety of ST variants, being ST in tandem and before copulation the ancestral strategy. We discuss putative evolutionary routes for all the variants found and emphasise the importance of retrieving detailed observations of such unique behaviours in the field,

which could help to better understand behavioural evolution in this insect group. Behavioural diversity is rarely addressed by conservation strategies, despite unique behaviours being at a higher risk of extinction." (Authors)] Address: Rivas-Torres, A., ECOEVO LabUniversidad de Vigo, Escola de Enxeñaría Forestal Pontevedra Spain

23741. Soh, M.; Ng, M.; Ngiam, R.W.J. (2019): New Singapore record of a dragonfly, *Indothemis carnatica*, with an updated Singapore Odonata checklist. Singapore Biodiversity Records 2019: 10-17. (in English) [Location, date and time: Pulau Ubin, flooded quarry at the base of Butterfly Hill, near Pekan Quarry; 13-X-2018; around 1300 hrs.] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569. E-mail: ngiam_wen_jiang@nparks.gov.sg

2020

23742. Aliyev, S. (2020): Macrozoobenthos of rivers of north-western part of Greater Caucasus within the boundaries of Azerbaijan. Sci. Bull. Uzhhorod Univ. (Ser. Biol.) 49: 65-72. (in English, with Ukrainian summary) ["The article provides information regarding species composition, distribution of macrozoobenthos on biocenosis and its environmental characteristics of north-western rivers of Greater Caucasus in the territory of the Republic of Azerbaijan: Alazani (Ganikh) and its tributaries – Balakenchay, Katekhchay, Ayrichay, Kurmukchay, Kishchay, Karachay, and Talachay rivers. 94 species of macrobenthos organisms belonging to 13 systematic groups were found in these rivers. Among the organisms found, aquatic insects predominate." (Author) The following Odonata species are listed: *Calopteryx virgo*, *Epallage fatime*, *Ischnura elegans*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Libellula depressa*, *Somatochlora metallica*. The identification of material is questionable, probably basing on larvae, and including species never have been found in Azerbaijan as *O. cecilia* or *S. metallica*.] Address: Aliyev, S., 23, Academic Zahid Khalilov str., Baku State University, Baku, Azerbaijan; email: alisaleh56@mail.ru

23743. Ong'wen, F.; Onyango, P.O.; Bukhari, T. (2020): Direct and indirect effects of predation and parasitism on the *Anopheles gambiae* mosquito. Parasites & Vectors (2020) 13:43: 11 pp. (in English) ["Background: A good understanding of mosquito ecology is imperative for integrated vector control of malaria. In breeding sites, *Anopheles* larvae are concurrently exposed to predators and parasites. However, to our knowledge, there is no study on combined effects of predators and parasites on development and survival of larvae and their carry-over effects on adult survivorship and susceptibility to further parasite infection. Methods: This study focused on effects of the nymphs of *Pantala flavescens* and the parasitic fungus *Beauveria bassiana* on *Anopheles gambiae*, to determine: predation efficacy of nymphs against *An. gambiae* larvae; development rate of *An. gambiae* larvae in the presence of one, two or four constrained nymphs; efficacy of *B. bassiana* against *An. gambiae* larvae at doses of 3, 6 and 12 mg; and survival of adult mosquitoes exposed to *B. bassiana*, following pre-exposure to a constrained predator and/or parasite at the larval stage. The experiments consisted of survival bioassays quantified as pupation day, or dead larvae and/or adults. Results: Nymphs had an average predation efficacy of 88.3% (95% CI: 87.5–89.1) at 24 hours, against *An. gambiae* larvae. The presence of one or two nymphs reduced development time of larvae by 0.65 and 0.35 days, respectively. However, development time of larvae exposed to four nymphs was similar to the

control larvae. Larvae exposed to 3, 6 and 12 mg of *B. bassiana* were 2.0, 2.5 and 3.5 times more likely to die, respectively, compared to control larvae. Adults not pre-exposed, those pre-exposed to predator, parasite, or both were 45.8, 67.4, 50.9 and 112.0 times more likely to die, respectively, compared to control that were unexposed to predator or parasite, at larval and adult stage. Conclusions: This study shows that both predator and parasite can reduce larval population of *An. gambiae*, and presence of predator cues decreases development time in breeding sites, as well as, increases the susceptibility of emerging adult to fungus. Predator and parasite both have an additive effect on survival of adults exposed to *B. bassiana*. Field studies are required for an in-depth understanding of predator and parasite influence on mosquito development time, survival and susceptibility in nature." (Authors)] Address: Bukhari, T., Dept of Zoology, School of Physical & Biological Sciences, Maseno Univ., Maseno, Kenya. Email: tbukhari@maseno.ac.ke

23744. Rai, R.; Sharma, S.; Gurung, D.B.; Sitaula, B.K.; Devi, R.; Shah, T. (2020): Assessing the impacts of vehicle wash wastewater on surface water quality through physico-chemical and benthic macroinvertebrates analyses. Water Science 34(1): 39-49. (in English) ["Vehicle wash wastewater (VWW) contains a wide range of contaminants and discharge of such contaminated wastewater into the surface water bodies degrade water quality and affect aquatic ecosystems. This study, presents an impacts of discharging VWW into the stream Olarong Chhu in Thimphu and river Paa Chhu in Paro using water chemistry and benthic macroinvertebrates data sets obtained over a period of 6 months. Water samples and benthic macroinvertebrates were sampled once in a month from upstream, impact, and downstream sites in premonsoon (March to May) and post-monsoon (September to November) seasons in 2016. Significant levels of contaminants associated with vehicle washing were detected in water samples of impact sites whose cumulative effects on benthic macroinvertebrate assemblages were supported by HKHbios index, biological indices, and statistical analyzes. Canonical correspondence analysis indicated that T, dissolved oxygen, pH, biological oxygen demand, chemical oxygen demand, total suspended solids, turbidity, oil and grease, and sulfate significantly alter water quality and affect benthic macroinvertebrate assemblages [including Gomphidae]. With the increasing number of vehicles, management of VWW is becoming a serious issue in Bhutan. Hence, there should be proper enforcement of water and environmental legislations and effective measures like constructions of wastewater treatment facilities should be considered for protecting Bhutan's surface water resources and aquatic ecosystems." (Authors)] Address: Rai, R., Dept of Environmental Science and Engineering, School of Science, Kathmandu University, Kathmandu, Nepal. Email: reetarai.sce@rub.edu.bt

2021

23745. Cherpitel, T.; Herbrecht, F. (2021): Rapport d'activités 2019-2020 de l'animation de la déclinaison du PNA odonates en Pays de la Loire. Rapport du GRECIA pour la DREAL Pays de la Loire: 24 pp. (in French) ["The breakdown of the National Action Plan for Odonates (PNAO) in Pays de la Loire, drafted by GRECIA, the structure that is currently its facilitator, was validated by the Regional Scientific Council for Natural Heritage on 20 November 2012. As early as 2012, some anticipated actions had already been implemented, but the actual animation officially began in 2013. The document can be downloaded from the National

Action Plan for Odonates website (<http://odonates.pnapie.fr/>). This document takes stock of the actions carried out, initiated or completed, in the order in which they appear in the regional breakdown. On this subject, we will recall here that the breakdown includes 41 actions divided into 5 "families", following the sequence of the national plan. As a reminder, the regional variation concerns 15 species, 9 being retained at the national level and 6 others, of regional interest, having been added." (Author/google translate) <https://side.developpement-durable.gouv.fr/ACCIDR/doc/SYRACUSE/794333>] Address: Groupe d'Etude des Invertébrés Armoricaïns (GRETIA) (Antenne des Pays de la Loire – 5, rue du Général Leclerc - 44390 Nort-sur-ERDRE)

23746. Jeziorski, P. (2021): Dragonflies (Odonata) of the Nature Reserve Rákosina in the Poodří Protected Landscape Area (Czech Republic). *Acta Musei Beskidensis* 11: 67-84. (in Czech, with English summary) ["The purpose of this article is to summarize the results of dragonflies and damselflies (Odonata) surveys in the Rákosina Nature Reserve in the Poodří Protected Landscape Area (Czech Republic). Odonates were studied by sampling adults, larvae, and exuvia in 2012 and 2018 at 7 different sites which contain stagnant waters (forest and meadow pool, wetland meadow), meadow channel and running water (forest stream, Mlýnka millrace). Altogether, 33 species (29 species in 2012 and 25 species in 2018) were documented in this area. Five of them are listed in the Czech redlist - critically endangered species *Sympetrum depressiusculum*, vulnerable *S. flaveolum* and nearly threatened *Coenagrion pulchellum*, *Orthetrum coerulescens*, *S. meridionale*. *O. coerulescens* represents the first record in the Poodří Protected Landscape Area." (Author)] Address: Jeziorski, P., Muzeum Beskyd Frýdek-Místek, Hluboká 66, CZ-738 01 Frýdek-Místek, Czech Republic. Email: petr.jeziorski@muzeumbeskyd.com

23747. Prieto Piloña, F. (2021): Adiciones a la "Bibliografía entomológica gallega". *Nota* 11. *Arquivos Entomológicos* 24: 367-372. (in Spanish) ["Additions to the "Galician entomological bibliography". Note 11. 90 new bibliographic references about the fauna of arthropods of Galicia are provided. The total number of papers so far collected in these notes is close to 2,800." (Author)] Address: Fernando Prieto Piloña: E-mail: fprieto@aegaweb.com

23748. Stemp, K.M.; Anderson, T.L.; Davenport, J.M. (2021): The effects of intraguild interactions (or lack of) on prey diversity in experimental ponds food webs. *Food Webs* 29, December 2021, e00207: 7 pp. (in English) ["The interactions between top- and intermediate-level predators can have significant effects on community structure of food webs. The direct and indirect effects of top predators not only affect prey communities both negatively (e.g. predation) and positively (e.g. thinning effects), but can also impact intermediate-level predators (via intraguild predation [IGP]). These IGP interactions can have especially far-reaching implications when predators of increased ecological importance, such as keystone predators, are involved. Yet, the strength of these interactions are often context-dependent with relationships that are highly variable, and little is known about the factors that shape the outcomes. We conducted a mesocosm experiment to test for the potential IGP interactions among top (invertebrate) and intermediate (amphibian) predators and their effects on a diverse prey community. We used larval *Boyeria vinosa*, a rarely studied member of the family Aeshnidae, and *Ambystoma opacum* (Marbled Salamander), a known keystone predator in parts of its range, in a mesocosm study with an additive experimental design.

Each mesocosm received an equal assemblage of five anuran prey species. Total prey survival was lowest when both predators were present, but *A. opacum* overwhelmingly reduced the survival of three prey species, lowering species diversity in all food webs when present. Species diversity was highest in the *B. vinosa* food web, with one prey species (*Anaxyrus americanus*) emerging smaller and sooner than from other food webs. We did not detect any interactions between predator species, indicating that *B. vinosa* may not be as voracious as other members of Aeshnidae. Our findings suggest that density mediated IGP interactions are non-existent among our focal species. Ultimately, we also demonstrate the importance of examining variability in keystone predators and how abundant, but less-known predator species affect community structure." (Authors)] Address: Davenport, J.M., Dept of Biology, Southeast Missouri State University, Cape Girardeau, MO 63701, USA. Email: davenportj@mappstate.edu

23749. Van Grunsven, R.H.A.; Wynhoff, I. (2021): De bronlibel en andere libellen in de Venbeek. Rapport VS2021.045, De Vlinderstichting, Wageningen: 19 pp. (in Dutch) ["The Venbeek and its surroundings are located in the Flinke Ven area. This area is located between the Natura 2000 areas Meinweg and Roerdal. It receives groundwater from the higher situated Meinweg that flows westwards. In the Natura 2000 area Roerdal, the Turfkoelen and other areas are also located against the Flinke Ven that are strongly influenced by the groundwater. The deep Venbeek drains this water and that leads to desiccation in these areas. In order to stop this desiccation, adjustments to the hydrological system in the Flinke Ven are necessary. The Venbeek is surrounded by agricultural plots, but it is still an important area for dragonflies. Three protected dragonfly species occur here, *Cordulegaster boltonii*, *Somatochlora flavomaculata*, *Calopteryx virgo*. However, the Venbeek, which is the most important breeding water for these three species, drains water, which leads to desiccation of the surroundings, including several valuable and protected nature reserves. The possibility of reducing the desiccation by allowing the Venbeek to discharge less water without losing the protected dragonfly species has been investigated. By slowly deepening the stream with dead wood and sand supplementation, the stream can become more natural and remain suitable for these species. By planting trees and shrubs along the stream, solar radiation can be limited and the water temperature can remain sufficiently low. The side stream that flows from the Venhofweg to the Venbeek is also a breeding habitat for *C. boltonii*. This can be made more suitable by redevelopment, whereby the stream will carry more water and will have a more open structure.... The Venbeek and the side stream are important streams for protected dragonfly species despite the artificial situation and the intensive land use in the immediate vicinity. The desire to deepen the Venbeek and to give a zone along the stream a more natural appearance can be combined well with the prevention of these species if the requirements of the species are taken into account during the implementation. The most important aspects are that the deepening must be done gradually by placing sand on the bank so that it ends up in the stream in a natural way and by introducing wood, which creates sheltered spots where the sand is captured. In addition, by planting trees and shrubs on the southern bank, the increase in solar radiation due to the deepening can be prevented. The side stream is already a breeding habitat for *C. boltonii*, but this can be strengthened by leading more water through it. In addition, more space can be created in the vegetation along the stream, the stream is now very overgrown with bramble and American bird cherry.

A more open forest structure with trees shading the stream is more favourable for *C. boltonii* and *C. virgo*." (Authors/google translate)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands

2022

23750. Borisova, N.V. (2022): Towards understanding the fauna of dragonflies (Odonata) of the Prisursky State Nature Reserve and its protected zone (based on the results of the 2021-2022 field seasons). Scientific works of the Prisursky State Nature Reserve 37: 81-85. (in Russian, with English summary) [The paper contains some information about 37 species of Odonata from eight families, which were collected in the Prisursky State Nature Reserve and its buffer zone in 2021.2022. *Coenagrion lunulatum*, *Leucorrhinia dubia*, *Aeshna isocetes*, *Aeshna soneharai* (Asahina, 1988), are registered for explored sites for the first time. *A. isocetes* and *A. soneharai* detected for the first time for regional fauna of the Chuvash Republic." (Authors)] Address: Borisova, Natalia, State Nature Reserve Prisursky; Russian Entomological Society, Chuvash branch, Russia. E-mail: natborisova18@yandex.ru

23751. Bos-Groenendijk, G.I. (2022): Libellen tellen om te beschermen. Opleiden van nieuwe tellers. Rapport VS2022.033, De Vlinderstichting, Wageningen: 6 pp. (in Dutch) ["Counting dragonflies to protect. Training new counters: All activities in this project were well attended and received with great enthusiasm. We are happy with the expansion of our network of volunteers and that we were able to introduce many new people to the recognition, counting and protection of dragonflies." (Author/google translate)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands

23752. Bos-Groenendijk, G.I.; van Stipdonk, A. (2022): Dagvlinders en libellen in Genhoes & Berghofweide 2022. SNL-monitoring. Rapport VS2022.031, De Vlinderstichting, Wageningen: 29 pp. (in Dutch) ["SNL monitoring was carried out in Genhoes and Berghofweide in 2022. The area studied is located in South Limburg east of Valkenburg and is part of the Natura 2000 area Geuldal. It has 98 hectares and has been examined for butterflies. The mapping was carried out in accordance with the guidelines that apply to SNL monitoring. Ten field visits were made between mid-May and mid-August. Most plots were visited two or three times, no important parts were missed. Of the area to be mapped, 94% was visited twice or more. The observations were recorded in the field with the LiveAtlas app (part of Avimap) from Sovon. On average, 4.7 minutes were spent crossing one hectare square during fieldwork. An average of 14 hectares was inventoried per fieldwork hour. 32 species of butterflies were observed in the study area. The regional importance of the research area is therefore great. There are many species and for several of these species this area is one of the few places in the Netherlands where they reproduce. We expect that the species list gives a realistic picture of the butterflies that occur in the area. Species that may be missing from the list only occur sporadically in the area and therefore have a low chance of being found. Phased mowing management is carried out on most grasslands. Our advice is to continue this management in the coming years. For a number of grasslands where the vegetation consists almost exclusively of grass, it could be considered to mow them completely for the time being so that the nutrient richness in the soil decreases more quickly. The

white bulb grasslands are best mowed before the white bulb blooms. In dry periods such as last summer, it is better to postpone mowing or at least not to mow too short. ... 4.2 Dragonflies: The dragonflies were not a target species in the mapped management types, but were noted in most cases. 18 species were found, which are shown in Table 5. This list cannot be considered a complete species list of the study area, as there was not time to pay much attention to the waters in the area. Several nice dragonfly species, such as the southern bank dragonfly and the brook bank dragonfly, were found together on the same day at the same pool. The pronghorn damselfly is also special, a newcomer from the south that has been slowly expanding since 2007. The puddle bolt and the brown corn bolt are rare species that are sporadically seen in the area." (Authors/google translate)] Address: <https://assets.vlinderstichting.nl/docs/3a7709d0-dc25-4f35-8ff6-5659479aa1d1.pdf>

23753. Boudouine, W. (2022): Etude bibliographique des Odonates dans le Nord-Est Algérien. MSc thesis, Sciences de la Nature et de la Vie, Institut des Sciences et de la Technologie, Département des Sciences de la Nature et de la Vie, Universitaire Abdelhafid BOUSSOUF- Mila: 85 pp. (in French, with English summary) [47 species in wilaya d'El-Tarf, 43 in the wilaya of Guelma, and 34 the wilaya of Annaba totalling to a regional fauna of 52 Odonata species.] Address: <https://dspace.centre-univ-mila.dz/jspui/bitstream/123456789/1911/1/Etude%20bibliographique%20des%20Odonates%20dans%20le%20Nord-Est.pdf>

23754. Dalu, T.; Cuthbert, R.N.; Methi, M.J.; Dondofema, F.; Chari, L.D.; Wasserman, R.J. (2022): Drivers of aquatic macroinvertebrate communities in a Ramsar declared wetland system. Science of The Total Environment 818, 20 April 2022, 151683: (in English) ["Highlights: • Baetidae, Corixidae, Coenagrionidae, Dytiscidae and Physidae were the most abundant families. • Functional feeding group ratios indicated that all sites were strongly autotrophic. • Environmental variables and fish had an influence on macroinvertebrate community. • Different macroinvertebrate taxa respond differently to seasonal changes. Abstract: Wetlands in the Global South are under increasing pressure due to multiple stressors associated with global change. Water and sediment quality assessments, as well as biomonitoring using macroinvertebrates communities, are fundamental tools for informing wetland condition and management strategies. Here, we examine water and sediment parameters affecting aquatic macroinvertebrates in Nlyslvey Wetland, Limpopo Province, South Africa. Water quality, sediments, fish and macroinvertebrate community data were collected across three seasons (hot-dry, hot-wet, cool-dry) from five sites. Baetidae, Corixidae, Coenagrionidae, Dytiscidae and Physidae were the most abundant and dominant families, with functional feeding group (FFG) ratios indicating that all sites were strongly autotrophic, had high predator-prey ratios, few shredders and had a stable substrate across seasons. Fish abundances increased significantly towards the cool-dry season. Based on redundancy analysis, P, Ca, pH, Cu and Na were strongly positively associated with macroinvertebrates, including Physidae, Corixidae, Planorbidae, Ostracoda, Potamonautidae and Hydropsychidae; turbidity and sulphur were associated with Dytiscidae, Oligochaetae, Libellulidae, Gerridae and Dixidae, and fish abundance, Fe, oxygen reduction potential and total dissolved solids were negatively associated with Baetidae, Belostomatidae, Hydrophilidae and Leptoceridae. Therefore, these variables accounted for large levels of variation in macroinvertebrate families, with the cool-dry season clearly distinguished from the hot-wet and hot-

dry seasons according to functional feeding groups. Being a protected area, this information could provide a useful baseline for further studies into wetlands in the region subject to greater anthropogenic stresses, as well as future studies in this Ramsar site under global changes. Further studies are required to assess the importance of environmental factors influencing the richness and distribution of macroinvertebrate communities in wetlands under growing anthropogenic pressures." (Authors) Aeshnidae, Libellulidae Coenagrionidae] Address: Dalu, T., School of Biology & Environmental Sciences, University of Mpumalanga, Nelspruit 1200, South Africa. Email: dalutatenda@yahoo.co.uk

23755. Heilmeier, H.; Achtziger, R.; Günther, A.; Richert, E.; Wiche, O. (2022): 25 Jahre AG Biologie / Ökologie an der TU Bergakademie Freiberg – eine Bilanz zu Lehre und Forschung - 25 years of Biology & Ecology Unit at the TU Bergakademie Freiberg – an overview on teaching and research. Freiberg Ecology online 10: 1-29. (in German, with English summary) ["This contribution provides an overview on teaching and research activities of the Biology / Ecology Unit (Arbeitsgruppe Biologie / Ökologie) at the Institute for Biosciences of TU Bergakademie Freiberg since it was established in 1996. From winter term 1996 until summer term 2022 in total 56 courses had been developed and provided, mainly for the study programs geoecology and applied natural science. Furthermore, 314 students' theses have been supervised (160 undergraduate and bachelor theses, 136 diploma and master theses, 17 PhD theses). Most of the theses were conducted in geoecology and in the research fields community ecology, population biology, landscape ecology and eco-physiology/soil ecology/phytomining. The most frequently studied habitat and landscape types in the field studies was post-mining landscape (34 % of the theses), followed by standing and streaming water bodies, grasslands, and residential areas. As examples of education materials developed, the booklet on mandatory plant and animal species, the booklet for knowledge of mandatory plant species, and specific OPAL courses are presented. For the 16 research projects conducted by the Biology / Ecology Unit, the focus of research shifted from more conceptual research and development projects on national, state and regional level at the beginning (e.g., sustainability indicator for species richness and landscape quality of Germany, concept for species conservation in Saxony) to more applied projects in the fields of nature conservation / habitat and landscape management (e.g., EU project on Natura 2000 habitat monitoring by using remote sensing techniques) and phytomining (e.g., BMBF project on extraction of Germanium by plants). Since 1996 in total 460 publications have been published by the scientific staff of the working unit, mainly in the research fields of population biology and community ecology, nature conservation and landscape ecology, and phytomining and ecosystem analysis. In the online journal „Freiberg Ecology online“ (FECO) which was founded in 2016 and is edited by the working group, 10 volumes with in total 36 papers with results from courses, students' theses, research projects and meetings have been published. ... The animal species or animal groups studied as part of the zoological work ... Of the 101 papers in which at least one of the listed species (groups) was investigated, almost half dealt with vertebrates, with a particular focus on the groups of birds, amphibians, reptiles (sand lizards) and bats, which are relevant to planning and important for nature conservation. Within the work on invertebrates, the focus was on certain insect groups such as cicadas, bugs and dragonflies, in line with the specialisation of the WG members and their importance as indicator groups in the context of nature conservation biology studies (Fig. 7); other work

dealt with other insect species (groups [8 papers are dealing with Odonata]) and with molluscs or crustaceans." (Authors)] Address: Heilmeier, H., TU Bergakademie Freiberg, Inst.für Biowissenschaften / Interdisziplinäres Ökologisches Zentrum (IÖZ), AG Biologie / Ökologie, Leipziger Str. 29, 09599 Freiberg, Germany. EMail: hermann.heilmeier@ioez.tu-freiberg.de

23756. Jeziorski, P. (2022): Dragonflies (Odonata) of Kotvice Nature Reserve in the Poodří Protected Landscape Area (Czech Republic). Acta Musei Beskidensis 12: 37-64. (in Czech, with English summary) ["The purpose of this article is to summarise the results of Odonata surveys in Kotvice Nature Reserve in the Poodří Protected Landscape Area (Czech Republic). Odonates were studied by sampling adults, larvae, and exuvia in the years 2019 to 2021 at 11 different stations with stagnant waters (e.g. forest and meadow wetlands, meadow pools, wet meadows, oxbow lakes, ponds) and running water (forest stream, Odra river). Altogether, 37 species (30 species in 2019, 31 species in 2020 and 19 species during only one field visit in 2021) were documented in the reserve. Six of them are listed in the Czech redlist - critically endangered species *Sympetrum depressiusculum*, vulnerable *S. flaveolum*, *Onychogomphus forcipatus* and near threatened *Lestes barbarus*, *Brachytron pratense* and *S. meridionale*. The occurrence of two species (*Coenagrion pulchellum* and *Somatochlora metallica*) in Kotvice Nature Reserve was not confirmed. Currently, a total of 39 species of Odonata are known from Kotvice Nature Reserve." (Authors)] Address: Jeziorski, P., Muzeum Beskyd Frýdek-Místek, Hluboká 66, CZ-738 01 Frýdek-Místek, Czech Republic. Email: petr.jeziorski@muzeumbeskyd.com

23757. Jiang, B.; Zhang, Y.; Mauersberger, R.; Schiel, F.-J.; Mikolajewski, D.J. (2022): Predation promotes diversification in the mean and variance of antipredator traits. Ecological Entomology 47(4): 679-688. (in English) ["1. Predator species are separated along habitat gradients, with predation known to play an essential role in species' trait diversification. Because predator species differ dramatically in their hunting style and mode, a change in predator species will alter the mean and variance of prey's antipredator traits. Population trait variation has an impact on community ecology. It influences species' niche width and interactions in the food web. However, empirical studies on variance change by predation are scarce. 2. In this study, we collected large numbers of the last instar *Leucorrhinia pectoralis* exuviae from lakes with predatory fish (fish lakes) and lakes with large invertebrate predators (dragonfly lakes) and compared their two antipredator traits (spines and body size). 3. We found that individuals in dragonfly lakes grew shorter spines than individuals in fish lakes. Body size showed no significant difference between dragonfly-lake individuals and fish-lake individuals. Moreover, populations from dragonfly lakes showed a smaller variance of spine length than populations from fish lakes; while populations from dragonfly lakes had a larger variance in body size than populations from fish lakes. 4. These results indicate that trait variance, as well as mean, is strongly modified by different predation regimes. Studying the mean and variance of traits can help to define the mode of selection forces (directional selection and stabilising selection) in nature. Moreover, dragonfly larvae might be ideal organisms for the study of phenotypic selection on quantitative traits in the wild." (Authors)] Address: Bin, J., Anhui Provincial Key Laboratory for Conservation and Utilization of Important Biological Resources, College of Life Sciences, Anhui Normal University, Beijingdong Road 1, Wuhu, Anhui Province 241000, China. Email: bin.jiang@ahnu.edu.cn

23758. Liu, D.; Hefler, C.; Shyy, W.; Qiu, H. (2022): Implications of dragonfly's muscle control on flapping kinematics and aerodynamics. *Physics of Fluids* 34(8) (2022); <https://doi.org/10.1063/5.0097790>: (in English) ["In this work we designed and characterized a passive structural wing actuation setup that was able to realistically mimic the flapping and pitching kinematics of dragonflies. In this setup an inelastic string limited the wing pitch that may be sufficiently simple for practical micro air vehicle (MAV) applications. In order to further evaluate the dominance of inertial passive and active muscle-controlled pitch actuation in dragonfly flight, the flow fields and pitching angle variations of the naturally actuated wing of a tethered dragonfly were compared with that of the same wing artificially actuated via a proposed passive mechanism. We found that passive rotation characterizes most of the forewing flapping cycle except the upstroke reversal where the dragonfly uses its muscle movement to accelerate its forewing rotation. The measured flow fields show that accelerated wing rotation at the upstroke reversal will result in a stronger leading edge vortex (LEV) during the downstroke, the additional force from which is estimated to account for 4.3% of the total cycle averaged force generated." (Authors)] Address: Qiu, H., Dept of Mechanical and Aerospace Engineering, The Hong Kong University of Science & Technology, Clear Water Bay, Kowloon, Hong Kong. Email: meqiu@ust.hk

23759. Martins, R.T.; Brito, J.; Dias-Silva, K.; Leal, C.G.; Leitão, R.P.; Oliveira, V.C.; Oliveira-Júnior, J.M.B.; de Paula, F.R.; Roque, F.O.; Hamada, N.; Juen, L.; Nessimian, J.L.; Pompeu, P.S.; Hughes, R.M. (2022): Congruence and responsiveness in the taxonomic compositions of Amazonian aquatic macroinvertebrate and fish assemblages. *Hydrobiologia* 849: 2281-2298. (in English) ["Stream degradation in Amazonia is outpacing our ability to effectively monitor it for three key reasons: (1) Many changes are cumulative and occur gradually; (2) Scientists have failed to clearly link anthropogenic disturbances with ecological and economic indicators of concern to decision makers and the public; (3) There are too many potential indicators to assess in a cost-effective manner. Therefore, we sought to assess congruency at three taxonomic resolutions (species, genus and family) and between assemblages (fish species and macroinvertebrate genera) and groups of taxa (fish: Characiformes and Siluriformes; macroinvertebrates: Anisoptera, Heteroptera, Odonata, Trichoptera, Zygoptera, EPT [Ephemeroptera, Plecoptera and Trichoptera] and THZ [Trichoptera, Heteroptera and Zygoptera]). To do so, we assessed taxonomic, land-use and habitat data from 92 stream sites in the eastern Amazonian state of Pará. We found that anthropogenic disturbances of our sites influenced abundance and incidence of macroinvertebrate and fish taxa, but the two assemblages responded to slightly different stressors. Family and genera levels were suitable substitutes for similarity patterns measured at the macroinvertebrate genera and fish species levels, respectively. Odonata, Trichoptera, EPT and THZ were highly congruent with whole macroinvertebrate assemblage (genus level) variation. Characiformes was also congruent with whole fish assemblage (species level) variation. Congruence among macroinvertebrates and fish was intermediate (55% to 79%) and related to differing responses to environmental variables. Our results suggest that some groups (e.g., Odonata, Trichoptera and Characiformes) are useful surrogates of macroinvertebrate or fish assemblages to evaluate anthropogenic disturbance in Amazonian streams." (Authors)] Address: Martins, R.T., Coordenação de Biodiversidade, Instituto Nacional de Pesquisas da Amazônia, Manaus, AM, 69067-375, Brazil

23760. Siqueira Caixeta, E.; Meza Bravo, J.V.; Barbosa Pereira, B. (2022): Ecotoxicological assessment of water and sediment river samples to evaluate the environmental risks of anthropogenic contamination. *Chemosphere* 306, November 2022, 135595: (in English) ["Highlights: • *Daphnia magna* was used for acute and surviving chronic tests. • Water and sediments samples collected demonstrated a metal contamination gradient. • Macroinvertebrates indicate the sediment contamination. • Genotoxic effects were evaluated by the Microtox assay. • Ecotoxicological assessment showed risks of anthropogenic contamination. Abstract: Several studies have shown the issue of effluent discharges as a source of contamination into waterways. Still, the impact of chemical pollutants on sediment is less well understood, especially from an ecotoxicological perspective, even though it is known that chemicals from industrial processes are frequently released into river systems. Therefore, here we compared water-sediment samples collected in high-anthropogenic urban area and low-anthropogenic peri-urban area. We have used physicochemical parameters, genotoxicity assay, bioindication and acute and surviving chronic toxicity tests - in an integrated biological assessment. Results suggest no acute toxicity related to exposure to samples from both areas. Still, samples collected in the high-anthropogenic urban area were associated with chronic toxicity effects in *D. magna*. Heavy metals Pb, Cu, and Cr were found in all samples. Even having all averages below the allowed level as determined by CONAMA (Resolution 420-Class 2), the Water Quality Index (WQI) score showed us that samples from high-anthropogenic sites were identified as "Poor," and samples from low-anthropogenic sites were identified as "Good." Ephemeroptera, Plecoptera, and Odonata, which are very sensitive organisms, were largely absent in high-anthropogenic areas, showing that it is likely to be associated with WQI. Therefore, careful consideration should be applied to monitoring effluent discharges using predictive tests, considering the environmental risks of sediment contamination and its consequences on the total environment." (Authors)] Address: Barbosa Pereira, B., Federal University of Uberlândia, Institute of Geography, Santa Monica Campus, Avenida João Naves de Ávila, 2121, 38.408-100, Uberlândia, Minas Gerais, Brazil. Email: boscolli86@hotmail.com

23761. Vijayakumaran, V.; Nair, V.P.; Samuel, A.; Palot, M.J.; Sadasivan, K. (2022): A new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from the Brahmagiri Hills, Kerala, India. *Entomol* 47(3): 265-276. (in English) ["A new species of *Protosticta* Selys, 1885 is described from Brahmagiri hills of Coorg landscape of the Western Ghats in Peninsular India. The new species *Protosticta francyi* sp. nov., is a congener of *P. antelopoides* Fraser, 1931 and *P. ponmudiensis* Kiran, Kalesh & Kunte, 2015, occupying a similar microhabitat, but distributed north of the major biogeographical divide, the Palghat Gap. The new taxon is distinguished from all other *Protosticta* of Western Ghats by the presence of long prothoracic spines in the males, the structure of the tip of the male cerci and genital ligula. A revised key to the species of *Protosticta* of Western Ghats is provided based on mature males." (Authors)] Address: Vijayakumaran, V., Vipanchika, Kanichar 670674, Kannur, Kerala, India

23762. Wang, Y.; He, X.; He, G.; Wang, Q.; Chen, L.; Liu, X. (2022): Aerodynamic performance of the flexibility of corrugated dragonfly wings in flapping flight. *Acta Mechanica Sinica* volume 38(11), Article number: 322038 (2022): (in English, with Chinese summary) ["At low Reynolds numbers, the variable flexibility of flapping insect wings is considered essential in improving the favorable aerodynamic

forces. To further explore whether significant aerodynamic coupling exists between the microstructure and passive flexible deformation, this paper proposes three technical comparison airfoils: a corrugated wing with deformation, a symmetric flat plate wing with deformation, and a corrugated wing without deformation. Based on STAR-CCM+ software, this paper numerically solves the Navier-Stokes equations using the fluid-structure interaction method. The results show that the aerodynamic performance of the flexible corrugated wing is better than that of the rigid corrugated wing, and its lift and thrust are both improved to a certain extent, and the thrust efficiency of the flexible corrugated wing is significantly higher than that of the flexible flat plate. Although the thrust is improved, a part of the lift is lost, and as the flapping amplitude increases past 35°, the disparity gradually increases. A comparison of the flexible technical airfoils shows that the corrugated structure promotes thrust and retards lift, which is closely related to the formation and dissipation of strong vortex rings during the downstroke phase. On the premise of maintaining typical flapping without falling, dragonflies can fly with skillful efficiency by adjusting the way they flap their wings. The results of this work provide new insight into the formation and role of thrust in flapping maneuvering flight and provide a specific reference for developing new bionic flapping-wing aircraft." (Authors)] Address: He, G., College of Aircraft Engineering, Nanchang Hangkong University, Nanchang, 330063, China

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23763. Abejo, J.R.A.; Jumawan, J.H. (2023): A multifaceted study of Wawa River, Esperanza, Agusan Del Sur, Philippines: Aquatic macroinvertebrates, water quality, and soil particle size analysis. *American Journal of Interdisciplinary Research and Innovation* 2(4): 36-46. (in English) ["The diversity of macro-invertebrate species in specific aquatic habitats often assesses environmental stress caused by pollution. To find out interactions in various macroinvertebrates communities, different water quality parameters and soil particles of Wawa River, research was conducted on Wawa River, Esperanza Agusan del Sur. Samples of macro-invertebrates, water and soil were taken from three different river stations. A total of 13 taxa of various macro-invertebrates were identified from the area. Phylum Arthropoda constitutes 62% of the total population and 32% form Phylum Mollusca. There is a notable similarity in macroinvertebrate abundance across the three stations, but the maximum numbers were observed in downstream. Most of the water physicochemical parameters of Wawa River were within the normal range, suitable for the healthy growth of macroinvertebrates. Most of the three sampling stations have medium sand particles, indicating relatively stable sediment, suitable habitat availability, and ongoing sediment transport and deposition processes. Diversified populations of various macro-invertebrates confirm good ecological condition of the environment and water in the studied site especially ample concentration of DO in River. The documented data on macro-invertebrates in the studied site will provide a baseline for future research." (Authors) The study includes "damselfly nymphs".] Address: Abejo, J.R.A., Dept of Education, Agusan del Sur Caraga State Univ., Philippines. Email: jeanabejo30@gmail.com

23764. Borisova, N.A. (2023): The Red Book of the Chuvash Republic. Volume 1. Part 2. Rare and endangered animal species. – Second edition, revised and supplemented. Scientific ed. L.V. Egorov, G.N. Isakov, V.N. Podshivalina, under the general ed. S.P. Soldatov. – Cheboksary: Perfectum. 336 pp: 36-39. (in Russian) ["The Red Book of the Chuvash

Republic is an official legal document. Rare and endangered species of animals included in its list are protected. Their list was approved by the Ministry of Natural Resources and Environment of the Chuvash Republic on the submission of the Government Commission on the Red Book of the Chuvash Republic and officially registered with the Ministry of Justice of the Chuvash Republic. The book is a scientific monograph prepared on the basis of a comprehensive analysis of the literature on the distribution and ecology of rare animal species in the Chuvash Republic and neighboring regions, as well as many years of field research. The book contains information on 229 animal species, for each of which there is an essay with an image of the taxon and a map of its distribution in Chuvashia. The book is intended for government agencies and environmental expertise as a scientific and legal document, as well as for specialists at all levels in the field of environmental protection and nature management, researchers, teachers, students and schoolchildren." (Publisher) On pages 36-39, *Nehalennia speciosa*, *Orthetrum brunneum*, and *Anax imperator* are treated in detail. <https://www.prlib.ru/item/684801>] Address: Borisova, Natalia, State Nature Reserve Prisursky; Russian Entomol. Society, Chuvash branch, Russia. E-mail: natborisova18@yandex.ru

23765. Borisova, N.V. (2023): Annotated list of dragonflies (Insecta: Odonata) of the Prisursky State Nature Reserve and its protected zone. Part 3. Scientific works of the Prisursky State Nature Reserve 38: 63-74. (in Russian, with English summary) ["A list of 51 species of Odonata belonging to 8 families from the Prisursky State Nature Reserve and its buffer zone based on original and literature data obtained in 2010–2023 is given. *Erythromma viridulum* and *Anax parthenope* are registered in this territory for the first time." (Author)] Address: Borisova, Natalia, State Nature Reserve Prisursky; Russian Entomological Society, Chuvash branch, Russia. E-mail: natborisova18@yandex.ru

23766. Borisova, N.V.; Yakovlev, A.A. (2023): New and interesting finds of dragonflies (Insecta: Odonata) in the Chuvash Republic in 2022. *Natural science research in Chuvashia* 9: 22-30. (in Russian, with English summary) ["*Nehalennia speciosa* and *Anax parthenope* are registered for the first time for the fauna of the Chuvash Republic." (Authors) The paper includes treatments and distribution maps on *Coenagrion armatum*, *C. lunulatum*, *N. speciosa*, *Sympetrum fonscolombii*, *Isoaeschna isocetes*, "*Aeshna sonoharai*", *Anax imperator*, and *A. parthenope*.] Address: Borisova, Natalia, State Nature Reserve Prisursky; Russian Entomol. Society, Chuvash branch, Russia. E-mail: natborisova18@yandex.ru

23767. Choong, C.Y. (2023): Larval development and description of the larva of *Indothemis carnatica* (Fabricius, 1798) (Insecta: Odonata) from peninsular Malaysia. *Serangga* 28(3): 282-294. (in Malay, with English summary) ["The final instar larva of *I. carnatica* is described for the first time based on larvae and exuviae. This is also the first description of larva for the genus *Indothemis*. At the same time, the larval development of *I. carnatica* was studied. The larva rearing started from the eggs collected from an egg-laying female at a pond in Universiti Kebangsaan Malaysia, Bangi Campus, Selangor, Malaysia. The fresh eggs of *I. carnatica* were in yellow colour with a mean length of 0.48±0.02 mm and mean width of 0.36±0.01 mm. The eggs took at least seven days to hatch. The larval development of *I. carnatica* consisted of 12–13 stadia, and it took 61–64 days to complete. The larva of *I. carnatica* larva is in oval form slightly elongated with the size of 16.5 mm in body length. The presence

of spines on abdomen is minimum. The information of the larval development of *I. carnatica* from the hatching of eggs until the larval emergence is of great interest for the breeding and conservation of the species." (Author)] Address: Choong, C.Y., Pusat Sistemik Serangga, Fakulti Sains dan Teknologi, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor. Email Pengarang: cychoong@ukm.edu.my

23768. Eislöffel, J. (2023): Ein neuer Nachweis des Spitzenflecks (*Libellula fulva* O. F. Müller, 1764) in Thüringen (Insecta: Odonata). Thüringer Faunistische Abhandlungen 26: 27-30. (in German, with English summary) ["A new record of the Scarce Chaser (*Libellula fulva* O. F. Müller, 1764) in Thuringia (Insecta: Odonata): An Observation of a female of *L. fulva* over water in disused gravel pits near Orlamünde is presented. This is the first Observation in Thuringia since 2005, and the first confirmed record." (Author) 24.06.2023, former gravel pits near Orlamünde (11°33'07" E / 50°46'29" N).] Address: Eislöffel, J., Ziegenhainer Str. 27B, 07749 Jena, Germany. EMail: jochen.eisloeffel@web.de

23769. Jeziorski, P. (2023): Dragonflies (Odonata) of Kaceni louka Nature Reserve and its vicinity, Litovelské Pomoraví Protected Landscape Area (Czech Republic). *Acta Musei Beskidensis* 13: 55-101. (in Czech, with English summary) ["This article summarizes the results of Odonata surveys in Kaceni louka Nature Reserve and at 5 adjacent localities in the Litovelské Pomoraví Protected Landscape Area (Czech Republic). The studied material (adults and larvae) was collected between 1995 and 2000 at 6 different localities which contain stagnant waters (alluvial meadow, sedge meadow, ditch, forest fen and pond) and slowly running water (canal). A total of 42 species were found at the studied localities, 20 species at locality no. 1 (Moravicany, alluvial meadow), 33 species at locality no. 2 (Moravicany, Kaceni louka Nature Reserve, predominantly a sedge meadow), 24 species at locality no. 3 (Medlov, ditch), 11 species at locality no. 4 (Medlov, forest fen), 35 species at locality no. 5 (Moravicany, canal), and 29 species at locality no. 6 (Moravicany, pond). Eight of them are listed in the Czech redlist – vulnerable species *Leucorrhinia rubicunda*, *Sympetrum flavoleolum*, and *S. pedemontanum*, and nearly threatened *Lestes barbarus*, *L. dryas*, *Brachytron pratense*, *Leucorrhinia pectoralis*, and *Orthetrum coerulescens*. One species is listed in Act no. 114/1992, on nature and landscape protection – endangered species *L. pectoralis*. The results were compared with the surveys by L. Brejcha from the period 1962–1983, who found 28 species. Occurrence in Kaceni louka Nature Reserve was not confirmed for three species (*Coenagrion hastulatum*, *Coenagrion pulchellum*, and *Somatochlora flavomaculata*). Currently, a total of 36 species of Odonata are known from Kaceni louka Nature Reserve, and 45 species from the surveyed area." (Author)] Address: Jeziorski, P., Muzeum Beskyd Frydek-Mistek, Hluboká 66, 738 01 Frydek-Mistek, Czech Republic. Email: petr.jeziorski@muzeumbeskyd.com

23770. Markphan, W.; Suankaew, S. (2023): Survey of the surface water quality within Muang Nakhon reception house, Phrom Khiri district, Nakhon Si Thammarat province, by using biological indicators. *Burapha Science Journal* 28(3): 1477-1490. (in Thai, with English summary) ["This research was to survey the surface water quality within Muang Nakhon Reception House, Phrom Khiri District, Nakhon Si Thammarat Province, by using biological indicators. Inside the City Hall By collecting samples at 5 points, conducted for 3 months, from August to October 2021, samples were collected once a month. Using bricks and a colander Collect

insect larvae and organisms as indicators of water quality at predetermined points and compare them using assessment criteria according to the Green World Foundation's Water Detective Guide 2018. The results of the survey revealed the diversity of aquatic insect groups in 5 ranks, 8 families, respectively, from Odonata, Gastropod, and Hemiptera, 2 of each, while Ephemeroptera, Caridea, of 1 of each, respectively. Water quality from all 5 sampling points was within the criteria of fair water quality. Suitable for use in agriculture and animal husbandry. Found insect larvae and organisms that are water quality indicators such as shrimp, periwinkle, pagoda snails, short insect larvae, and solitary dragonfly larvae [treated at family level: Macromiidae, Gomphidae, Aeshnidae]. The nature of water source will have a large accumulation of leaves and weed debris and be partially covered with grass. There is always a flow of water. The survey, insect larvae, and organisms that are indicators of clean water quality and fair water quality are also found in the same spot. Caused by the adaptation of insect larvae to adapt to all environments for living." (Authors)] Address: Program in Environmental Science, Faculty of Science and Technology, Nakhon Si Thammarat Rajabhat University, Thailand

23771. Misiko, M.F.; Bere, T.; Andika, D.O.; Okoth, P.; Onyango, B. (2023): Spatial variations in aquatic insect community structure in the Winam Gulf of Lake Victoria, Kenya. *International Journal of Ecology* Volume 2023, Article ID 8817525, <https://doi.org/10.1155/2023/8817525>: 20 pp. (in English) ["Background. Aquatic insect community structure is dynamic due to threats by anthropogenic activities coupled with changing climatic conditions. *e insect's survival is dependent on the substrate, water quality, and environmental e0ects. *e changes in water quality in uence their distribution and abundance and are re ected in spatial and temporal trends. *is study sought to document the e0ects of spatial variation on aquatic insects in Winam Gulf of Lake Victoria, Kenya. Materials and Methods. Systematic random design was used in sampling, and water quality parameters were assessed. Insects were sampled by profundal lake procedure, pooled, sorted, and identi7ed based on the morphological approach and diversity indices analyzed. *e relationship between insects and water quality was established. Results. Statistical homogeneity in water quality parameters was documented with the exception of nitrates, nitrites, soluble reactive phosphorus, ammonium, and silicates, which displayed significant variation at $p < 0.05$. A total of 383 individual insects representing 19 species, 19 genera, 16 families, and six orders were obtained from Winam Gulf. Hemiptera, Ephemeroptera, and Diptera were the most predominant orders, respectively. *Chironomus* spp. and *Ablebesmyia* spp. were representatives of the Chironomidae family. Species distribution and water quality were determined using cluster analysis (CA) and conical correspondence analysis (CCA). Conclusion. *e 7ndings of this study demonstrated that spatial variations were associated with change in water quality and had a corresponding in uence on insect community structure." (Authors) The single odonate species mentioned is *Agrion* (=Calopteryx) *virgo*, a palaeartic species [(10 individual insects; 2.61% total abundance)], not occurring Kenya.] Address: Misiko, Monica Florence, Dept of Plant, Animal and Food Sciences, School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology, P.O. Box 210, Bondo 40600, Kenya. Email: misikomonica.orence@ejooust.ac.ke

23772. Willems, T.; Beart, K. (2023): Terugkeer van dagvlinders en libellen op Natuurrijk. *Vlinders* 4 2023: 6-7. (in Dutch) ["Return of butterflies and dragonflies at Natuurrijk:

In 1977, Birgitte and Kees Beart purchased 1.2 hectares of agricultural grassland in the Krimpenerwaard, with the aim of developing nature and gaining experience with nature management. They called the area 'Natuurrijk'. In the meantime, the area has grown into a diverse forest in the middle of a large-scale agricultural landscape. ... Dragonflies are slowly returning due to the construction of pools: Before the new plot was developed as a nature reserve, it was intensively managed by agriculture, as were most of the plots in the immediate vicinity of Natuurrijk. The ditches have poor water quality due to a combination of over-fertilisation, annual cleaning management and a large population of American crayfish that cuts the bank vegetation finely. The dragonfly fauna is therefore extremely poor and consists almost exclusively of *Ischnura elegans*. It is known that this species is relatively resistant to water pollution. The dragonfly fauna is still poor in the recently constructed pools. It is noticeable that there are clearly more species present here than in the border ditches. In addition to *I. elegans*, *Orthetrum cancellatum*, *Anax imperator* and *Libellula quadrimaculata* are now also found here. These species are characteristic of stagnant, slightly acidic waters with bare banks. This is currently still a young pioneer community, but there is certainly a chance that more species will establish themselves in the near future. It is important for this that the crayfish do not all reach the pools, because their presence seriously hinders the formation of bankside and aquatic vegetation." (Authors/Google translate)] Address: not stated

23773. Xie, J.; Zhang, Y. (2023): Diversity and distribution of mites (ACARI) revealed by contamination survey in public genomic databases. *Animals* 2023, 13, 3172. <https://doi.org/10.3390/ani13203172>: 12 pp. (in English) ["Simple Summary: Mites are a group of minute animals ubiquitously distributed on the planet. They have close ecological ties with other species, such as plants, insects and vertebrates. With the development of sequencing technology, the genomic data have increased dramatically. Although the contaminations of microbial symbionts in public genomic databases have been explored to reveal the interactions between microbes and hosts, no similar study has been carried out to the microscopic mites. Here, we present a survey and analysis of the contamination of mites in Genbank genomic resources for the first time. The results showed that contamination of mites in public databases is not rare. Based on these contaminated contigs, the host associations and evolution of mites are discussed. Abstract: Acari (mites and ticks) are a biodiverse group of microarthropods within the Arachnida. Because of their diminutive size, mites are often overlooked. We hypothesized that mites, like other closely related microorganisms, could also contaminate public genomic database. Here, using a strategy based on DNA barcodes previously reported, we scanned contaminations related to mites (Acari, exclusive of Ixodida) in Genbank WGS/TSA database. In 22,114 assemblies (17,845 animal and 4269 plant projects), 1717 contigs in 681 assemblies (3.1%) were detected as mite contaminations. Additional taxonomic analysis showed the following: (1) most of the contaminants (1445/1717) were from the specimens of Magnoliopsida, Insecta and Pinopsida; (2) the contamination rates were higher in plant or TSA projects; (3) mite distribution among different classes of hosts varied considerably. Additional phylogenetic analysis of these contaminated contigs further revealed complicated mitehost associations. Overall, we conducted a first systemic survey and analysis of mite contaminations in public genomic database, and these DNA barcode related mite contigs will provide a valuable resource of information for understanding the diversity and phylogeny of mites." (Authors) The paper includes

references to Odonata.] Address: Xie, J., Chongqing Key Laboratory of Big Data for Bio Intelligence, Chongqing Univ. of Posts and Telecommunications, Chongqing 400065, China. Email: xiejz@cqupt.edu.cn

2024

23774. Abdelmadjid, C.; Tababouchet, M.; Bougaham, A.F. (2024): New record of *Pyrrhosoma cf. nymphula* (Odonata: Coenagrionidae) in north-eastern Algeria. *Notulae odonologicae* 10(4): 152-159. (in English) ["During a survey of odonates along the river Wadi Boulahdaid in the north-east of Algeria, a new population of *Pyrrhosoma cf. nymphula*, was recorded. This stream had not been explored in previous odonatological studies in Algeria. The population displayed a range of reproductive behaviours, from copulation and oviposition to territoriality, which suggests local establishment. This finding adds a new locality within the previously known North African range of this taxon, which runs from northern and western Morocco to Tunisia through the Rif Mountains, the High and Middle Atlas and the Tell Atlas orographic system. It contributes to an improved understanding of the North African odonate fauna." (Authors)] Address: Bougaham, A.F., Lab. de Recherche en Ecologie et Environnement. Fac. des Sciences de la Nature et de la Vie, Univ. de Bejaia, 06000 Bejaia, Algeria. Email: abdelazize.bougaham@univ-bejaia.dz

23775. Adde, A.; Külling, N.; Rey, P.L.; Fopp, F.; Brun, P.; Broennimann, O.; Lehmann, A.; Petitpierre, B.; Zimmermann, N.E.; Pellissier, L.; Altermatt, F.; Guisan, A. (2024): Projecting untruncated climate change effects on species' climate suitability: Insights from an Alpine country. *Global Change Biology*, 2024; 30:e17557: 16 pp. (in English) ["Climate projections for continental Europe indicate drier summers, increased annual precipitation, and less snowy winters, which are expected to cause shifts in species' distributions. Yet, most regions/countries currently lack comprehensive climate-driven biodiversity projections across taxonomic groups, challenging effective conservation efforts. To address this gap, our study evaluated the potential effects of climate change on the biodiversity of an alpine country of Europe, Switzerland. We used a state-of-the-art species distribution modeling approach and species occurrence data that covered the climatic conditions encountered across the full species' ranges to help limiting niche truncation. We quantified the relationship between baseline climate and the spatial distribution of 7291 species from 12 main taxonomic groups [Arthropods: Ephemeroptera, Plecoptera, Trichoptera, Odonata (EPTO)] and projected future climate suitability for three 30-year periods and two greenhouse gas concentration scenarios (RCP4.5 and 8.5). Our results indicated important effects of projected climate changes on species' climate suitability, with responses varying by the taxonomic and conservation status group. The percentage of species facing major changes in climate suitability was higher under RCP8.5 (68%) compared to RCP4.5 (66%). By the end of the century, decreases in climate suitability were projected for 3000 species under RCP8.5 and 1758 species under RCP4.5. The most affected groups under RCP8.5 were molluscs, algae, and amphibians, while it was molluscs, birds, and vascular plants under RCP4.5. Spatially, by 2070–2099, we projected an overall decrease in climate suitability for 39% of the cells in the study area under RCP8.5 and 10% under RCP4.5, while projecting an increase for 50% of the cells under RCP8.5 and 73% under RCP4.5. The most consistent geographical shifts were upward, southward, and eastward. We found that the coverage of high climate suitability cells by protected areas was expected to increase. Our models

and maps provide guidance for spatial conservation planning by pointing out future climate-suitable areas for biodiversity." (Authors)] Address: Adde, Antoine, Dept Aquatic Ecol., Eawag, Swiss Federal Institute of Aquatic Science & Technology, Dübendorf, Switzerland. Email: antoine.adde@eawag.ch

23776. Aleena, K.J.; Deva, G.S.H.; Munirathinam, M.J. (2024): Diversity assessment of odonates in Bheemanakuppe, South Bengaluru. *Insect Environment* 27(3): 344-349. (in English) [Bangalore, India, NPKL 4th Block Lake, 12.91442265419-682, 77.4342195876245 in Bheemanakuppe, Bengaluru. Ten odonate species are listed.] Address: Munirathinam, M.J., Dept of Zoology, St. Joseph's University Bengaluru-560027, India. Email: jayashankar.m@sju.edu.in

23777. Amaral, L.G.R.; Ferreira, E.D.F.; Oliveira, T.M.D. de; Vilela, D.S.; Jacques, G. de C.; Souza, M.M. de (2024): Odonata Community in a transition area between Atlantic Forest and Cerrado, Southern Minas Gerais, Brazil. *Entomobrasilia*. 17, (Oct. 2024), e1088.: 10 pp. (in English) ["The Atlantic Forest and Cerrado biomes are global biodiversity hotspots. Despite this, they are constantly losing their natural habitats, making it urgent to conduct fauna inventories for the conservation of taxa such as dragonflies. These insects provide fundamental environmental services to both aquatic and terrestrial ecosystems and are poorly sampled in some regions of Minas Gerais state. In this regard, the present study aimed to inventory the Odonata community in the surroundings of Luminárias, a municipality located in southern Minas Gerais state, Brazil. This area consists of a transition between Cerrado and Atlantic Forest, with biotic and abiotic attributes suggesting the creation of a Conservation Unit (CU) to provide data on the distribution of this taxon for future conservation actions. The study was conducted between 2023 and 2024, in 10 locations, totaling 690 hours of sampling effort. 57 species were recorded, distributed among seven families, with four species at some risk of extinction or with insufficient data, according to the IUCN or ICMBio. Considering the significant richness of Odonata fauna obtained in this study, which includes threatened species, it is urgent to establish management actions for the protection of these populations, including the creation of a CU." (Authors)] Address: Amaral, Lara, Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas Gerais, Inconfidentes, MG, Brazil. Email: laramaral.bio@gmail.com

23778. Amusan, B.O.; Akin-Aina, O.F. (2024): Diversity and seasonal abundance of aquatic insects associated with the littoral zone of a tropical inland water. *Futa. Journal of Life Sciences* 4(1): 14-21. (in English) ["Aquatic habitats harbour a great diversity of insects which either live permanently or spend certain stages of their life cycle in water. These insects are of significant importance as they play vital ecological roles in the freshwater ecosystem. This has made the analysis of their structural composition a veritable tool in ecological assessment. This study presented a record of the aquatic insects associated with the littoral zone of Osinmo Reservoir with the aim of determining the diversity and health status of the littoral zone of the waterbody. Aquatic insects were sampled every two months covering both Wet and Dry season between November, 2021 and October, 2022. Aquatic insects were collected using kick method and hand picking. A total of 397 specimens of aquatic insects distributed in seven (7) Orders and seventeen (17) genera were recorded in this study. Odonata dominated the collection as it accounted for the highest diversity and abundance (105) which constituted 26.4% of the entire insect collection. Diptera was

equally numerically dominant as a total of 85 specimens of mosquitoes were recorded in this study. Overall, more insect were recorded in the dry season (223) as compared with the wet season (174) but the EPT orders were more abundant in the wet season. The diversity and abundance of the aquatic insects coupled with the abundance of the EPT orders indicated the pristine condition in the littoral zone of the waterbody." (Authors) Taxa are treated at genus level.] Address: Amusan, B.O., Dept of Zoology, Obafemi Awolowo University, Ile-Ife, Nigeria. Email: tundeamusan5@yahoo.com

23779. Anagonou, G.H.; Gandji, K.; Salako, K.V.; Houeto-hossou, A.; Zannou, E.T.; Mensah, G.A.; Assogbadjo, A.E.; Chadare, F.J. (2024): Socio-economic and cultural drivers of local perceptions and willingness to consume of edible insects in Benin. *Future Foods* 10:100424: 11 pp. (in English) ["Insects serve as alternative protein sources for humans. While entomophagy, the practice of eating insects, has deep historical roots in some regions, it remains less common in Benin. Understanding perceptions and determinants of entomophagy can guide actions for promoting the consumption of edible insects. The present study aimed to assess local perceptions of consuming edible insects and the drivers of their adoption. An ethnozoological study using interviews was conducted with 450 individuals from rural and peri-urban areas in Benin's humid and semi-arid zones. Data were analyzed using descriptive statistics, univariate inference, and classification models. Findings showed greater acceptance of insects' consumption in the semi-arid zone (33.56%) than in the humid zone (23.11%) and in rural areas (33.11%) than in peri-urban areas (23.56%). Edible insects' consumption was also higher in rural areas (34.22%) than in peri-urban areas (27.11%), with no significant difference between biogeographical zones. Gender, age, and biogeographical zones were key determinants of local perceptions regarding the consumption of edible insects. Furthermore, factors influencing the decision to adopt the consumption of edible insects included perceptions of their nutritional value, gender, duration of residence, and geographical location. These factors can inform awareness raising about the usefulness of edible insects in promoting their consumption." (Authors) The paper includes a passing note to Odonata.] Address: Gandji, Kisito, Lab. de Biomathématiques et d'Estimations Forestières, Fac. des Sciences Agronomiques, Univ. d'Abomey-Calavi, Abomey-Calavi, Bénin. Email: gkisito@gmail.com

23780. Aracheloff, C.; Garrouste, R.; Nel, A.; Godoy-Diana, R.; Thiria, B. (2024): Subtle frequency matching reveals resonant phenomenon in the flight of Odonata. *Journal of The Royal Society Interface* 21(219): 20240401: 10 pp. (in English) ["In this work, we investigate the connection between the flight flapping frequency and the intrinsic wing properties in Odonata. For such large flying insect species, it has been noted that the wingbeat frequency is significantly lower than the structural resonance of the wing itself. However, the structural resonance mechanism is often evoked in the literature for flying and swimming animals as a means to increase locomotion performance. Here, we show that the flight of Odonata is based on a nonlinear mechanism that strongly depends on the wingbeat amplitude. For large flapping amplitudes (as observed in natural flight), the resonant frequency of the wings decreases with respect to its value at low amplitudes to eventually match the wingbeat frequency used in flight. By means of this nonlinear resonance, Odonata keep a strong wing stiffness while benefiting from a passive energy-saving mechanism based on the dynamic softening of the wing." (Authors)] Address: Aracheloff, Camille, Lab. de Physique et Mécanique des Milieux Hétérogènes (PMMH),

CNRS UMR 7636, ESPCI Paris - PSL University, Sorbonne Université, Université Paris Cité, Paris 75005, France. Email: camille.arachelloff@mnhn.fr

23781. Archibald, S.B.; Cannings, R.A. (2024): Three new Odonata species (cf. Cephalozygoptera and cf. Dysagrionidae) from the early Eocene Okanagan Highlands of British Columbia, Canada, and Washington, United States of America. *The Canadian Entomologist* 156, e35: 1-9. (in English) ["Three new species of Ypresian (early Eocene) Odonata are described: *Paradysagrion sosbyae* gen. and sp. nov. from the Klondike Mountain Formation at Republic, Washington, United States of America, and *Dysagrionites allenbyensis* sp. nov. and *Allenby* gen. and sp. A from the Allenby Formation near Princeton, British Columbia, Canada. All three are assigned to the Dysagrionidae and Cephalozygoptera but only tentatively, as key diagnostic morphology is missing from their incomplete fossils. The definition of the collective genus *Dysagrionites* is broadened to include odonates tentatively assigned to the Dysagrioninae (Dysagrionidae) that are distinct as species but have unclear nominal genus affinity." (Authors)] Address: Archibald, S.B., Beaty Biodiversity Museum, University of British Columbia, Vancouver, British Columbia, V6T 1Z4, Canada. Email: Bruce.Archibald@ubc.ca

23782. Augul, R.S.; Al-Saffar, H.H.; Ali, H.B. (2024): Survey of Insects Fauna of Al-Tar Caves in Karbala, Iraq. *Indian Journal of Ecology* 51(4): 877-882. (in English) ["The Al-Tar caves are geologically important sites due to their location in a semi-desert area and proximity to Al-Razzaza Lake in Karbala, Iraq. Multiple surveys were conducted from September 1, 2020, to November 15, 2020, to collect and identify the insect species that occur inside and around these caves. During this investigation, a variety of species were collected from different orders and families. These include Blattodea (Termitidae), Orthoptera (Acrididae), Odonata (*Crocothemis servillia*), Diptera (Muscidae and Calliphoridae), Coleoptera (Meloidae and Tenebrionidae), and Hymenoptera (Formicidae and Sphecidae). Beetle species showed a high degree of diversity compared to the insect species in other groups during the study period." (Authors)] Address: Augul, R.S., Iraq Natural History Research Center & Museum, Univ. of Baghdad, Iraq. Email: dr.rsha@nhm.uobaghdad.edu.iq

23783. Ballén-Guapacha, A.V.; Ospina-Garcés, S.M.; Guevara, R.; Sánchez-Guillén, R.A. (2024): Reproductive character displacement: insights from genital morphometrics in damselfly hybrid zones. *Heredity* 133(6); DOI: 10.1038/s41437-024-00719-9: 355-368. (in English) ["Reproductive Character Displacement (RCD) refers to the phenomenon of greater differences in reproductive characters between two species when they occur in sympatry compared to when they occur in allopatry to prevent maladaptive hybridization. We explored whether reinforcement of a mechanical barrier involved in the first contact point between male and female genital traits during copulation in the cross between *Ischnura graellsii* males and *Ischnura elegans* females has led to RCD, and whether it supports the lock-and-key hypothesis of genital evolution. We employed geometric morphometrics to analyze the shape and size of male and female genital traits, controlling for environmental and geographic factors. Consistent with an increase in mechanical isolation via reinforcement, we detected larger divergence in genital traits between the species in sympatry than in allopatry, and also stronger signal in females than in males. In the Northwest (NW) hybrid zone, we detected RCD in *I. graellsii* males and *I. elegans* females, while in the Northcentral (NC) hybrid zone we detected RCD only in *I. elegans* females

and *I. elegans* males. The detection of RCD in both sexes of *I. elegans* was consistent with the lock-and-key hypothesis of genital evolution via female choice for conspecific males in this species. Our study highlights the importance of using geometric morphometrics to deal with the complexity of female reproductive structures while controlling for environmental and geographic factors to investigate RCD. This study contributes valuable insights into the dynamics of reproductive isolation mechanisms and genital coevolution." (Authors)] Address: Sánchez-Guillén, Rosa Ana, Instituto de Ecología A. C. (INECOL), Red de Biología Evolutiva, 91093, Xalapa, Veracruz, México

23784. Barbosa dos Santos, F.M.; Juen, L.; Cajaiba, R.L.; Pereira de Sousa, J.R. (2024): Distribution of the Odonata assemblages along an environmental gradient in the streams of the legal Amazonia region in western Maranhão (Brazil). *Journal of Insect Conservation* 28: 651-663. (in English) ["Understanding the distribution patterns of biodiversity is a pivotal challenge in ecology, exacerbated by the escalating frequency of anthropogenic events with severe consequences. This urgency underscores the need for comprehensive investigations, as exemplified by our study, which focuses on evaluating the effects of environmental and spatial variables on Odonata distribution across a gradient of vegetation cover in the eastern Amazonia landscape. In our investigation, we aimed to test the hypothesis that the distribution pattern of species Zygoptera is significantly different from that of species in Anisoptera, considering that the environment is a more important factor for Zygoptera. Sampling was conducted across 27 streams within a landscape altered by various human activities, resulting in changes to riparian forests, sediment influx, and bank destabilization. Environmental alterations were quantified using the Habitat Integrity Index (HII) in conjunction with water's physical-chemical variables. We register 29 Odonata species/morphospecies, reflecting a significant biodiversity. Our hypothesis regarding the differing distribution patterns of species from the Odonata suborders Anisoptera and Zygoptera due to their ecophysiological distinctions was confirmed. This underscores that environmental and spatial factors serve as the primary determinants shaping the structure of Zygoptera suborder assemblages, given that the studied streams harbored environments that greatly impede the dispersal of species within this suborder. This study contributes valuable insights into the interplay between environmental changes induced by land use alterations and the resulting impacts on Odonata biodiversity in the Amazonian landscape." (Authors)] Address: Barbosa dos Santos, F.M., Laboratory of Environmental Sciences and Bioaffiliation, Universidade Estadual do Maranhão, Cidade Universitária Paulo VI, Av. Lourenço Vieira da Silva, nº 1000, Jardim São Cristóvão, São Luís, MA, CEP 65055-310, Brazil

23785. Bello, L.; Albó, A.; Aymerich, P.; Buchaca, T.; Caner, J.; Cardarelli, E.; Corapi, A.; Nogué, L.; Osorio, V.; Sabás, I.; Sacchi, G.; Suraci, F.; Ventura, M.; Tiberti, R. (2024): Introduced fish reduce the occurrence of shrews in alpine lakes. *Biological Conservation* 299, 110830: 12 pp. (in English) ["Widespread fish introductions into originally fishless mountain lakes have had severe consequences for native biota, including aquatic macroinvertebrates, which provide important food subsidies for terrestrial and semiaquatic insectivores like shrews (Fam. Soricidae). Since both fish and shrews rely on aquatic macroinvertebrates as food, whether in their larval or imaginal stage, we investigated if fish presence had adverse effects on shrews. Baited tubes were deployed to monitor the presence/absence of shrews by collecting their

scats in lakes with and without fish in the western Italian Alps. Only two species, the Valais shrew (*Sorex antinorii*) and the Eurasian water shrew (*Neomys fodiens*), were found inhabiting the lakes' edges, where they fed on aquatic insect subsidies. The results indicate a significant pattern of exclusion between shrews and introduced fish. This negative association was especially evident in the presence of large-bodied fish (i.e., salmonids), but also of small fish (i.e., cyprinids). Consistently, compared to naturally fishless lakes, those with fish exhibit a lower availability of aquatic prey, representing a significant portion of the diet of both shrew species. Overall, our findings suggest that the impact on shrews may be mediated by a complex interplay of competition and predation between fish and shrews. Fish impacts may extend beyond the lakes to insectivorous mammals in surrounding areas. We recommend that the potential benefits to species and habitats reliant on aquatic subsidies be considered and integrated into conservation and restoration plans, and that these findings be communicated to the public to foster greater support for restoration efforts." (Author)] Address: Bello, L., University of Calabria, Dept Biol., Ecology & Earth Sciences (DiBEST), Ponte Pietro Bucci, 4B, 87036 Rende, CS, Italy

23786. Benediktov, A.A., (2024): Review of species diversity of dragonfly (Odonata) in the Kuskovo Forest Park before improvement measures on its territory in 2022. Bull. Moscow Society of Naturalists. Biological Ser. 2024. V. 129. N 4: 3-13. (in Russian, with English summary) ["In 2019–2021 Monitoring of dragonfly imagines was carried out in the Kuskovo forest park. Data of scientific articles of the 19th century and up-to-date information from nature photographers since 2016 were analyzed. 24 species out of 25 was discovered and confirmed. Five species out of 24 are included in the Moscow Red Data Book, and other 19 to Appendix – «List of species of animals, plants, and fungi that are not included in the Red Data Book of the city of Moscow, but require constant control and observation on the territory of the city». This data is used for analyzing changes in the Odonata fauna after the improvement measures in 2022, which caused habitat destruction of Kuskovo ponds. Recovery of local dragonfly diversity is being discussed." (Author)] Address: Benediktov, A.A., Moscow State University, Biology Faculty, Moscow, Russia. Email: entomology@yandex.ru

23787. Bensaid, L.F.Z. (2024): Recherche de la valeur indicatrice des Macroinvertébrés dans deux cours d'eau du bassin versant de la Tafna. MSc thesis, Ecologie animale, Faculté des Sciences de la Nature et de la Vie, et des Sciences de la Terre et l'Univers département de l'écologie et de l'environnement Laboratoire de Recherche Valorisation des Actions de l'Homme pour la Protection de l'Environnement et Application en Santé Publique, Université Aboubaker Belkaid Rtlmen: 82 pp. (in French, with Arabian and English summaries) ["A study of benthic macroinvertebrates is being carried out in two rivers in the Tafna catchment, in western Algeria, to understand the physical structure of the rivers and establish links with community structure. Our main objective is to use the IndVal index to identify the indicator value of species in relation to the physical conditions of the environment. The five macroinvertebrate groups used are Odonata, Ephemeroptera, Trichoptera, Coleoptera and Diptera Simuliidae. These insects are studied for their ecological roles and their morphological, biological and ecological characteristics. Of the 33 types of microhabitat individualised, more than half (55%) have slow currents, eroded or heterogeneous substrates, with aquatic vegetation and little sunlight. The richness and diversity of the communities is generally low. The IndVal analysis, used to determine the

indicator value of species, is based on the fidelity and relative abundance of species in specific microhabitat groups. The IndVal index scores obtained highlighted 15 bioindicator species physical conditions. This information is invaluable for the management and conservation of aquatic habitats." (Author) The following odonate species are listed: *Platycnemis subdilatata*, *Pyrrhosoma nymphula*, *Ceriatrigon tenellum*, *Erythromma lindenii*, *E. viridulum*, *Ischnura pumilio*, *I. graellsii*, *Coenagrion scitulum*, *Calopteryx haemorrhoidalis*, *C. splendens*, *C. exul*, *Lestes virens*, *L. barbarus*, *L. viridis*, *Sympetrum fusca*, *Orithetrum nitidinerve*, *Sympetrum striolatum*, *S. fonscolombii*, *Trithemis kirbyi*. *Crocothemis erythraea*, *Anax imperator*, *A. parthenope*] Address: http://dspace1.univ-tlemcen.dz/bitstream/112/22975/1/BENSAID_linda_fatima_zohra.pdf

23788. Borisovskiy, A.G.; Adakhovskiy, D.A.; Dedyukhin, S.V. (2024): Rare and specially protected species of insects on one of the sections of the right bank of the Nizhnekamsk reservoir (Almaly area, Agryz district, Republic of Tatarstan). Bulletin of the Udmurt University 34(3): 251-265. (in Russian, with English summary) ["In the course of long-term studies (2008–2024), a high concentration of rare and specially protected insect species (a total of 23 species from 5 orders) was revealed in a local area of the high right bank of the Lower Kama River (Almaly area, Agryz district, Republic of Tatarstan). In this territory, located at the northern border of the forest-steppe, 3 species listed in the Red Book of the Russian Federation (*Anax imperator*, *Protaetia speciosissima*, *P. fieberi*) and 15 species included in the Red Book of the Republic of Tatarstan were found. Analysis of the distribution of species showed that 10 of them are located here at the northern border of their ranges, including typical representatives of the steppe complex (*Licinus cassideus*, *Blaps halophila*, *Dibolia metallica*, *Ceutorhynchus potanini*, *Datonychus transsylvanicus*, *Melanargia galathea*, *Messor structor*)." (Authors) The additional second dragonfly species documented is *Aeshna grandis*.] Address: Borisovskiy A.G, Candidate of Biology, Head of Laboratory, Educational & Scientific Laboratory of Applied Ecology, Department of Botany, Zoology & Biocology, Udmurt State Univ. Universitetskaya st., 1/1, Izhevsk, Russia, 426034. Email: borisovscky.alexander@yandex.ru

23789. Borkenstein, A.; Jödicke, R. (2024): Endogenes Aufwärmern durch Flügelschwirren bei immaturren *Leucorrhinia rubicunda* (Odonata: Libellulidae). *Drosera* 41: 29-32. (in German, with English summary) ["Endogenous warming by wing-whirring in immature *Leucorrhinia rubicunda* (Odonata: Libellulidae). – Immatures of *L. rubicunda* that were unable to fly due to cold began to warm up their body by wing-whirring when disturbed and were able to fly off after 90 seconds at the latest. This endothermic form of temperature regulation is described here for the first time in detail and compared with the morning warm-up by wing-whirring of mature individuals already known from this species. By combining flight-muscle work (endothermy) with a finely balanced site selection and body posture in direct sunlight (ectothermy), *L. rubicunda* has a particularly effective ability to regulate its thorax temperature. This enables an early start of the flying season by helping the species to survive even cold periods in spring." (Authors)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany. EMail: angelikaborkenstein@t-online.de

23790. Brauner, O. (2024): Dritter Zwischenbericht zur Untersuchung der Libellen-, der Amphibienfauna sowie der Vegetation im Jahr 2023 im Rahmen der Revitalisierung der Schmelzwasserrinne Plänitz nordwestlich Neustadt/Dosse. Auftraggeber: Stiftung NaturSchutzFonds Brandenburg, Heinrich-

Mann-Allee 18/19, 14473 Potsdam: 36 pp. (in German) [Brandenburg, Germany "Conclusion The current faunistic mapping of the Plänitzrinne, which was revitalized in autumn 2016, shows a rapid colonization of the animal groups of amphibians and dragonflies examined. In the study year 2023, 26 dragonfly species were already recorded on the Plänitzrinne. In 2019, 21 dragonfly species were mapped, and in 2018 a total of 17. For all three study years combined, 33 dragonfly species have already been identified on the Plänitzrinne. This corresponds to just under half (approx. 47%) of the 70 species now known for Brandenburg (Mausersberger et al. 2016, Günther 2019). The dragonfly community of the newly created body of water can therefore be classified as extraordinarily species-rich. In the current investigations in 2023, 21 of the 26 species were classified as currently native through exuviae finds and/or through the observation of newly hatched animals. The current status of four other species was unclear. They were/are probably mostly in the process of becoming native, at least temporarily. This is also indicated by the reproductive and territorial behavior observed in several of these species. In comparison, 14 species were classified as (potentially) native in 2019. In 2018, however, only seven species achieved this status. For seven other species (2019: three), the status was still unclear at that time. When looking at the ecological groups, the currently native species were predominantly widespread species of ponds and small bodies of water (2023: 12 species, 2019: 10 species, 2018: 4 species), of bodies of water with emerged structures (2023/ 2019: 3 species, 2018: 2 species). As a result of the significant spread of the reedbed structures by cattails and in some places also by reeds, there was also an increase in the characteristic species of the structurally rich reedbeds (2023: 3 species; 2018/ 2019 1 species each). *Brachytron pratense*, of which three patrolling males were recorded in 2023 and whose status was currently assessed as still uncertain, also belongs to this ecological requirement type. In 2023, two males of the state and nationally endangered species *Lestes dryas* were recorded for the first time. As a result of the significant increase in riparian woody plants in some areas, particularly on the northern bank (especially silver birch, occasionally also black alder and pine), numerous exuviae and adults of *Lestes viridis*, which has been recorded for laying eggs on riparian woody plants, were also recorded in 2023.... With a further increase in emerged and submerged vegetation and thus in egg-laying structures and hiding places from predators, the living conditions for most dragonfly and amphibian species are likely to improve in the future. However, care must be taken to ensure that the water does not become overgrown or silted up too quickly due to overly dense vegetation." (Author/google translate)] Address: https://www.naturschutzfonds.de/fileadmin/nsf/Dokumente/Projekte/EKK/LibellenAmphibien_Gutachten_Plaenitz_rinne_2023_Endfass._O.Brauner.pdf

23791. Brochard, C.; Groenendijk, D.; van der Ploeg, E.; Termaat, T. (2024): Handboek Libellenlarven en hun huidjes - Noordwest-Europa. KNNV: 552 pp. (in Dutch) ["Handbook of Dragonfly Larvae and Their Skins" bundles all available knowledge about ecology and is specifically aimed at the determination of all 87 species of dragonfly larvae and their skins in Northwestern Europe. The work contains a determination key, species descriptions and unique photo material showing all the details. More than 2500 unique photos of the larval skins, the larvae, the adult dragonflies and the habitat. Describes 87 species of Anisoptera and Zygoptera for North-West Europe. Extensive species descriptions and identification key for the dragonfly larvae and skins. Comparative plates of larvae and their skins and important details. Photos of the adult dragonfly and habitat with the hatching sites indicated

Identification, rarity, occurrence and ecology and behaviour. Background information about searching, collecting, preparing and creating your own collection. A unique handbook for enthusiasts and professionals such as students, ecologists, nature managers and researchers. 'Handbook of dragonfly larvae and their skins' is a completely revised and updated edition of the previously published photo guides 'Larvenhuidjes van Libellen' and 'Larven van Libellen'." (Publisher/google translate)] Address: <https://knnvuitgeverij.nl>

23792. Brockhaus, T. (2024): Stirbt die Alpen-Smaragdlibelle *Somatochlora alpestris* (Selys, 1840) im Erzgebirge aus? Eine Diskussion anhand ihrer Entwicklungszyklen und klimatischer Ereignisse in den Jahren 2018 bis 2023 (Odonata, Corduliidae). *Entomologische Nachrichten und Berichte*, 68: 394-401. (in German, with English summary) ["Will the Alpine Emerald *Somatochlora alpestris* (Selys, 1840) become extinct in the Erzgebirge? A discussion based on its developmental cycles and climatic events in the years 2018 to 2023. (Odonata, Corduliidae) – *S. alpestris* has become recently very rare in the Erzgebirge. The sparse reproduction records from 2023 concern a few or only single exuviae. The reason for this development is the reduction of breeding waters as a result of very dry, warm summers since 2018. Since the larvae develop over several years in mostly small peat moss waters, it was important to determine how many years it takes in the Erzgebirge for the imago to emerge. Morphometric measurements on larvae and exuviae, compared with known data on the morphometry and developmental time of the individual larval stages, showed a predominantly three-year developmental period. The evaluation of climatic data collected near important raised bogs revealed extreme situations in the summers of 2018 and 2019. Long dry periods with unusual maximum temperatures caused many development sites to dry out. This particularly affected the embryonic development and the young larvae of the years 2018 and 2019, which led to a reduction of the imaginal populations from around 2021. The number of occurrences was reduced by two thirds. Since the climatic conditions in the summer and autumn months have stabilized again since 2020, there is hope that the species will be preserved in this natural area." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

23793. Buczynski, P.; Rychla, A.; Tanczuk, A.; Tarkowski, A.; Bojar, P.; Czechowski, P.; Daraz, B.; Dubicka-Czechowska, A.; Golab, M.J.; Greinke, M.; Jasnosz, K.; Juraszczyk, A.; Libera, A.; Libera, K.; Oldaki, K.; Orlikowski, M.; Orzechowski, R.; Penk, A.; Rauner-Bulczynska, E.; Roczynska, J.; Rosiak-Stepa, K.; Sadowska, G.; Stefaniak, M.; Struk, A.; Sniegula, J.A.; Sniegula, S.; Tonczyk, G.; Wisniewski, K.; Zapart, A.; Zóralski, R. (2024): Wazki (Odonata) stwierdzone podczas XX Sympozjum Sekcji Odonatologicznej Polskiego Towarzystwa Entomologicznego w 2024 r. we Wdzydzkim Parku Krajobrazowym (Bory Tucholskie, Polska północna) Dragonflies (Odonata) recorded during the 20th Symposium of the Odonatological Section of the Polish Entomological Society in 2024 in the Wdzydze Landscape Park (Tuchola Forest, northern Poland). *Odonatrix* 209 (2024): 1-21. (in Polish, with English summary) ["From May 30th to 2nd June 2024, the participants of the 20th Symposium of the Odonatological Section of the Polish Entomological Society conducted field observations on dragonflies and damselflies in the Wdzydze Landscape Park (WPK) (N Poland). A total of 15 sites were visited and 35 species were recorded, 34 of them being autochthonous or probably autochthonous. Detailed comments are provided for 13 species, distinguished for their 1) legal protection (Ophiogomphus

cecilia, *Cordulegaster boltonii*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*), 2) threat status at the continental scale and/or within the European Union (*Lestes sponsa*, *Coenagrion hastulatum*, *Aeshna grandis*, *Somatoclora metallica*, *Leucorrhinia albifrons*, *L. dubia*, *L. rubicunda*), 3) role as umbrella species (*Onychogomphus forcipatus*, *O. cecilia* and *C. boltonii* for small forest streams; *L. albifrons*, *L. dubia* and *L. pectoralis* for *Sphagnum* peat bogs) and/or 4) rarity in this area (*Crocothemis erythraea*). The results emphasize the high value of the WPK in terms of species diversity, the numerous records of protected and endangered species, as well as the scarcity of "southern" species not yet fully established in this area. Furthermore, the species composition of its dragonfly fauna has remained remarkably stable over the past twenty years, demonstrating the area's great resilience to unfavourable climate trends. This resilience is likely to be critical for the maintenance of populations of odonate species particularly sensitive to such changes." (Authors) Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

23794. Buczynski, P. (2024): 7-1.2. Dragonflies (Odonata). Environmental Engineering in Polesye: International Scientific Monograph. Book 3: 537-546. (in English) ["The odonofauna of Lublin Polesye is rich in species (65 species - 88% of the fauna of Poland) and ecologically diversified in a way typical for areas with a large number of different aquatic and wetland habitats. The western and eastern shores of the region are large river valleys with fauna typical of hydrologically dynamic areas, with well-preserved habitat systems and elements of Potamocene fauna. The central part is poorer in running water and dominated by marshes and bogs lying in areas of no or slow drainage, with a fauna typical of such habitats. A specific lake fauna has also developed in the Leczna-Włodawa Lake District. Western Polesye started to be anthropogenically transformed already in the 19th century, with many areas being reclaimed and subjected to economic activities. Despite this, the area of naturally valuable habitats and well-preserved dragonfly fauna remains significant, and many traditional management methods - now sadly abandoned - are conducive to maintaining this state. Today, however, the aquatic habitats of Polesye and their dragonflies are under increasing threat. The most adverse factor is climate warming, which exacerbates the effects of other environmental changes. Area-based protection does not prevent these threats; for the survival of many species and association it seems necessary to implement active protection methods, such as water damming, interference in the succession of vegetation in water bodies and peatlands, mowing of peatlands or controlled grazing to prevent overgrowth by trees and shrubs. It is also necessary to start actively using the potential of anthropogenic waters, especially peat-pits, sand pits and retention basins." (Author)] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

23795. Buczynski, P., Tanczuk, A.; Tarkowski, A. (Organizers) (2024): „Wazki (Odonata) Borów Tucholskich” Program symposium i książka abstraktów ["Dragonflies (Odonata) of the Tuchola Forest" Symposium Program and Book of Abstracts]. XX Ogólnopolskie Sympozjum Odonatologiczne Sekcja Odonatologiczna PTE. 30 V—2 VI 2024 r. Schodno, Wdzydzki Park Krajobrazowy — Bory Tucholskie: 18 pp. (in Polish or English) [Abstracts of the following lectures are presented: Dragonflies (Odonata) of the Tuchola Pinewoods; "Second hand"? On the use of dragonfly (Odonata) exuviae by other invertebrates; Russian and Ukrainian names of the

dragonflies of Ukraine; Oxidative stress in damselfly in the broad latitudinal gradient; Forktail damselflies (*Ischnura*) – dragonflies with impressive dispersal abilities; Immediate and delayed impact of environmental stressors on traits in the blue-tailed damselfly; Dragonflies of Cyprus – review of observations during International Congress of Odonatology.] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

23796. Cao, Y.; Li, Y.; Gao, Z.-Y.; Zhang, X.-G.; Jiang, B.-T.; Wang, H.-B. (2024): Genetical and Morphological Identification of *Prosthogonimus pellucidus* (Digenea, Prosthogonimidae) in *Grus japonensis*. *Biology* 2024, 13, 900. <https://doi.org/10.3390/biology13110900>: 9 pp. (in English) ["Simple Summary: Species of the family Prosthogonimidae are considered the most pathogenic trematodes of poultry and wild birds worldwide, causing heavy economic losses in many countries. The authors of this study conducted morphological and molecular identification of *Prosthogonimus pellucidus*. These data provide significant molecular markers for the study of taxonomy, population genetics, and systematics of Prosthogonimidae. Abstract: Species of the family Prosthogonimidae are considered the most pathogenic trematodes of poultry and wild birds worldwide, causing heavy economic losses in many countries. Prosthogonimosis was a common parasitic disease of *Grus japonensis* (Müller, 1776) which caused inflammation of the cloaca and bursa of Fabricius and even death. Morphological identifications of *Prosthogonimus* species are easily confusing; therefore, molecular characterization is used for discrimination. The present study was conducted to identify *Prosthogonimus* species at Zhalong National Nature Reserve, north-east of China. Considering the morphological variability and wide host range of individual *Prosthogonimus* species, a combination of both morphological and molecular analyses is indispensable for the valid identification of this parasite and the internal transcribed spacer (ITS) region was amplified for the sequence analysis and phylogenetic analysis. The results of molecular analysis together with phylogenetic reconstruction indicated that the *Prosthogonimus pellucidus* (von Linstow, 1873) in this study form a single cluster with *P. pellucidus*, revealing potentially high diversity within the genus *Prosthogonimus*. Classification of *Prosthogonimus* species seems to be unrelated to the host and may be related to geographical location. These data provide a significant resource of molecular markers for studying the taxonomy, population genetics, and systematics of Prosthogonimidae." (Authors) The life cycle of *Prosthogonimus* spp. - including larvae of Odonata - is briefly outlined.] Address: Cao, Y., Heilongjiang Academy of Agricultural Sciences Branch of Animal Husbandry and Veterinary Branch, Qiqihar 161005, China. Email: yu_cao2021@163.com

23797. Casanueva, P.; Santamaría, T.; Sánchez-Sastre, L.F.; Campos, F. (2024): Reproducción de *Anax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) en las provincias de Ávila y Salamanca, centro de España. *Boletín de la Sociedad Entomológica Aragonesa* 74: 245-247. (in Spanish, with English summary) ["Data are provided from two places where the reproduction of *Anax ephippiger* has been proven: one in the province of Salamanca and another in the province of Ávila, 120 km apart. Both constitute confirmation of this species as a breeder in Castilla-León." (Authors)] Address: Casanueva, Patricia, Department of Experimental Sciences, European University Miguel de Cervantes, CI Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pccasanueva@uemc.es

23798. Cham, S. (2024): Colour variants of female *Coenagrion pulchellum* Vander Linden (Variable Damselfly) in populations in England. *Journal of the British Dragonfly Society* 40(2): 87-108. (in English) ["Females of *C. pulchellum* exhibit a range of colouration. The immature colour variants, transitional colouration and their duration are poorly understood and recorded. The terminology used in guides for identification is inconsistent when describing the observed colour variants. This paper discusses the development of colouration and proposes an alternative approach to describing colouration of females and the transitional changes." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Bedfordshire SG16 6LQ, UK

23799. Cham, S. (2024): Observations of male-female heterospecific connection between a male *Ischnura pumilio* Charpentier (Scarce Blue-tailed Damselfly) and a female *Coenagrion mercuriale* Charpentier (Southern Damselfly). *Journal of the British Dragonfly Society* 40(2): 84-86. (in English) ["An unusual heterospecific male-female coupling involving two genera (*Ischnura* and *Coenagrion*) was observed that resulted in full copulation." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Bedfordshire SG16 6LQ, UK

23800. Chandler, M.; Davis, D.; Newton, L.; Goodman, A.; Ware, J. (2024): Looking out for the little guy: species distribution modeling and conservation implications of the elfin skimmer *Nannothemis bella* (Odonata: Libellulidae). *International Journal of Odonatology* 27: 232-242. (in English) ["*Nannothemis bella* Uhler, 1857 (Odonata: Libellulidae), the smallest dragonfly in North America, inhabit bogs and sedge fens across their distribution, spanning from Quebec (Canada) south to Florida and west to Minnesota and Louisiana (USA). While common in the northern part of their range, *N. bella* is of conservation concern in the southern populations where they are disjunct and rare. Little work has been done on the ecology and geographic conservation of this species. To fill this knowledge gap, we constructed species distribution models (SDMs) to analyze the spatial distribution and climatic niche of *N. bella*, define factors in habitat suitability and estimate potential niche shifts under climate change and inform conservation efforts. Our present-day SDMs indicate the dominant environmental elements determining habitat suitability include the proportion of silt in soil, temperature seasonality, percentage of clay and coarse components in soil, and soil class. Our paleodistribution models show a southern distribution within the last glacial maximum, with a shift northward 8,326 to 4,200 years ago. Our projected SDMs for 2050 under RCP 2.6 and RCP 8.5 predict a significant decrease in habitat suitability throughout the entire range of *N. bella*. As such, *N. bella* is a species of conservation concern and conservation measures are imperative for its continued existence as a much-needed bioindicator for these freshwater ecosystems. Additionally, this ecological knowledge provides the foundation for identifying population sites from which to collect *N. bella* for future population genetic studies." (Authors)] Address: Chandler, Maia, Swarthmore College, Swarthmore, PA, 19081, USA

23801. Chandran, A.V.; Chandran, R.; Jose, S.K.; Payra, A.; Koparde, P. (2024): *Melanoneura agasthyamalaica* sp. n. (Odonata, Platycnemididae) from the Western Ghats, India. *International Journal of Odonatology* 27: 213-226. (in English) ["*Melanoneura* Fraser, 1922 is a genus of damselflies which was, to date, regarded as monotypic. It is represented by the nominate species, *Melanoneura bilineata* Fraser, 1922 which is endemic to the Western Ghats in India. We describe the population of *Melanoneura* in the Agasthyamalai landscape

of the Western Ghats as a species new to science based on differences in the structure of male cerci, mesostigmal plates, genital ligulae, and the structure and marking of the prothorax. Subtle differences in body markings are also documented. Further, we demonstrate a significant genetic distance (7.2–7.4%) between the new species and *M. bilineata*, based on mitochondrial Cytochrome Oxidase I analysis. Our study combines morphological and genetic evidence to describe a new species belonging to the genus *Melanoneura*, cancelling its monotypic nature." (Authors)] Address: Chandran, A.V., Aqua Research Lab, Dept of Geology & Environmental Science, Christ College (Autonomous), Injalakuda, Thrissur, Kerala 680125, affiliated to the University of Calicut, Thenhpalam, Kerala 673635, India. Email: avivekchandran2@gmail.com

23802. Chasnoff Long, B.; Moyle, P.B.; Young, M.J.; Crain, P.K. (2024): Age, growth, and trophic ecology of the Redeye Bass, an introduced invader of California rivers. *Transactions of the American Fisheries Society* 153(5): 559-575. (in English) ["Objective: The Redeye Bass *Micropterus coosae* is a piscivore introduced into California, which has become a threat to the state's endemic freshwater fishes. It has eliminated native fishes from the middle reaches of the Cosumnes River, our study stream, which is the largest stream without a major dam on its main stem in the Sacramento–San Joaquin River drainage, central California, USA. We thoroughly documented its novel life history and ecology in California to shed light on why it has been such a successful invader despite its relatively small native range. Methods: Over 4000 stable carbon and nitrogen isotope samples were utilized to refine our understanding of fish trophic position within the river food web, along with a stable isotope mixing model that accounts for uncertainty in trophic enrichment data. Result: Growth was slow, with an adult size range of 9–25 cm standard length (SL), although few were larger than 15-cm SL (5–6 years old). Stable isotope analyses showed that Redeye Bass dominate the river ecosystem to the exclusion of most native fishes, occupying multiple trophic levels and microhabitats. Adults largely consumed non-native crayfish and large aquatic insects, while juveniles consumed aquatic insects, the size of prey increasing with Redeye Bass length. There was no evidence of cannibalism. Redeye Bass have effectively occupied the diverse trophic positions of at least four native fish species and have altered the trophic position of Rainbow Trout *Oncorhynchus mykiss* in sites where they co-occur with bass. Conclusion: The introduction of Redeye Bass poses a continuing threat to natively stream fishes in California and elsewhere." (Authors)] Address: Moyle, P.B., Center for Watershed Sciences & Dept of Wildlife, Fisheries, & Conservation Biology, University of California, Davis, Davis, California, USA. Email: pbmoyle@ucdavis.edu

23803. Chen, Z.; Xie, Y.; Meng, X. (2024): Unsteady aerodynamic forces of tandem flapping wings with different forewing kinematics. *Biomimetics* 9(9), 565; <https://doi.org/10.3390/biomimetics9090565>: 19 pp. (in English) ["Dragonflies can independently control the movement of their forewing and hindwing to achieve the desired flight. In comparison with previous studies that mostly considered the same kinematics of the fore- and hindwings, this paper focuses on the aerodynamic interference of three-dimensional tandem flapping wings when the forewing kinematics is different from that of the hindwing. The effects of flapping amplitude (Φ 1), flapping mean angle ϕ 1), and pitch rotation duration (Δt 1) of the forewing, together with wing spacing (L) are examined numerically. The results show that Φ 1 and ϕ 1 have a significant effect on the aerodynamic forces of the individual and tandem systems, but Δt 1 has little effect. At a

small L, a smaller Φ 1, or larger ϕ 1 of the forewing can increase the overall aerodynamic force, but at a large L, smaller Φ 1 or larger ϕ 1 can actually decrease the force. The flow field analysis shows that Φ 1 and ϕ 1 primarily alter the extent of the impact of the previously revealed narrow channel effect, downwash effect, and wake capture effect, thereby affecting force generation. These findings may provide a direction for designing the performance of tandem flapping wing micro-air vehicles by controlling forewing kinematics." (Authors)] Address: Meng, X., State Key Lab. for Strength & Vibration of Mechanical Structures, School of Aerospace Engineering, Xi'an Jiaotong University, Xi'an 710049, China. Email: mengxg@xjtu.edu.cn

23804. Cheng, C.-H.; Hsu, C.-H.; Hatch, K.A.; Hwang, W.; Chen, S.-L.; Chang, Y.-M. (2024): Cool season communal roosting of *Cratilla lineata* in a Taiwanese submontane forest (Odonata: Libellulidae). *Odonatologica* 53 (3-4): 385-407. (in English) ["We investigated communal nocturnal roosting aggregations of *C. lineata* in the Chia-Ling Lake area in Tainan, Taiwan. Communal roosting began during the colder months from late October to mid-March. The dragonflies roosted 2-4 m above the ground on slender vines such as *Bauhinia championii*, *Dalbergia benthamii*, *Hiptage benghalensis*, and *Pothos chinensis*, under open canopies along a forest path. The aggregations exhibited a sex ratio predominantly skewed towards males and their numbers were negatively correlated with daily mean temperature, indicating that more dragonflies roost as temperatures decrease. The dragonflies showed fidelity to specific roosts and vines. Roosting began between 15:30 h and 17:00 h CST (UTC+8) when light intensity was high (252-3 607 lux). They departed between 08:50 h and 12:00 h, 2-6 hours after sunrise, with light levels ranging from 1 103 to 9 567 lux. The mechanisms and adaptive value of this behaviour remain open to speculation." (Authors)] Address: Chang, Y.-M., Dept of Ecology & Environmental Resources, National Univ. of Tainan, 33 Su-Lin Street, Section 2, Tainan 700, Taiwan. Email: changyuanmou@gmail.com

23805. Chimdo, A. (2024): Spatial distribution and composition of benthic macro-invertebrate in upper Awash River, below and upper Ginchi town, West Shoa Zone, Ethiopia. *Applied Water Science* 14:239: 9 pp. (in English) ["The composition and distribution of macro-invertebrates of benthic species can be influenced by water quality. The primary objective of this study was to understand the spatial distribution and composition of macro-invertebrates of benthic nature in the upper Awash River below and above Ginchi Town. The study was carried out for a period of three months from February 2020 to April 2020, and macroinvertebrates samples were collected from three stations using Surber sampler with 500 μ m/mesh size and 25 cm \times 25 cm (0.0625 m²) of sampling area coverage. The present study showed that, in the study area, there was a low density of macro-invertebrates and species richness in general with a comparative difference between the pool riffle habitats in density and family richness. And the total abundance of benthic macro-invertebrates showed a positive correlation with NO₃-N, dissolved oxygen, and total phosphorus, while a negative correlation with all the other physicochemical parameters measured during the study period. Spatial and monthly variations in the diversity and richness of benthic macro-invertebrates were attributed to the effects of human action and changes in environmental factors. So, the water shade management system should be applied to control pollution factors that can affect the macro-benthic fauna community." (Author) In the riffle section of Station II, "Aeshnidae and Coenagrionidae" were found.] Address: Chimdo, A., Dept

Biol., College of Natural & Computational Sci., Ambo Univ., Ambo, Ethiopia. Email: ayana.chimdo@ambou.edu.et

23806. Chiorino, M.; Spreafico, C.; Solazzo, D.; Doretto, A. (2024): Biodiversity, ecological status and ecosystem attributes of agricultural ditches based on the analysis of macroinvertebrate communities. *Diversity* 2024, 16(9), 558; <https://doi.org/10.3390/d16090558>: 17 pp. (in English) ["Ditches are widespread and common elements of the agricultural landscape. Although they can provide habitats for aquatic biodiversity, their ecosystem integrity and processes are generally limited or even unknown due to anthropogenic pressures and the paucity of studies on this type of aquatic ecosystem. This study aimed to enhance the knowledge on the biodiversity, ecosystem attributes and ecological status of agricultural ditches by analyzing the macroinvertebrate communities of six different ditches and those of the main river in the same area. While negligible differences in taxonomic richness were observed, macroinvertebrate community composition significantly varied among sites as a function of the heterogeneous habitat conditions. These compositional differences strongly affected the relative abundance of functional feeding groups among sites and their derived ecosystem attributes. Moreover, the ecological status assessment depicted different scenarios depending on the biomonitoring indices applied. By means of a multifaceted, but still poorly adopted, analysis of the macroinvertebrate community, ranging from the taxonomic and functional diversity to ecosystem attributes and biomonitoring indices, the results obtained in this study offer useful information on the ecology of agricultural ditches with potential insights to improving their management." (Authors) Taxa - including Odonata - are treated at family level.] Address: Chiorino, Martina, Dept for Sustainable Development and Ecological Transition, University of Eastern Piedmont, Piazza Sant'Eusebio 5, 13100 Vercelli, Italy. Email: martina.chiorino@gmail.com

23807. Chovanec, A. (2024): Reproduktionsverhalten un- ausgefärbter Männchen der Blutroten Heidelibelle, *Sympetrum sanguineum* (Müller, 1764) (Odonata: Libellulidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 76: 11-17. (in German, with English summary) ["Reproductive behaviour of males of *S. sanguineum* in the colour of the prereproductive period. - Two observations are presented showing the reproductive behaviour of males with undeveloped colouration in *S. sanguineum*. The first case concerns a likely immature male in a homospecific-heterosexual tandem. This pair showed no reproductive behaviour apart from the tandem position. In the second case, mating including egg deposition is documented." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

23808. Chovanec, A. (2024): Libellenkundliche Untersuchung der Biotope im Prießnitztal / Mödling im Jahr 2024. Studie im Auftrag des Österreichischen Naturschutzbundes / Landesgruppe Niederösterreich, Mariannengasse 32/2/16, 1090 Wien. Dezember 2024: 64 pp. (in German) ["In the Prießnitztal in Mödling, on the eastern edge of the Wienerwald Biosphere Reserve (Lower Austria), three small bodies of water (KG) were created close to each other: KG1 in 1990, KG2 in 2011 and KG3 in 2017. These three bodies of water were the subject of a detailed dragonfly study in 2024. In the period from March 23rd to November 9th, 2024, 32 inspections were carried out, which provided evidence of 21 dragonfly species; 16 of these were definitely, probably or possibly native, i.e. reproducing in at least one of the bodies of water. Of particular note is the discovery of the definitely native

Sympetrum meridionale, which is threatened with extinction according to the Red List for Austria. In a study carried out in 1996 at KG1, 26 species were detected, of which 20 were classified as definitely, probably or possibly native. Despite the existence of three bodies of water with different characteristics, the number of species was significantly reduced in 2024. The main reasons are the strong shading of the three bodies of water by the surrounding tree and shrub vegetation, the overgrowth of KG1 by floating-leaf and submerged-leaf plants and of KG2 by reeds, and the (almost) complete drying out of KG3 (as a result of the leaky pond liner) and KG2 (due to the leaky clay pit). On the basis of the results obtained in the present study, measures are proposed to promote and sustainably strengthen the dragonfly community at this site. The study design implemented in 2024 was adapted to that of 1996 in order to achieve the best possible comparability of the results. In 1996, 26 mappings were carried out between May 4 and November 9. This methodological comparison also enabled phenological analyses, among other things. The increased temperatures caused by climate change led to significant differences between the emergence and flight times recorded in 2024 and those recorded in 1996 for most of the native species occurring in both years. For *Pyrhosoma nymphula*, for example, the flight period began about 1 month earlier. The detection of a *Sympetma fusca* that emerged in 2024 as early as June is also worth mentioning." (Author/Google translate).] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

23809. Chovanec, A. (2024): Eine Beobachtung von Kannibalismus bei *Imagines* der Großen Pechlibelle, *Ischnura elegans* (Vander Linden, 1820) (Odonata: Coenagrionidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 76: 1-9. (in German, with English summary) ["The present paper deals with an example of intraspecific imaginal predation in *I. elegans*. A cannibalistic interaction wherein an adult male feeds on a very young female, is documented for the first time in this species." (Author)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

23810. Clem, C.S.; McHugh, J.V. (2024): Documentation of diurnal and nocturnal migratory activity of the dragonfly *Anax junius* (Odonata: Aeshnidae) on Sapelo Island, Georgia, USA. *Southeastern Naturalist* 23(3): N54-N57. (in English) ["Here we report an incidental observation of migration of *A. junius* on Sapelo Island, GA, while conducting field work on 6–7 October 2023. Hundreds of dragonflies were observed moving in a western direction away from the Atlantic Ocean during daylight hours. That evening, ~35 individuals landed on a white sheet that was amplified using a mercury vapor lamp, suggesting that they were still active after sunset. This incident occurred simultaneously with a large southeasterly cold front that blew through that weekend. We suspect that the dragonflies were headed south and attempting to course-correct at ground level, after being blown out to sea at a higher altitude. Backwards-trajectory analyses of the air mass suggest that these insects could have flown hundreds of kilometers within a 24-hr period. To our knowledge, this is the first published record of dragonfly migration on Sapelo Island, GA, and possibly the first evidence of nocturnal migratory activity in this species." (Authors)] Address: Clem, C.S., School of Biological Sciences, Illinois State Univ., Julian Hall 210, Campus Box 4120, Normal, IL 61790-4120, USA

23811. Cochak, C.; Zanon, F.M.; Pineda, A.; Lansac-Toha, M.; Jati, S.; Machado Velho, L.F. (2024): Beta diversity of

freshwater algal communities: Influence of different dispersal mechanisms. *Aquatic Sciences* 86(26): (in English) ["This study investigates the impact of different dispersal vectors, such as amphibians and Odonata, on the temporal beta diversity of freshwater algae in a 33-day field experiment conducted in 2018. Four treatments were employed, including a control group, exclusive amphibian dispersal, exclusive Odonata dispersal, and a mixed dispersal group. In total, we identified 76 algal species, each influenced by specific dispersal patterns associated with these vectors. The experiment initially revealed an increase in species richness and abundance; however, as the study progressed, a decrease in the rates of new species incorporation was observed, possibly indicating community establishment. Additionally, competitive dynamics emerged among algal species, leading to a reduction in temporal beta diversity over time. In summary, as communities mature and achieve stability, beta diversity decreases, especially when multiple dispersal agents are involved. Biological vectors, such as animals, significantly influence temporal beta diversity, but over time, local factors gain progressively more influence." (Authors)] Address: Cochak, Crislaine, Programa de Pós-Graduação em Ecologia de Ecossistemas Aquáticos Interiores (PEA), Univ. Estadual de Maringá (UEM), Centro de Pesquisa em Limnologia, Ictiologia e Aquicultura (Nupélia), Maringá, Paraná, Brazil. Email: Crislainecochak@hotmail.com

23812. Coelho, E. (2024): Regionalização biogeográfica de Odonata da região neotropical. BSc thesis, Trabalho de Conclusão de Curso apresentado ao Instituto Latino Americano de Ciências da Vida e da Natureza da Universidade Federal da Integração Latino Americana, como requisito parcial à obtenção do título de Bacharel em Ciências Biológicas - Ecologia e Biodiversidade: 34 pp. (in Portuguese, with English summary) ["Biogeographic regionalization of Odonata in the Neotropical region: Biogeography is the science that studies the geographic distribution of organisms, seeking to describe processes that explain biogeographic patterns, and can be visualized through regionalizations. Biogeographic regionalization is a hierarchical system that classifies geographic areas, and can be represented through a map. For the Neotropical Region, several regionalizations based on different taxonomic groups have been proposed, however none for the Order Odonata, even though it is a group present in almost all freshwater habitats in the world, since part of its life cycle is in aquatic environments. The group has almost six thousand described species and the greatest diversity is in the Neotropical Region. The objective of this work is to do the biogeographic regionalization of Odonata in the Neotropical Region, and compare it with other thematic maps, which include province-based regionalization, interfluvial map, biome map, ecoregion map and climate type maps. Data on the geographic distribution area of Odonata species were obtained from the website of the International Union for Conservation of Nature. The geographic distribution of the 1,504 Odonata species were submitted to the InfoMap Bioregion application, which defined 13 bioregions. To compare the Odonata regionalization scheme with the thematic maps, the R program was used, through the RStudio interface, with the use of v-measure, implemented by the SABRE package (Spatial Association Between REgionalizations). The comparisons that showed the greatest spatial agreement were with the Neotropical Region Regionalization scheme based on provinces (Morrone, 2022) and with the hybrid biome map (Antonelli, et al 2018). Although the Caatinga, Cerrado and Amazon biomes were not discriminated in the regionalization, in general, the results obtained in the analyses demonstrated an agreement with works previously carried out for other taxons, showing a relationship between the Odonata

Bioregions and biomes of the Neotropical Region." (Author)] Address: <https://dspace.unila.edu.br/server/api/core/bitstreams/52ee5304-5264-438c-acfa-4badeae9256e/content>

23813. Conesa-García, M.A.; Bernal-Sánchez, A. (2024): Description of the final instar larva of *Ischnura saharensis* Aguesse, 1958 (Odonata: Coenagrionidae). *Odonatologica* 53 (3-4): 408-428. (in English) ["This study describes and illustrates for the first time the final larval instar of *I. saharensis*, based on the analysis of 26 F-0 larvae and 29 exuviae gathered on Gran Canaria and Fuerteventura, Canary Islands, where it is the only species of damselfly present. We examine 16 morphometric traits and analyse the biometric and morphological differences between the females and males. Lastly, we compare the information obtained with corresponding knowledge of sympatric congeneric species distributed throughout the Iberian Peninsula and the Maghreb. *I. saharensis* can be distinguished from other species by the structure of the genitalia, caudal lamellae, and cerci." (Authors)] Address: Conesa-García, M.A., Sociedad odonológica de Andalucía, Málaga, Spain. Email: mconesa@libelulas.es

23814. Cordero-Rivera, A.; Rivas-Torres, A.; Sánchez-Guilén, R.A. (2024): Evolution in Islands: contrasting morph frequencies in damselfly populations of the Balearic Islands. *Biological Journal of the Linnean Society* 143(2): 11 pp. (in English) ["Colour polymorphism is an example of visible phenotypic variability that is often associated with ecological factors and may produce local adaptations. Small populations, particularly in islands, offer opportunities for evolutionary novelties, and are therefore of particular interest to the study of polymorphisms. Here we study the dynamics of female colour morphs in *Ischnura elegans* in the Balearic Islands (Menorca, Mallorca). We found that insular populations are small, show low density, low mating activity, and low androchrome frequency. Our surveys suggest that male harassment is a powerful force in the dynamics of this female-limited polymorphism, because high male densities result in lower presence of mature females around the water, where copulation takes place. Non-male-like (infuscans) females have higher mating frequency. Androchromes were rare (15%) in all populations, but the frequency of the two non-male like females (infuscans and aurantiaca) was reversed between islands, despite their geographical proximity. We found a possible novel morph, suggesting that insular conditions allow innovations. Fitness differences between the two non-male-like females of *I. elegans* are still understudied, because most previous research has concentrated on the maintenance of androchromes, and are therefore a priority for future research." (Authors)] Address: Cordero-Rivera, A., Universidade de Vigo, ECOEVO lab, E.E. Forestal, Campus Universitario, 36005 Pontevedra, Spain. Email: adolfo.cordero@uvigo.gal

23815. Das, A.N.; Ahmed, G.; Leshiini, A.; Das, A. (2024): Exploring edible insects: An investigation in Kamrup District (Assam) and Ri-Bhoi District (Meghalaya), North-Eastern India. *Asian Journal of Biological and Life Sciences* 13(1): 187-196. (in English) ["In the ecological context, insects play a crucial role by establishing a connection between people's livelihoods and the assessment of sustainable practices. The exploration of edible insects as a food source necessitates consideration of various factors such as ecology, management, conservation implications, industrialization and marketing to foster their sustainable development. Through a survey conducted in selected areas, the study identified a total of 26 edible insect species across 9 Orders and 20 Families. Notably, Beltola Market yielded 14 species, while the USTM campus Forest area contributed 10 species. Among

these, Orthoptera emerged as the most consumed edible insect species in Kamrup District (Assam) and Ri-Bhoi District (Meghalaya), comprising 27%, followed by Lepidoptera, Decapoda and Hymenoptera at 15% and Odonata [*Anaciaeschna donaldii*] and Coleoptera at 8%. Conversely, Isoptera, Hemiptera and Blattodea exhibited the lowest consumption rates, each at 4%. The survey also highlighted that 46% of the insects categorized as omnivorous, 37% as herbivorous, 13% as carnivorous and only 4% as detritivores. The traditional knowledge of entomophagy, deeply rooted in indigenous practices, is gradually diminishing due to evolving socioeconomic conditions and dietary habits. Recognizing this trend, there is a pressing need to assess insect biodiversity and explore the role of ethno-entomophagy, particularly in northeastern India, to conserve this invaluable natural resource, along with its traditional knowledge and potential commercial applications." (Authors)] Address: Dr. Arup Nama Das, A.N., Dept of Zoology, Univ.of Science & Technology Meghalaya, 9th Mile, Kiling Road, Baridua, Ri-Bhoi-793101, Meghalaya, India. Email: arupn8@gmail

23816. De Knijf, G.; Billqvist, M.; van Grunsven, R.; Allen, D.; Assandri, G.; Bellotto, V.; Bruslund, S.; Bedjanic, M.; Conze, K.-J.; Díaz Martínez, C.; Dolný, A.; Ferreira, S.; Gam, A.; Goertzen, D.; Holzinger, W.; Houard, X.; Hunger, H.; Jeanmougin, M.; Jovic, M.; Kalninš, M.; Karlsson, T.; Kazila, E.; Kitanova, D.; Kulijer, D.; Leus, K.; Lohr, M.; Maynou, X.; Motte, G.; Múria, C.; Olsen, K.; Prunier, F.; Sahlén, G.; Schiel, F.-J.; Šácha, D.; Šigutová, H.; Sparrow, D.; Sparrow, R.; Tanczuk, A.; Tarkowski, A.; Taylor, P.; Trotter, A.; Vilenica, M.; Vinko, D.; Lees, C. (2024): European Dragonflies: moving from assessment to conservation planning. A report to the European Commission by the IUCN SSC Dragonfly Specialist Group and the IUCN SSC Conservation Planning Specialist Group. Conservation Planning Specialist Group, Apple Valley, MN, USA: 44 pp. (in English) ["Between February 6 and March 5 2024, following the second assessment of European dragonflies for the IUCN European Red List (De Knijf et al., 2024), 37 dragonfly experts from 23 European countries participated in five online conservation action-planning workshops. These workshops focused on 30 species categorised as threatened (Critically Endangered (CR), Endangered (EN), Vulnerable (VU)), and 19 species classified as Near Threatened (NT) within the European Union (EU). The project followed the "Assess-to-Plan" (A2P) methodology of the IUCN Species Survival Commission (SSC) Conservation Planning Specialist Group (CPSG). A2P is designed to build consensus among assessors and other experts on the priority actions needed to reverse declines in targeted species and to identify organisations that could implement these actions over the next 5-10 years." (Authors)] Address: https://iucn.org/sites/default/files/2024-12/european-dragonflies_a2p.pdf

23817. Deacon, C.; Samways, M.J.; Pryke, J.S. (2024): Conservation corridors with many small waterbodies support dragonfly functional diversity across a transformed landscape mosaic. *Diversity and Distributions*, 2024; 0:e13939: 15 pp. (in English) ["Aim: Human activities pose many challenges to freshwater biodiversity. Among these, is landscape transformation, such as conversion of natural grassland to plantation forestry, impacting both terrestrial and freshwater biodiversity. Functional diversity measures provide substantial information on current and emerging impacts on biological communities, and aid conservation decisions relative to anthropogenic impacts. We determined (1) environmental similarities among 10 freshwater biotope types; (2) whether freshwater biotopes in conservation corridor networks support

equal levels of functional richness and divergence compared with an extensive neighbouring protected area; (3) whether certain biotopes are more important for maintaining functional richness and divergence than others; and (4) whether associations between traits and biotope types could be identified. Location: The northeastern coastal region of South Africa. Methods: Using dragonflies as model organisms, and data from 140 freshwater lotic and lentic sites, we investigated the distribution of dragonfly traits across a plantation forestry-natural grassland landscape mosaic with a range of biotope types. Results: Lake sites were different in their environmental conditions compared with the other biotopes. Environmental conditions were variable among the other biotope types and were difficult to distinguish. Freshwater biotopes in the conservation corridors supported equal levels of functional richness and divergence compared with those in the protected area. Overall, dragonfly functional richness and divergence were low at lake sites and wallows, while all other biotopes supported high levels of functional richness and divergence. Trait associations were complex across the waterscape and driven by habitat selection, flight behaviour and ecological sensitivity. Main Conclusions: Maintaining a mosaic of small lentic and lotic habitats would best support dragonfly conservation in this transformed landscape. A combination of biotopes offers a wide range of environmental conditions essential for conserving the full range of dragonfly traits and species across the region." (Authors)] Address: Deacon, C., Dept Conservation Ecol. & Ento., Fac. of AgriSciences, Stellenbosch Univ., Stellenbosch, South Africa. Email: charldeacon@sun.ac.za

23818. Dekanová, V.; Svitok, M.; Bento, S.; Caramelo, J.; Peixe e Sousa, P.; Carreira, B.M. (2024): Length-mass relationships of pond macroinvertebrates do not hold between Southern and Northern Europe. *PeerJ* 12:e18576 DOI 10.7717/peerj.18576: 24 pp. (in English) ["The lack of reliable data on length-mass relationships, essential to obtain accurate biomass estimates, limits our ability to easily assess secondary production by aquatic invertebrates. In the absence of published equations from similar habitat conditions, authors often borrow equations developed in geographic regions with different climate conditions, which may bias biomass estimates. A literature overview of published size-mass relationships for Portugal and Sweden highlights the need for further data within these biogeographic regions. We increased the number of equations available to Southern and Northern Europe, developing 18 new length-mass relationships for two families and 10 genera in Portugal and Sweden. All equations were published for the first time for these countries, except the genus *Asellus*. Our length-mass relationships were obtained from specimens collected on a one-time sampling of eight ponds in Portugal and five ponds in Sweden during late spring in 2023. Dry mass (DM) was modelled as a function of body length (BL), using the natural log-linear function with a power model ($\ln DM = \ln a + b \times \ln BL$). The equations obtained were compared with linear mixed models testing the fixed effects of "body length" and "country", as well as their interaction. A comparison of the equations developed in this study showed country-specific differences for all taxa, except the genus *Caenis*, indicating a low potential transferability of the equations between Southern and Northern Europe. In contrast, the comparison of the equation obtained for *A. aquaticus* in this study with an equation published for this taxon in Sweden showed great similarities, suggesting a high transferability. Recommending caution in the borrowing of published length-mass equations, that can differ drastically between different geographic and climatic regions, especially at larger sizes, we provide a series of guidelines and good practices in this field." (Authors) The set of data

includes Odonata: Coenagrionidae, Anax, Aeshna, and Symptetrum.] Address: Dekanová, Vladimira, Centre for Ecology, Evolution & Environmental Changes & CHANGE – Global Change & Sustainability Institute, Fac. of Sciences, Univ. of Lisbon, Lisbon, Portugal. Email: dekanovav@gmail.com

23819. Dérozier, V. (2024): A new Malgassophlebia Fraser, 1956, from Republic of Congo (Odonata: Libellulidae). *Odonatologica* 53(3-4): 429-438. (in English) ["A new species of Malgassophlebia Fraser, 1956 (*M. baaka* sp. nov.) is described from the Nouabalé-Ndoki National Park, Republic of Congo, based on a single male adult. Diagnostic features and the type locality of the new species are illustrated." (Author)] Address: Dérozier, Violette, African Natural History Research Trust (ANHRT), Street Court, Leominster-Kingsland, HR6 9QA, United Kingdom. Email: violette.derozier@gmail.com

23820. Djikoloum, B.T. Seino, R.A.; Ngameni, N. T. (2024): Stream quality and benthic macroinvertebrate diversity in the Badeye Area, Logone Occidental Province, southwestern Chad. *International Journal of Ecology Article* ID 3878910, <https://doi.org/10.1155/2024/3878910>: 9 pp. (in English) ["The aim of this study of benthic macroinvertebrates in the southwestern canton of Badeye in Chad was to analyze the community structure in relation to the physicochemical quality of water in the Man baptem tributary. A total of 4,012 benthic macroinvertebrates were identified and counted in 38 families. Arthropods were the most diverse, with 35 families and the most abundant (92.32%) of the total, followed by molluscs (6.65%) and annelids (1.02%). Insects predominated at all sampling stations (89.40%), followed by Gastropoda (6.75%), Malacostracans (2.85%), Hirudinea (0.57%), and Oligochaetes (0.45%). The preponderance of the Chironomidae, Psychodidae, and Physidae families in station A3 implies that the water at this station is of poor quality compared with the other 3 stations. The Shannon-Weaver and Pielou indices are higher at station A3, confirming some of the values of the physicochemical parameters at this station. In general, the four sampling stations are diverse. The abundance of certain benthic groups such as Diptera (Chironomidae) in the Man baptem tributary shows that this watercourse is subject to anthropogenic disturbance." (Authors) Odonata are treated at family level.] Address: Djikoloum, B.T., Biology & Applied Ecology Research Unit, (URBEA), Faculty of Science, University of Dschang, P.O. Box 67, Dschang, Cameroon. Email: djikoloumbe@gmail.com

23821. Dow, R.A.; Chong, C.Y.; Grinang, J.; Lupiyaningdyah, P.; Ngiam, R.W.J.; Kalkman, V.J. (2024): Checklist of the Odonata (Insecta) of Sundaland and Wallacea (Malaysia, Singapore, Brunei, Indonesia and Timor Leste). *Zootaxa* 5460(1): 1-122. (in English) ["A checklist, based on a database containing published data, of the Odonata occurring in Sundaland and Wallacea is presented. The presence of (sub-)species is indicated for eight main regions (Singapore & Peninsular Malaysia, South China Sea (islands in the South China Sea that are not sensibly treated as satellites of larger landmasses), Borneo, Sumatra, Java & Bali, Lesser Sunda, Sulawesi, Moluccas), 22 subregions and 80 smaller islands and island groups. In total 743 full species are recorded from the entire area with 549 species known from Sundaland and 270 from Wallacea. Of these 482 are not found outside Sundaland and Wallacea, 385 (ca. 52% of the fauna) of which are single region endemics; the majority of these are actually single island endemics. Notes are provided on taxonomic problems or indicating problematic distribution records. *Prodasi-neura lansbergei* is considered to be a nomen nudum (stat nov.). For each of the eight main regions the history of the

study of odonates is briefly discussed, information is provided on the coverage of the available data and the faunal composition is described. An overview is given of genera for which no larvae have been described. A brief comparison is made between the faunas of Sundaland and Wallacea showing that they only share 10% of the species between them (76 of 743)." (Authors)] Address: Dow, R.A., Inst. Biodiversity & Environmental Conservation, Univ. Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk;

23822. Dumont, H.J. (2024): A mass migration of *Libellula* species in North Holland in 1681 documented in artwork by Rochus van Veen. *Notulae odonatologicae* 10(4): 111-114. (in English) ["A watercolour painting executed by the Dutch painter Rochus van Veen in 1681 and held in the Getty Museum, Alabama, depicting, in exquisite detail, two males of *Libellula quadrimaculata* and one male of *L. depressa*, is presented and discussed. The specimens were obtained in May 1681 during the first documented mass migration of dragonflies in the Netherlands. Other records of early dragonfly migrations are noted." (Author)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, 9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

23823. Emrose, A.; Shome, A.R.; Rabbe, M.; Mukteruzman, M.; Jaman, M.F. (2024): Odonata diversity in a tropical landscape of Bangladesh. *Proceedings of the Zoological Society* 77: 214-220. (in English) ["Odonata help to assess the wetland ecosystem's health and serve as indicator species. A year-long study from November 2021 to October 2022 was conducted to investigate the community structure of Odonata in Tetulia sub-district (locally called 'Upazila'), the northernmost area of Bangladesh, under five study site areas. A total of 1626 individuals belonging to 47 species consisting of 36 species of Anisoptera and 11 species of Zygoptera were observed. Libellulidae was the dominant family with 28 species of dragonflies. Among five sites, site A1 shared the highest number of species (41 species, $n = 508$), and highest values of species diversity ($H = 3.255$, $D_s = 0.951$). However, evenness ($E = 0.632$) was the highest in the site A4. Odonates in sites between A1-A4 and A2-A5 shared more similar species. According to the observation status, 9 (19.15%) were very common, 12 (25.53%) common, 7 (14.89%) uncommon, and 18 (38.29%) were few. Among all the species, *Orthetrum sabina* showed the highest relative abundance (181 individuals, 11.13%). Results can be useful in understanding the importance of odonate diversity in the environment of the study area." (Authors)] Address: Rabbe, F., Wildlife Research Laboratory, Dept of Zoology, University of Dhaka, Dhaka, 1000, Bangladesh

23824. Enabulele, C.O.; Olumukoro, J.O. (2024): Benthic macroinvertebrates as indicators of water quality and ecological health in a tropical lake, southern Nigeria. *Limnology and Freshwater Biology* 2024(5): 1276-1283. (in English) ["This study assesses the community structure and diversity of benthic macroinvertebrates in Ozomu Lake, Southern Nigeria, to evaluate the water quality and ecological health. Sampling was conducted twice monthly from March to August 2020, at three stations using bottom sediment grabs and bank-root zone sampling. A total of 23 taxa and 427 individuals were recorded. Diptera (25%) and Odonata (22%) were the most abundant, followed by Coleoptera (18%) and Ephemeroptera (12%). In terms of diversity, the stations were ranked as follows: Station 2, Station 1, and Station 3. The Shannon-Wiener index indicated that Station 2 had the highest species diversity (2.896), followed by Station 1 (2.828) and Station 3

(2.472). Pielou's Evenness index revealed that Station 2 had the most even distribution of species (0.7871), while Station 1 had the lowest (0.6235). Pollution-sensitive taxa at station 1 comprised 40.8% of the benthic fauna (58 individuals), indicating relatively good water quality. Moderately tolerant taxa represented 28.9% (41 individuals), while pollution-tolerant taxa accounted for 30.3%. Station 2 recorded similar results for pollution-sensitive taxa at 40.3% (52 individuals). However, moderately tolerant taxa dominated this station, making up 41.1% (53 individuals), with pollution-tolerant taxa at only 18.6%, suggesting lower environmental stress. Pollution-tolerant taxa predominated at 40.4% at station 3 (65 individuals), indicating greater environmental disturbance. Moderately tolerant taxa constituted 33.5%, while pollution-sensitive taxa were reduced to 26.1%, reflecting the most stressed environment among the stations. Overall, the lake's ecological health appears stable, but localized stressors may require targeted management." (Authors)] Address: Enabulele, C.O., Dept of Animal & Environmental Biology, Faculty of Life Sciences, Univ. of Benin, Benin City, Nigeria

23825. Eshghi, S.; Rajabi, H.; Matushkina, N.; Claußen, L.; Poser, J.; Büscher, T.H.; Gorb, S.N. (2024): WingAnalogy: a computer vision-based tool for automated insect wing asymmetry and morphometry analysis. *Scientific Reports* volume 14, Article number: 22155: 17 pp. (in English) ["WingAnalogy is a computer tool for automated insect wing morphology and asymmetry analysis. It facilitates project management, enabling users to import pairs of wing images obtained from individual insects, such as left and right, fore- and hindwings. WingAnalogy employs image processing and computer vision to segment wing structures and extract cell boundaries, and junctions. It quantifies essential metrics encompassing cell and wing characteristics, including area, length, width, circularity, and centroid positions. It enables users to scale and superimpose wing images utilizing Particle Swarm Optimization (PSO). WingAnalogy computes regression, Normalized Root Mean Square Error (NRMSE), various cell-based parameters, and distances between cell centroids and junctions. The software generates informative visualizations, aiding researchers in comprehending and interpreting asymmetry patterns. WingAnalogy allows for dividing wings into up to five distinct wing cell sets, facilitating localized comparisons. The software excels in report generation, providing detailed asymmetry measurements in PDF, CSV, and TXT formats." (Authors)] Address: Eshghi, S., Dept of Functional Morphology and Biomechanics, Zoological Institute, Kiel University, 24118 Kiel, Germany. Email: eshghi.shahab@gmail.com

23826. Fentaw, G.; Beneberu, G.; Wondie, A.; Getnet, B. (2024): Composition and dynamics of macroinvertebrates community in relation to physicochemical parameters of hydrogeologically connected wetlands in Abbay River basin, Ethiopia. *PLOS ONE* 19(12): e0314969: 16 pp. (in English) ["Assessing the macroinvertebrate assemblage in relation to physicochemical parameters can provide insight into the ecological state of aquatic environments. Therefore, this study aimed to assess macroinvertebrate assemblage of hydrogeologically connected wetlands in relation to physicochemical water quality parameters. Data were collected between June 2022 and April 2023 from twelve purposively selected sampling sites following established procedures. A total of 1,211 macroinvertebrates were collected from 18 orders and 44 families. The majority (72.83%) are generally pollution-tolerant families of the order Hemiptera, Odonata, Coleoptera and Diptera. There was significant spatio-temporal variation ($P < 0.05$, One-way ANOVA) in total macroinvertebrate abundance and bioindices. There were more individual macroinvertebrates

collected during the dry season. The CCA and correlation analysis indicated that the physicochemical parameters had an effect on the distribution and abundance of macroinvertebrates. The size of the wetlands and the intensity of anthropogenic intervention might also result in difference in macroinvertebrate abundance across the wetlands. The higher nutrient concentrations, the low DO level, the higher abundance of tolerant taxa and the medium Shannon_Hvalue (range: 2.13 to 2.68) all indicate the wetlands' poor ecological status. Therefore, regular water quality monitoring, identification of the macroinvertebrate at the lower taxonomic level and the development of macroinvertebrate based multimetric indices are recommended for their sustainable management." (Authors) Taxa - including Odonata - are treated at family level.] Address: Fentaw, G., Department of Fisheries and Aquatic Science, College of Agriculture and Environmental Sciences, Bahir Dar University, Bahir Dar, Ethiopia. Email: getachewfentaw2010@gmail.com

23827. Fernandes, D.; Gama, N.S.C.; Cardozo, F. (2024): Spatial diversity of Lepidoptera and Odonata species of Village Verna. *Journal of Applied Entomologist* 4(3): 19-27. (in English) ["Goa is an extension of the Western Ghat biodiversity hotspot, a tropical, bio-diverse region in India. However, basic literature on insect species in Goa on their abundance, distribution and ecology is still lacking. Documenting biodiversity in Goa is important to provide valuable biological information in order to set up the biodiversity conservation and protection strategies to combat rapid regional habitat loss and climate change. This study provides information on the biodiversity of Lepidoptera and Odonata species in one of the small village areas of Verna in South Goa. Verna, with its undulating terrain, is rich in bio-resources but is facing habitat loss due to land use changes in recent years. A total of 181 Lepidoptera species, including 142 butterfly species from 5 families and 39 species of moth from 11 families, as well as 33 species of Odonata, including 20 species of dragonflies from 3 families and 13 species of damselflies from 4 families, were observed in this village. The study also includes the first finding of *Protosticta gravelyi* in this village. This study data of Lepidoptera and Odonata species collected through photo documentation contribute to the insect population for biodiversity monitoring in Goa." (Authors)] Address: Fernandes, D., Verna Biodiversity Management Committee (VBMC), Goa State Biodiversity Board (GSBB), Saligao, Goa, India

23828. Ferreras-Romero, M. (2024): Early effects of forest diseases on the Odonata assemblage of a mountain stream in the southern Iberian Peninsula. *Odonatologica* 53 (3-4): 343-363. (in English) ["Forest diseases caused by fungi, such as Elm graphiosis and Alder phytophthora, have become a serious problem in the conservation of riparian woodland. Freshwater habitats in the Mediterranean are under diverse anthropogenic pressures; of these, the forest management in the surroundings is among the least analysed. Odonata larvae in a permanent stream in the Sierra Morena were studied for 27 years, recording the changes that occurred in the stream bed and the surrounding forest. Several diversity indices were analysed and apparent differences between years in Odonata species richness were recorded. Our findings show that forest diseases, as a consequence of anthropogenic activities, can initially lead to a higher Odonata diversity in Mediterranean permanent streams. This increase in species richness is a consequence of an increase in the seasonality of the flow and luminosity in the channel from late spring to early autumn. Homogeneity of the stream bed due to the disappearance of alternate riffles and ponds of more than a meter deep, and the appearance of strongly rooted

aquatic phanerogams like water-cress also plays an important role. The populations of Anisoptera species with a long life cycle, which previously were the only ones inhabiting the stream and which still are dominant today, will possibly disappear in the long term." (Authors)] Address: Ferreras-Romero, M., Depto de Biología Animal (Zoología), Fac.de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es

23829. Fiala, B.R. (2024): Population dynamics and structure of *Coenagrion puella* and *Pyrrhosoma nymphula* in the urbanised centre of Prague. *Diplomová práce, Univerzita Karlova, Přírodovědecká fakulta, Katedra ekologie, Praha: 45 pp.* (in English, with Czech summary) ["As many other species, also dragonflies can inhabit suitable urban habitats even in the centre of big cities. This study has been focused on population dynamics of *C. puella* and *P. nymphula* in urban environment. Main goal has been to experimentally study dispersal of populations and migration between these populations in the Prague city centre using mark-release-recapture (MRR) method to observe whether the urban environment does somehow act as a barrier for population dynamics. Lentic bodies located in the broader centre of the city were chosen as sufficient study sites, situated mostly in green areas. Field study took place in 2023 from the end of May to beginning of July. Every individual was given a unique code and the information about locality of every encounter was included to track movement of individuals. In total, around 1800 individuals of both species were marked in the experiment. Results of the analysis suggest that individuals from zygopteran populations are mostly connected to their parent site. Occasional migration in *C. puella* species and almost no migration in *P. nymphula* species was observed. The putative metapopulation structure of both species discussed further. MRR also allowed to assess some basic population parameters (separately for both sexes), i.e. the population size and survivorship of each species. From a broader perspective, our study belongs to very few of those dealing with dispersal and population patterns of dragonflies in urban landscape." (Author)] Address: <https://dspace.cuni.cz/bitstream/handle/20.500.1-1956/194162/120489132.pdf?sequence=1&isAllowed=y>

23830. Fischer, S.; Nicolai, B.; Grimm, H. (2024): Odonata records from the coastal region of the Islamic Republic of Mauritania. *Notulae odonatologicae* 10(4): 115-128. (in English) ["During an 11-day birdwatching trip in coastal Mauritania (West Africa) we recorded 18 species of Odonata, including two identified only to genus. Five of these are new to Mauritania: *Ceriagrion glabrum* / *suave*, *Pseudagrion* sp., *Rhythemis semihyalina*, *Tholymis tillarga* and *Tritthemis hecate*. We report the first Mauritanian records of *Acisoma inflatum*, *Orthetrum trinacria* and *Urothemis edwardsii* for almost 50 years. At Plage de Ghara we found dead or dying dragonflies of 10 different species on a beach. In pellets of the Blue-cheeked Bee-eater found near a small pond south of Tamxat, Odonata made up 33.6 % of food items." (Authors)] Address: Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. Email: nicolaibea@gmx.de

23831. Fleck, G.; Mézière, N. (2024): *Aeschnosoma yelena* sp. nov. from French Guiana (Odonata: Corduliidae), with notes on its phylogenetic affinities and bionomics. *Zootaxa* 5555(3): 443-450. (in English) ["*Aeschnosoma yelena* sp. nov., based on a single male specimen, is described from lowland coastal forest (Sinnamary) in French Guiana. This species belongs to the *auripennis*-group and seems to be closely related to *Aeschnosoma heliophila* Fleck known from a single watershed in a Brazilian elevated plateau in

western Bahia State (part of Cerrado) impacted heavily by agro-industrial activities. The shape of the anal appendages, especially the distal fifth of the cerci being bent at a right angle in dorsal view, is the most convenient structural character to separate this species from its congeners. Like *A. heliophila*, the new species flies in sunshine several metres above the ground in clearings dotted with shrubs surrounded or bordered by a dense formation of taller trees." (Authors)] Address: Fleck, G., 07150 Lagorce, France. Email: fleckgunther@gmail.com

23832. Fliedner, H.; Orr, A.; Theischinger, G. (2024): In memoriam Ian Endersby (18th April 1941 – 19th April 2024). *Odonatologica* 53(3/4): 246-264. (in English) ["A brief biography, recollections and memories of Ian Endersby and his odonatological bibliography are presented." (Authors)] Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany. E-mail: H.Fliedner@t-online.de

23833. Fortunato, M.H.T. (2024): Estratégias sustentáveis para o manejo de Odonata na piscicultura: Revisão e implicações. *Lumen et virtus, São José dos Pinhais XV(XLI):* 6030-6037. (in Portuguese) ["This study conducted a systematic review of the literature on predation of Odonata larvae in fish farming, using databases such as Google Scholar and SciELO. The results showed that predation can reduce the survival of fry by up to 30%, impacting the productivity of ponds. Alternative control methods, such as natural extracts and entomopathogenic fungi, were analyzed, which proved to be effective without the negative effects of agrochemicals, as well as the use of prey, such as Chironomidae. The research highlighted the importance of sustainable management strategies and the preservation of Odonata diversity, which are essential for the health of aquatic ecosystems. In addition, the use of water quality monitoring technologies was considered essential to optimize larval management." (Author/Google translate)] Address: Fortunato, M.H.T., Biólogo, mestre em Ciências Ambientais e Doutor em Agricultura Sustentável. Pós-graduando pela Universidade de São Paulo, Brazil.

23834. Gauci, C. (2024): Some notes on larval duration and voltinism in *Anax imperator* Leach (Emperor Dragonfly) in the Maltese Islands. *Journal of the British Dragonfly Society* 40(2): 57-63. (in English) ["*A. imperator* eggs hatched and the larvae reached F0 and emerged after as little as 80 days from a pond at Ghadira Nature Reserve, Malta (approximately 36°N) in 2023. Exuviae collected from four ponds at this reserve and from a number of reservoirs at other sites between 2020-23 indicate that the species is bivoltine in Malta." (Author)] Address: Gauci, C., 28. Trig il-Kissier, Mosta, MST1822, Malta

23835. Gibson, J.F.; Howse, M.H.W.; Paillard, C.A.; Penfold, C.D.; Penno, A.Z.; van der Voort, G.E.; Huber, D.P.W. (2024): Keys to the cabinets: unlocking biodiversity data in public entomology collections. *The Canadian Entomologist* 156, e42: 16 pp. (in English) ["Canadian entomology collections contain valuable biodiversity and ecological data. To be most accessible to those working outside of the collections, they need to be digitised. Multiple analyses of the digital database of the Odonata collection at the Royal British Columbia Museum (Victoria, British Columbia, Canada) were conducted. These analyses reveal that complete digital datasets can be used to explore questions of historical and current geographical distribution and species composition differences based on ecoprovince and elevation. The results of these analyses can be used directly in conservation

and climate change impact mitigation decisions. These analyses are possible only because the Odonata collection has received concerted effort to digitise all specimen records. The full value of long-term historical insect biodiversity data can be accessed only once collections are digitised. Additional training and employment of collection management and curatorial staff is essential to optimise the use of abundant but underused Canadian biodiversity data." (Authors)] Address: Gibson, J.F., Entomology Collection, Royal BC Museum, Victoria, British Columbia, V8W 9W2, Canada. Email: jgibson@royalbcmuseum.bc.ca

23836. Guerrero-Moreno, M.A.; Juen, L.; Puig-Cabrera, M.; Teodósio, M.A.; Barbosa Oliveira-Junior, J.M. (2024): Neotropical dragonflies (Insecta: Odonata) as key organisms for promoting community-based ecotourism in a Brazilian Amazon conservation area. *Global Ecology and Conservation* 55, November 2024, e03230: 23 pp. (in English) ["Highlights: • Ecotourism in a Brazilian Amazon protected area lacks info on invertebrates. • Residents of an extractive reserve in the Amazon say the striking appearance of dragonflies could attract tourists. • The inhabitants of a protected area in the Amazon assert that dragonflies are vital to the environment, culture, and economy. • Indigenous and non-indigenous people want to develop dragonfly ecotourism activities. • The traditional ecological knowledge is fundamental to the development of ecotourism. Incorporating insects into ecotourism activities increases awareness of their importance in ecosystems. However, the inclusion of this group in ecotourism activities is still rare. In this context, we identified the perception of indigenous and non-indigenous leaders and residents about the potential of Odonata (dragonflies and damselflies) as key organisms for promoting community-based ecotourism (CBET) in the Tapajós-Arapiuns Extractive Reserve, Brazilian Amazon. We designed a semi-structured questionnaire and conducted interviews with 415 indigenous and non-indigenous residents (222 women and 193 men) from 73 communities and villages. When shown images of dragonflies (Anisoptera and Zygoptera), 98.55% of respondents recognized them, predominantly identifying them as "jacinas" (55.11%). Respondents noted differences between Anisoptera and Zygoptera based on body color and size, identified them as part of the insect group (45.78%), and associated their habitat with forests and jungles (57.34%). Most participants (96.38%) indicated that current ecotourism activities do not include information about invertebrates, emphasizing the need for greater understanding of their biology and ecological significance (44.64%), and management (29.16%). They stated that seeing (99.52%) and observing (99.04%) dragonflies could attract tourists due to their striking appearance (57.10%) and beautiful (39.03%). Most respondents recognized the importance of dragonflies for the environment (99.52%), culture (63.13%), and economy (55.66%), acknowledging their potential to generate income through tourism. Additionally, 89.88% expressed a desire to participate in the development of ecotourism activities involving Odonata. The results reflect the enormous potential of dragonflies to be included as key organisms in the development of CBET, allowing for environmental awareness, biodiversity conservation, cultural appreciation, and income generation for local communities. Furthermore, the study highlights the need to implement educational and training programs on Odonata, along with the development and funding of public policies to ensure the success and sustainability of such initiatives." (Authors)] Address: Guerrero-Moreno, Mayerly Alexandra, Postgraduate Program in Society, Nature & Development (PPGSND), Inst. of Biodiversity & Forests (IBEF), Federal University of Western Pará (UFOPA),

Vera Paz Street (Tapajós Unit), Salé District, Santarém 68040-255, Pará, Brazil. Email: alexandraguerreromoreno@yahoo.es

23837. Guglielmi, M.; De Filippo, G.; Elicio, F.; Usai, A. (2024): A review of knowledge on dragonflies and damselflies in the regional Nature Reserve "Foce Volturno – Costa di Licola". BORNH Bulletin of Regional Natural History 4(2): 32-43. (in English) ["Based on studies conducted on the Odonata of Campania between the 1980s and 1990s, the Authors have updated the list of species present in the wetlands of the Regional Natural Reserve "Foce Volturno - Costa di Licola", located between the provinces of Caserta and Naples (Campania, Southern Italy). The compilation of the check-list was conducted through bibliographic research in texts and databases, along with new surveys in the sites and initiating citizen science projects. In total, 22 species were recorded (23.1% of Italian species and 39.2% of Campanian species as of 2022), including 7 belonging to the Zygoptera and 15 to the Anisoptera. Referring to the regional Odonate fauna list of 1995, 18 species are confirmed (32.14% of those reported in Campania and 18.9% of those reported in Italy as of 2022). In addition to these, *Selysiothemis nigra* and *Brachytron pratense* were sampled by the Authors for the first time in the Reserve area, and *Orthetrum trinacria* was observed by a citizen scientist for the first time at the regional level, data relevant to their national distribution. The contribution provided brings the total number of Odonata species in Campania to 58 and represents the first piece of an ongoing investigation into species richness at the regional scale." (Authors)] Address: Guglielmi, Marina, Istituto di Gestione della Fauna, Naples, Italy. Email: marinaguglielmi99@gmail.com

23838. Guo, J.; Bode-Oke, A.T.; Leng Kong, T.; Dong, H. (2024): Abstract: C09.00009: Agile maneuvering: Damselfly backward flight and its aerodynamic mechanism. Bulletin of the American Physical Society. 77th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 24–26, 2024; Salt Lake City, Utah. Session C09: Interact: Swimming and Flying at Moderate and High Reynolds Numbers. 10:50 AM, Sunday, November 24, 2024. Room: Ballroom I: (in English) [Verbatim: Researchers have often looked to insects and small birds for inspiration to design highly maneuverable flapping-winged aerial vehicles. While considerable progress has been made in understanding the forward and turning flights of these animals, their remarkable ability to use backward flight to transition between flight modes has been largely overlooked. This study examines the body kinematics and aerodynamics of damselflies performing backward maneuvering flight. High-speed videos were captured to record damselflies in backward flight before transitioning to forward flight. A point-based reconstruction method was employed to accurately model the kinematics and deformation of the damselfly's body and wings. Using an in-house immersed-boundary-method-based (IBM) incompressible flow solver combined with the local refinement method, we accurately simulated the flow around the damselfly and its force production throughout the maneuver. Strong leading-edge vortices (LEVs) were generated on all four wings, with the LEV-induced leading-edge suction enabling effective and efficient lift and thrust production. The phase difference between the forewings and hindwings facilitated strong vortex interactions between the wings. This study provides a detailed analysis of vortex formation, wing kinematics, and their relation to the force production of the damselfly during backward maneuvers.] Address: Bode-Oke, A.T., Mechanical and Aerospace Engineering, University of Virginia, Charlottesville, VA 22903, USA

23839. Harisena, N.V.; Grêt-Regamey, A.; Van Strien, M.J. (2024): Identification of metacommunities in bioregions with historical habitat networks. Ecology and Evolution 14(8), e70076: 13 pp. (in English) ["Although metacommunity theory provides many useful insights for conservation planning, the transfer of this knowledge to practice is hampered due to the difficulty of identifying metacommunities in bioregions. This study aims to identify the spatial extent of metacommunities at bioregional scales using current and historical habitat data, especially because contemporary biodiversity patterns may be a result of time-lagged responses to historical habitat configurations. Further, this estimation of the metacommunity spatial extent is based on both the habitat structure and the dispersal ability of the species. Focusing on odonate species in the eastern Swiss Plateau, the research uses wetland habitat information spanning over 110 years to create a time series of nine habitat networks between 1899 and 2010. From these networks, we identified the spatial extents of metacommunities based on the year of habitat information as well as on watershed boundaries. To identify the best metacommunity spatial extents, the study investigates whether patch pairs within a metacommunity exhibit greater similarity in species composition (i.e. lower beta-diversity) than patch pairs between metacommunities. For the different metacommunities, we further investigated correlations between gamma diversity and metacommunity size and compare them to theoretical expectations. In both analyses we found that augmenting spatial metacommunity identification with historical geographical proximity results in stronger associations with biodiversity patterns (beta and gamma diversity) than when using only current-day habitat or watershed information." (Authors)] Address: Harisena, Nivedita Varma, Planning of Landscape & Urban Systems PLUS, Dept of Civil, Environmental & Geomatic Engineering, ETH Zurich, Stefano-Franscini-Platz 5, Zurich CH-8093, Switzerland. Email: nharisena@ethz.ch

23840. Hashemi, H.; Sadeghi, S.; Wappler, T. (2024): New Odonatan oviposition ichnotaxa from the Lower Jurassic of Iran. Swiss Journal of Palaeontology 143, 41: 10 pp. (in English) ["Distinct, new oviposition lesion types, *Paleoovoidis pyrifomis* ichnosp. nov. and *Variomorphonotatus sagittaeformis* ichnogen. et ichnosp. nov., occurring on two fossil compression Cycadophyte leaves from the Lower Jurassic Shemshak Formation of western Alborz Ranges, northern Iran are documented and compared with the previously instituted morphologically analogous taxa. Comparison of the shape and configuration of the scars with those of the modern zygopteran Odonata suggests that any member of the Lestid-damselfly produced *P. pyrifomis* ichnosp. nov. whereas any representative of Coenagrionid-damselflies (damselflies-dragonflies) induced formation of *V. sagittaeformis* ichnogen. et ichnosp. nov. In the absence, so far, of any entomofaunal evidence from the Shemshak Formation, the ichnotaxa documented herein offer unequivocal evidence to the presence of the Odonatan representatives in the Early Jurassic riparian ecosystems of northern Iran." (Authors)] Address: Hashemi, H., Dept of Geology, Fac. of Earth Sciences, Kharazmi University, Tehran, Iran. Email: h.hashemi@khu.ac.ir

23841. Hasik, A.Z.; Bried, J.T.; Bolnick, D.I.; Siepielski, A.M. (2024): Is the local environment more important than within-host interactions in determining coinfection? Journal of Animal Ecology 93(10): 1541-1555. (in English) ["Host populations often vary in the magnitude of coinfection they experience across environmental gradients. Furthermore, coinfection often occurs sequentially, with a second parasite infecting the host after the first has established a primary

infection. Because the local environment and interactions between coinfecting parasites can both drive patterns of coinfection, it is important to disentangle the relative contributions of environmental factors and within-host interactions to patterns of coinfection. Here, we develop a conceptual framework and present an empirical case study to disentangle these facets of coinfection. Across multiple lakes, we surveyed populations of five damselfly (host) species and quantified primary parasitism by aquatic, ectoparasitic water mites and secondary parasitism by terrestrial, endoparasitic gregarines. We first asked if coinfection is predicted by abiotic and biotic factors within the local environment, finding that the probability of coinfection decreased for all host species as pH increased. We then asked if primary infection by aquatic water mites mediated the relationship between pH and secondary infection by terrestrial gregarines. Contrary to our expectations, we found no evidence for a water mite-mediated relationship between pH and gregarines. Instead, the intensity of gregarine infection correlated solely with the local environment, with the magnitude and direction of these relationships varying among environmental predictors. Our findings emphasize the role of the local environment in shaping infection dynamics that set the stage for coinfection. Although we did not detect within-host interactions, the approach herein can be applied to other systems to elucidate the nature of interactions between hosts and coinfecting parasites within complex ecological communities." (Authors) [Ischnura posita, Enallagma basidens, E. traviatum, E. signatum, E. exsulans] Address: Hasik, A. Dept Biol. Sciences, Univ. of Arkansas, Fayetteville, Arkansas, USA. Email: adamzhasik@gmail.com

23842. Hering, J.; Geiter, O.; Fünfstück, H.-J.; Kiepsch, S. (2024): Die fünfte Expedition auf dem Nassersee: Rußvögel und afrotropische Schwalben. Der Falke 71(8): 14-20. (in German) [Verbatim/google translate: A widespread breeding bird species in the Lake Nasser region is the rock martin (*Ptyonoprogne fuligula*). The subspecies *obsoleta* found here nests mainly on rocky shores and in buildings. But nests can also be found in all temples. We found an easily controlled breeding site in a Muslim grave from the 15th century near the island of Qasr Ibrim, which was found occupied on every Lake Nasser expedition. There we collected over 60 faecal samples from under a nest, which could now be analyzed in more detail. The result was unexpected. Contrary to the information in the literature, dragonflies dominate. This affects a third of all prey, and in particular dragonflies (Anisoptera), which occur in incredibly large numbers on the lake. These dragonflies are the most important prey for rock martins in terms of both number and biomass, followed by ants (Formicidae) and flies (Diptera). We made another exciting observation in May 2019, when around 120 rock martins took a daytime rest in a limestone cave in the midday heat, protected from the sun and wind. We also discovered that this species of swallow breeds all year round in southern Egypt.] Address: not stated

23843. Hernandez, J.; Cognato, A.I. (2024): Incomplete barriers to heterospecific mating among *Somatochlora* species (Odonata: Corduliidae) as revealed in multi-gene phylogenies. *Cladistics* 40: 598-617. (in English) ["Mating between species occurs within many insect orders. The result of heterospecific mating depends upon the effectiveness of pre- and post-reproductive barriers. Incomplete reproductive barriers lead to introgression of DNA into one species or both. Intricate genital morphology among dragonflies provides little assurance of species specificity given that heterospecific mating or mating attempts have been observed among many species. The genetic consequence is unknown for many

heterospecific matings. For example, *Somatochlora* species mating and genetic exchange have been hypothesized based on observational records and individuals with hybrid morphology. We investigate the potential of heterospecific mating between North American *Somatochlora* species as inferred from multi-gene phylogenies. We used mitochondrial genes (COI and ND3) and nuclear genes (EF1-a and ITS2) to construct phylogenies using maximum parsimony. Observation of non-monophyletic mtDNA lineages but monophyletic nDNA lineages between *Somatochlora* sister-species would indicate mtDNA introgression and suggest heterospecific matings. Our results highlighted three instances of non-monophyly of mtDNA clades in the following groups: (i) *S. hineana* + *S. tenebrosa*; (ii) *S. kennedyi* + *S. forcipata* + *S. franklini*; and (iii) *S. calverti* + *S. provocans* + *S. filosa*. Analysis of partitioned Bremer support indicates that mtDNA COI largely contributed to the non-monophyly of these species, thus suggesting mtDNA introgression resulting from heterospecific matings. Additionally, the topology resulting from the combined data analysis was concordant with previous taxonomic understanding of *Somatochlora* species groups. These multi-gene phylogenies of North American *Somatochlora* are the first, providing a foundation for future ecological and evolution studies and knowledge for effective decision-making and public policy, which is especially important for the endangered species, *S. hineana*." (Authors)] Address: Cognato, A.I., Dept of Entomology, Michigan State Univ., East Lansing, MI, 48824 USA. Email: cognato@msu.edu

23844. Hidayat, A.M.; Ningrum, E.A.; Suherman, J.R.; Putri, D.A.; Erwahyudi, H.; Kumia, I.; (2024): Keanekaragaman Jenis Capung di Kawasan Setu Cileunca Kabupaten Bandung Provinsi Jawa Barat [Diversity of dragonfly species in the Setu Cileunca area, Bandung regency, West Java Province]. *Symbiotic: Journal of Biological Education and Science* 5(2): 96-109. (in Indonesian, with English summary) ["Setu Cileunca is an artificial reservoir built in 1857 with the main function for electricity generation. This research aims to analyze the dragonfly diversity in Setu Cileunca, West Java, Indonesia. The research was carried out in June 2023 in five habitat types including setu, pine forests, cultivated area, rivers and settlements. Dragonfly data was taken using a 100x20 meter strip method. Quantitative analysis was carried out using (1) chi-square test, (2) diversity index (H'), (3) evenness index (E), and (4) similarity index (IS). There were 19 species of dragonflies found from two sub-orders and six families. The most common species are found in cultivated areas (17 species) while the least common are in pine forest (4 species). The number of individuals found ranged from four individuals (pine forest) to 252 individuals (cultivated area). The chi-square test showed significantly different values for both of number of species and number of individuals. The H' value for all locations is 2.48 and the E value is 0.84. The IS values ranged from 0.17-0.88." (Authors)] Address: Kumia, I., Program Studi Ekowisata, Sekolah Vokasi IPB University, Jl. Kumbang No.14 Bogor 16151, Indonesia. Email: insan-kurnia@apps.ipb.ac.id

23845. Hwang, D.-s.; Kim, J.; Chung, J.; Lee, J. (2024): Refinement and validation of the SPECIES at risk index for metals (SPEARmetal Index) for assessing ecological impacts of metal contamination in the Nakdong River, South Korea. *Water* 2024, 16, 3308. <https://doi.org/10.3390/w16223308>: 17 pp. (in English) ["The SPECIES at Risk index for metals (SPEAR index) was refined using updated physiological sensitivity data and validated to assess the ecological impact of metal contamination on benthic macroinvertebrate communities in the upper Nakdong River, near a Zn

smelter in Korea. Biosurvey and chemical monitoring data were collected at 18 sites surrounding the smelter and nearby mines. Acute ecotoxicity tests on 20 indigenous species from the Korean peninsula were conducted and used to update taxon-specific metal sensitivity data. The refined SPEAR index, based on this updated sensitivity, was significantly lower than previous versions, with most values below the severe impact threshold (0.5) in the main stream. The correlation between hazard quotients in water and the SPEAR index improved, with the correlation coefficient increasing from 0.63 to 0.70. Despite consistently high benthic macroinvertebrate indices (BMIs) across the study area, generic ecological indices, such as total richness, EPT (Ephemeroptera, Plecoptera, and Trichoptera taxa richness), and Shannon's diversity index, showed correlations with metal contamination levels. Principal component analysis identified the SPEAR index as the primary indicator associated with metal contamination in both water and sediment. These findings highlight the improved performance of the refined SPEAR index as a more sensitive and specific tool for assessing the ecological status of metal-impacted aquatic ecosystems compared to traditional indices. ... Among insect orders, Coleoptera (-0.31) and Ephemeroptera (-0.009) were most sensitive, while Odonata (1.82) were relatively tolerant. Other taxa, such as Plecoptera (1.18) and Trichoptera (1.19), exhibited intermediate sensitivity." (Authors) In the supplementary material (Table S1) three odonate species and their sensitivity against Cu are listed: *Anax parthenope*, *Sieboldius albardae*, and *Ophiogomphus obscurus*. Table S3 compiles data on the physiological sensitivity (S) values for As, Cd, Co, Cr, Cu, Fe, Hg, Ni, Pb, Se and Zn of the following taxa: *Calopteryx splendens*, *Enallagma aspersum*, *E. cyathigerum*, *E. sp.*, *Ischnura elegans*, *I. heterosticta*, *Macromia sp.*, and *Zygoptera*. Table S5 documents information on benthic macroinvertebrate species found in the upper Nakdong River.] Address: Lee, J., EH Research & Consulting Co., Ltd., E TechHive, 410 Jeongseojin-ro, Seo-gu, Incheon 22689, Republic of Korea. Email: j.lee@ehrc.com

23846. Idec, J.; Bybee, S.; Ware, J.; Abbott, J.; Guillermo Ferreira, R.; Suvorov, A.; Kohli, M.; Eppel, L.; Kuhn, W.R.; Belitz, M.; Guralnick, R. (2024): Interactions between sexual signaling and wing size drive ecology and evolution of wing colors in Odonata. *Scientific Reports* 14, 25034: 10 pp. (in English) ["Insect coloration has evolved in response to multiple pressures, and in Odonata a body of work supports a role of wing color in a variety of visual signals and potentially in thermoregulation. Previous efforts have focused primarily on melanistic coloration even though wings are often multi-colored, and there has yet to be comprehensive comparative analyses of wing color across broad geographic regions and phylogenetic groups. Percher vs. flier flight-style, a trait with thermoregulatory and signaling consequences, has not yet been studied with regard to color. We used a new color clustering approach to quantify color across a dataset of over 8,000 odonate wing images representing 343 Nearctic species. We then utilized phylogenetically informed Bayesian zero-inflated mixture models to test how color varies with mean ambient temperature, body size, sex and flight-style. We found that wing coloration clustered into two groups across all specimens - light brown-yellow and black-dark brown - with black-dark brown being a much more cohesive grouping. Male perchers have a greater proportion of black-dark brown color on their wings as do species with longer wings. In colder climates, odonates were more likely to have black-dark brown color present, but we found no relationship between the proportion of black and temperature. Light brown-yellow showed similar scaling with wing length, but

no relationship with temperature. Our results suggest that black-dark brown coloration may have a limited role in thermoregulation, while light brown-yellow does not have such a role. We also find that the odonate sexes are divergent in wing color in percher species only, suggesting a strong role for color in signaling in more territorial males. Our research contributes to an understanding of complex interactions driving ecological and evolutionary dynamics of color in animals." (Authors)] Address: Idec, J., Florida Museum of Natural History, Univ. of Florida, Gainesville, FL, USA. Email: jacob.idec@ufl.edu

23847. Ikayaja, E.O.; Babalola, G.A.; Zabbey, N.; Arimoro, F.O. (2024): Agricultural-derived organochlorine pesticide residues impact on macroinvertebrate community in an Afro-tropical stream. *Heliyon* 10 (2024) e34606: 9 pp. (in English) ["This study evaluated the impact of pesticide application through agricultural activities in Chanchaga River, Nigeria, using macroinvertebrate data sets obtained for six months (September 2021–February 2022). Four (4) stations, characterized by various agricultural activities, were sampled along the river. Analysis of the water samples for organochlorine pesticide residues (OCP) using Gas Chromatography-Mass Spectrometry (GC/MS) at the peak of the two seasons revealed a high concentration of eleven isomers of organochlorine, which ranged from 0.01 to 0.81 µg/L, and a mean concentration that was above international drinking water standards set by the World Health Organization, the Federal Environmental Protection Agency, and the European Union. The mean concentration of detected OCP was recorded as DDT (0.72 µg/L), Dieldrin (0.59 µg/L), Paraquat (0.54 µg/L), Aldrin (0.49 µg/L), Metribuzin (0.48 µg/L), Butachlo (0.47 µg/L), Alachlor (0.28 µg/L), Atrazine (0.23 µg/L), Phenol (0.10 µg/L), Endrin (0.09 µg/L), and Benzene (0.08 µg/L). Atrazine, alachlor, metribuzin, aldrin, phenol, and endrin showed significant differences across the two seasons ($p < 0.05$), while dieldrin, butachlor, paraquat, benzene, and DDT showed no significant differences across the two seasons ($p > 0.05$). A total of 622 macroinvertebrate individuals from 19 species in 18 families from 8 orders were collected. More individuals were collected during the dry season (58.17 %) and the wet season (41.83 %). Canonical Correspondence Analysis (CCA) ordination revealed a strong relationship between species abundance and some organochlorine pesticide residues such as DDT, endrin, metribuzin, atrazine, benzene, and dieldrin. The response of macroinvertebrates to OCP indicates that Chanchaga River is a disturbed river, and the indicator organisms (*Lestes sp.*, *Coenagrion sp.*, *Zyxomma sp.*, *Appasus sp.*, *Chironomus sp.*, *Lymnaea natalensis*, and *Caridina nilotica*) can also be used for further biomonitoring." (Authors)] Address: Ikayaja, E.O., Ecology & Environmental Biology Unit, Department of Animal Biology, School of Life Sciences, Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria. Email: ikayajaeunice@gmail.com

23848. Ishiwaka, N.; Hashimoto, K.; Hiraiwa, M.K.; Sánchez-Bayo, F.; Kadoya, T.; Hayasaka, D. (2024): Can warming accelerate the decline of Odonata species in experimental paddies due to insecticide fipronil exposure? *Environmental Pollution* 341: 6 pp. (in English) ["Highlights: •Agrochemicals and global warming are major threats to biodiversity/community. •Odonata nymphs sharply decreased due to synergistic effects of insecticide and warming. •However, not all Odonata taxa were synergistically impacted by the two stressors. •Insecticide exposure under warming can accelerate the decline of Odonata community. Abstract: Systemic insecticides are one of the causes of Odonata declines in paddy fields. Since rising temperatures associated with global warming can

contribute to strengthen pesticide toxicity, insecticide exposures under increasing temperatures may accelerate the decline of Odonata species in the future. However, the combined effects of multiple stressors on Odonata diversity and abundance within ecosystems under various environmental conditions and species interactions are little known. Here, we evaluate the combined effects of the insecticide fipronil and warming on the abundance of Odonata nymphs in experimental paddies. We show that the stand-alone effect of the insecticide exposure caused a significant decrease in abundance of the Odonata community, while nymphs decreased synergistically in the combined treatments with temperature rise in paddy water. However, impacts of each stressor alone were different among species. This study provides experimental evidence that warming could accelerate a reduction in abundance of the Odonata community exposed to insecticides (synergistic effect), although the strength of that effect might vary with the community composition in targeted habitats, due mainly to different susceptibilities among species to each stressor. Community-based monitoring in actual fields is deemed necessary for a realistic evaluation of the combined effects of multiple stressors on biodiversity." (Authors)] Address: Hayasaka, D., Faculty of Agriculture, Kindai University, Nakamachi, 3327-204, Nara, Nara, 631-8505, Japan. Email: hayasaka@nara.kindai.ac.jp

23849. Jain, S.S.; Lee, K.J.P.; Wissa, A.; Seo, J.-H.; Mittal, R. (2024): Abstract: R30.00002: Direct numerical simulations of the aerodynamics of insect inspired gliders. Bulletin of the American Physical Society. 77th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 24–26, 2024; Salt Lake City, Utah. Session C09: Interact: Swimming and Flying at Moderate and High Reynolds Numbers. 10:50 AM, Sunday, November 25, 2024. Room: 255 B: (in English) ["Verbatim: While insects have often served as bioinspiration for flapping wing micro-aerial vehicles, several large insects such as grasshoppers, butterflies, moths, and dragonflies also exhibit excellent capabilities for gliding. We employ direct numerical simulations using an in-house ghost cell immersed boundary method-based CFD code to investigate the aerodynamics of a grasshopper-inspired glider. The glider is modeled as a thin membrane structure, and we examine the glider's performance in the context of various aerodynamic parameters such as Reynolds number, angle-of-attack, and roll angle and their impacts on the aerodynamics as well as quantities such as drag and lift coefficients. The effect of the presence of wing corrugations is also studied in this framework, along with the contribution of different flow structures such as wake and wing tip vortices using the Force and Moment Partitioning Method (FMPM). A special emphasis is placed on understanding the roll and pitch moment characteristics that ultimately affect the glider's stability.] Address: not stated

23850. Jana, P.K.; Mallick, P.H.; Bhattacharya, T. (2024): Preference and plasticity in selection of host for oviposition in Black Marsh Dart *Onychargia atrocyana* Selys, 1865 (Odonata: Zygoptera: Platycnemididae). Journal of Threatened Taxa 16(9): 25904-25912. (in English) ["An experimental study was conducted in a natural pond to investigate host plant preference and plasticity in *O. atrocyana*. The hypothesis was that this species has a host preference for oviposition and also sufficient plasticity to use other hosts in the absence of the preferred host. After mating, tandems were observed landing on plants in search of suitable oviposition substrates. The majority of landings occurred on *Alternanthera philoxeroides*, followed by *Colocasia esculenta* and *Comelina diffusa*. The frequency of landings on *A. philoxeroides*

and *C. esculenta* was not significantly different, while landings on *C. esculenta* and *C. diffusa* did differ significantly. In the absence of emergent littoral plants, the damselflies exhibited plasticity in host preference and shifted ovipositional substrate by laying eggs on submerged areas of petioles of free-floating *Eichhornia crassipes*. Females of *O. atrocyana* exhibited a flexible oviposition strategy, transitioning from a combination of emergent and submerged oviposition to primarily selecting emergent oviposition in most cases. Additionally, they divided oviposition events into multiple phases when required to ensure successful reproduction. *E. crassipes* supported a higher rate of oviposition compared to other plants. A multiple regression analysis demonstrated that during submerged oviposition water temperature and pH were significant predictors of the duration of submergence." (Author)] Address: Jana, P.K., Centre for Life Sciences, Vidyasagar University, Paschim Medinipur, West Bengal 721102, India. Email: pathikjana@gmail.com

23851. Jödicke, R. (2024): Erinnerung an Bernd Kunz (11.04.1967-19.06.2024) - Remembrance of Bernd Kunz (11-iv-1967–19-vi-2024). Libellula 43(1/2): 1-7. (in German) [This is a tribute based on a long-standing friendship, which highlights a few key aspects of B. Kunz's extensive odonatological and wide-ranging oeuvre, which goes beyond the publications and which could be significantly broadened on the basis of the extensive correspondence that B. Kunz maintained with so many people. Unfortunately, many planned projects remained unfinished.] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@@magenta.de

23852. Joest, R.; Bunzel-Drüke, M. (2024): Auenrenaturierung, Beweidung und Klimawandel: Langjährige Entwicklung der Libellenfauna in der renaturierten Lippeaue der Klostermersch (Kreis Soest, Nordrhein-Westfalen). Naturschutz und Landschaftsplanung 56(7): 14-23. (in German, with English summary) ["Floodplain restoration, grazing and climate change – Long-term development of the dragonfly fauna in the renaturalised Lippe floodplain of Klostermersch (Soest district, North Rhine-Westphalia): As one of the first German floodplain restoration projects on larger rivers, the Lippe in the Klostermersch near Lippstadt-Benninghausen was restored in 1996 and 1997. The floodplain has been subjected to near-natural year-round grazing since 1991. This article summarizes the effects of nature conservation measures and climate change on the dragonfly community for the period of 1991 to 2023. The restoration measures increased the water surface of the previously artificially constricted streams and rivers from 7 ha to nearly 11 ha. The number of still water bodies increased from 15 to 62. In the 18 years of the study, a total of 41 species of Odonata was detected. The number of species and the number of red listed species have both increased significantly. Increases were also evident in the sum of the frequency classes for all ecological groups considered. According to nationwide trends, the increasing number of species included many thermophilic and riverine species. This included the Green Snaketail (*Ophiogomphus cecilia*), which is listed in the Habitats Directive and was previously extinct statewide. Four species appeared with increasing frequency in the restored Klostermersch, while they declined across Germany. These were all species of ephemeral standing water bodies. A negative impact of the grazing of water bodies on the dragonfly fauna was not apparent; rather a positive influence by the delaying of vegetation succession. The present study is therefore an example of the successful promotion of an important indicator group by comprehensive floodplain restoration." (Authors)] Address:

Joest, R., Biologische Station Soest, Bad Sassendorf-Lohne. E-mail: r.joest@abu-naturschutz.de

23853. Kálmán, S. (2024): Az Északkeleti-Alföld vizes élőhelyeinek amfibikus rovarközösségei [Amphibious insect communities of the wetland habitats of the Northeast Great Plain]. PhD thesis, University of Debrecen: 120 pp. (in Hungarian, with English summary) ["The results of my entomofaunistic, ecological and methodological investigations carried out in the wetlands belonging to the northeastern part of the Hungarian Great Plain between 2014 and 2021 are presented in this study. ... The comparison of recent and former dragonfly fauna of Konyári-Kálló showed an extremely high habitat degradation, with nearly 50% diversity loss over a decade. Moreover, the relative frequencies of species indicated a shift from a balanced assemblage to an assemblage dominated by two common and pioneer species (*Coenagrion puella*, *Sympetrum sanguineum*)."] (Author)] Address: <https://dea.lib.unideb.hu/server/api/core/bitstreams/e8f3f6f1-8e37463-0-b997-e53881ed07c7/content>

23854. Keetapithchayakul, T.S.; Phan, Q.T. (2024): Description of the larva of *Platycnemis phasmovolans* Hämäläinen, 2003 (Odonata, Platycnemididae), with a key to the larvae of the subfamily Platycnemidinae from the Sino-Japanese and Oriental regions. *ZooKeys* 1221: 1-18. (in English) ["The final instar larva of the rare species *Platycnemis phasmovolans* Hämäläinen, 2003 is described and illustrated here for the first time, including a new distribution record from Vietnam. The larva of *P. phasmovolans* differs from that of congeneric species by distinct morphological features, including the presence of four setae on the palpal lobe of the labium, the presence of lateral spines on abdominal S5–9, and a long terminal filament on the caudal lamella. We also provide a key to species for the known larvae of the subfamily Platycnemidinae in the Sino-Japanese and Oriental regions."] (Authors)] Address: Keetapithchayakul, T.S., The Center for Entomology & Parasitology Research, College of Medicine and Pharmacy, Duy Tan University, 120 Hoang Minh Thao, Lien Chieu, Da Nang, Vietnam. Email: Keetapithchayakul.TS@gmail.com

23855. Keetapithchayakul, T.S.; Makbun, N.; Ignatius, K.J.; Phan, Q.T. (2024): *Prodasineura sangkhla* sp. nov., a new damselfly from western Thailand (Odonata: Platycnemididae). *Zootaxa* 5551(1): 131-140. (in English) ["*Prodasineura sangkhla* sp. nov. is described from the Takhian Thong waterfall near the Thai-Myanmar border, Kanchanaburi Province, Thailand. It differs from all other species of *Prodasineura* Cowley, 1934 by the combination of the characters including white pruinescence on prothorax, synthorax and some parts of legs, blue markings on S10 and anal appendages, shape of anal appendages in males, and shape of occipital band and posterior process of posterior lobe in females."] (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

23856. Kiteľ, D.; Kittelberger, K.; Agirkaya, K.; Tutar, G.; Sekercioglu, C.H. (2024): Notes on the phenology of dragonflies and damselflies (Insecta: Odonata) in the Aras River Valley of Turkey. *Caucasiana* 3: 281-294. ["A check-list of Odonata found at Aras River Valley in Kars and Igdir provinces of Turkey is published for the first time, representing 38 species. The abundance of species from March to November is noted by month, with the phenology of the flight period indicated. Summer months unsurprisingly host the highest number of species, up to 28 in June. We provide a

complete phenology for the imago (adult) presence in the area for 22 species, from their emergence to their disappearance at the end of their flight period and life cycle. Short notes regarding selected species which are either rare in the region or have international protection status are also provided. This study shows that the Aras River Valley is an important place for Odonata, especially *Onychogomphus flexuosus* and *Libellula pontica*, species which are classified as "Vulnerable" and "Near Threatened", respectively, in the present IUCN Red List of threatened species."] (Authors)] Address: Kiteľ, D., email: kiteľden@gmail.com

23857. Kumar, D.; Saxena, K. (2024): Diversity and abundance of dragonflies in Sikar region, Rajasthan (India). *International Journal of Entomology Research* 9(9): 130-135. (in English) ["This research was undertaken to study the diversity and abundance of dragonflies in Sikar region from October 2019 to July 2024. A combination of random sampling, observation and opportunistic sighting methods were used to record different species of dragonflies. Among the 31 dragonfly species recorded, the most diverse family, Libellulidae was represented by 29 species, Gomphidae and Cordulegasteridae [*Cordulegaster boltonii* ??] were present each with one species. But only 6 species were most abundant. Documentation of Odonata has not been done earlier from Sikar region and our observations testify this region worthy of providing suitable habitats for Odonata."] (Authors)] Address: Saxena, Kanan, Dept Zoology, Government Meera Girls College, Udaipur, Rajasthan, India

23858. Law, A.; Baker, A.; Sayer, C.D.; Foster, G.; Gunn, I.D.M.; Macadam, C.R.; Willby, N.J. (2024): Repeatable patterns in the distribution of freshwater biodiversity indicators across contrasting landscapes. *Landscape Ecology* 39: 195-16 pp. (in English) ["Context: Freshwater biodiversity is declining at unparalleled rates, but fundamental questions remain over how it is distributed at the spatial scales most relevant for conservation management. Objectives: Here, we test the hypothesis that freshwater biodiversity is distributed across standing waterbody types in a pattern that is reproducible across disparate biota and contrasting landscapes, such that conservation efforts can be aligned across landscapes and taxa. Methods: We analysed the richness, composition and distribution of macrophytes, molluscs, beetles and odonates from 199 standing waterbodies (lakes, ponds, ditches and canals) nested within UK landscapes with contrasting dominant land use (agricultural, upland and suburban). Results: We found a common pattern in the distribution of our biodiversity indicators across waterbody types in all landscapes that was largely repeated across biota; lakes consistently had the highest or equal alpha diversity and supported a greater proportion of the sampled species pool in each landscape (mean = 86%) in comparison to ponds (74%). Landscape-specific waterbody types (ditches and canals) also contributed significantly to the regional species pool (69 and 33% respectively). Each waterbody type contributed uniquely to landscape biodiversity and usually species of conservation concern, rather than simply supporting a subset of ubiquitous species found in lakes. Conclusions: Landscape-wide management strategies that encompass multiple habitats and biota should prove advantageous and generalisable. However, our study landscapes suggest that long-term biodiversity conservation should also recognise lakes as a priority for nature recovery, both to minimise further losses and to maintain the largest reservoir of biodiversity."] (Authors)] Address: Law, A., Biological & Environmental Sciences, Cottrell Building, Univ. of Stirling, Stirling FK9 4LA, UK. Email: alan.law1@stir.ac.uk

23859. Lee, D.J. (2024): On the respiratory consequences of the air-to-water transition in insects. PhD thesis, University of British Columbia: XV + 118 pp. (in English) ["Numerous terrestrial insect lineages have independently adapted to an aquatic existence to live and breathe underwater. Despite their success, these groups retained the same air-filled tracheal system used by their terrestrial ancestors. While the continued reliance on internal air to transport gases has numerous advantages, it also creates challenges that may hinder the insects' ability to thrive in water. This thesis investigates two potential consequences: reduced gas exchange efficiency in the tidally-ventilating dragonfly nymphs [*Anax junius*], and the tracheal system's susceptibility to pressure-induced failure. Testing the response of dragonfly nymphs to progressive hypoxia in Chapters 2 and 3 shows that they increase gill ventilation frequency while maintaining a constant metabolic rate. Calculating their oxygen (O₂) extraction efficiency (OEE) shows that it, while lower than that of unidirectional-breathers, is maintained even in severe hypoxia. Mathematical models indicate that this constant OEE cannot be explained solely by increased ventilation, and further experiments show that while the diffusion gradient is maintained in mild hypoxia due to a significant reduction in hemolymph PO₂, it steadily falls in severe hypoxia. Dragonfly nymphs compensate for this reduced gradient by increasing gill O₂ conductance, showing they employ both convective and diffusive methods to maintain O₂ uptake. Exposing water-breathing insects to increasing hydrostatic pressures in Chapter 4 shows that their tracheal systems collapse at depth and is associated with significant reductions in tracheal air volume. However, this tracheal collapse induced mortality only in mayflies and not in dragonflies and damselflies, potentially reflecting differences in their ability to ameliorate or tolerate the consequences of reduced tracheal gas transport. Comparing the tracheal wall morphology of the above insects with those of terrestrial species suggests that the former are thicker, likely as a consequence of living in an environment with higher external pressures. Overall, these findings indicate that the adaptation of the air-filled tracheal system in water-breathing insects is not perfect; while they are capable of extracting O₂ in hypoxia, they must also constantly contend with the risk of pressure-induced failure. Collectively, this thesis provides the starting point to a better understanding of how well insects have evolved to become secondary water-breathers." (Author)] Address: <https://open.library.ubc.ca/media/download/pdf/24/1.0447405/3>

23860. Lee, I.-L.; Ma, C.-M.; Chou, Y.-C.; Hu, F.-S. (2024): *Sympetrum parvulum* (Bartenev, 1913) (Odonata: Libellulidae): A newly recorded dragonfly from Matsu Islands, Taiwan. *Taiwanese Journal of Entomological Studies* 9(3): 29-32. (in Chinese, with English summary) ["The genus *Sympetrum* on Matsu Islands, Taiwan is summarized, and further records of *S. fonscolombii* are provided. *Sympetrum cordulegaster* and *S. depressiusculum* are newly reported from the islands. Additionally, *Sympetrum parvulum* is reported from Taiwan for the first time. The status of the *S. parvulum* in Taiwan is considered as an occasionally migrated record." (Authors)] Address: unknown

23861. Lejeune, O.; Berthe, J.; Devos, A.; Bollot, N.; Kraufel, T. (2024): Evolution du Pléistocène moyen à nos jours d'un site de tourbière de fond de vallée: l'exemple du marais de Germont / Buzancy. 6e colloque Du Réseau des Zones Ateliers CNRS, Zone atelier Argonne, Sep 2024, Sainte-Menehould, France. ?hal-04703259?: 66. (in French) [In a context of global climate change, the study of peatlands has become essential. Peatlands account for just 3% of the earth's surface area but nearly 30% of carbon stocks (Gorham,

1991; Griffiths et al., 2019), the release of which into the atmosphere could considerably increase the greenhouse effect. Eastern France, and Champagne-Ardenne in particular, has few large peat bogs, often located at the head of a valley, such as the Saint-Gond marshes (Marne) upstream of the Petit Morin or the Germont marsh (Ardennes) upstream of the Bar. It turns out that the latter, despite being classified as a NATURA 2000 and ZNIEFF 1 site and constituting a remarkable natural entity in terms of its habitats as well as its fauna (*Castor fiber*, *Coenagrion mercuriale*, etc.) and flora (*Carex*, *Cladium*, etc.), is very little known and is gradually deteriorating. Those involved in environmental protection (CENCA, AERM, etc.) have little knowledge of the sedimentary structure that determines the hydrodynamic functioning of this entity, which limits effective restoration policies. The 2022-2023 research programmes (HYMAGE, PALMAGE and KALMAR) funded by the Argonne ZARG and the AERM (Rhine-Meuse Water Agency) have made it possible to geomorphologically contextualise the Upper Bar marshes site (Germont marshes: Buzancy) by carrying out core drilling, geophysical measurements and a lidar topographic analysis of the valley floor. We propose here to present the sedimentary structure of the marsh as well as the way in which it was created, the latter originating in the dismantling of the local geological layers during the last glacial event but also in more ancient origins linked to the hydrographic capture of the Aire-Bar (Davis, 1895), dated during work carried out in collaboration with Andra (Agence Nationale pour la gestion des déchets radioactifs). (Verbatim/DeepL)] Address: https://colloquerza2024.sciencesconf.org/data/pages/ColloqueRZA_Programme_Detaille_11.pdf

23862. Lévêque, A.; Duputié, A.; Vignon, V.; Duez, F.; Godé, C.; Vanappelghem, C.; Arnaud, J.F. (2024): Contrasting patterns of spatial genetic structure in endangered southern damselfly (*Coenagrion mercuriale*) populations facing habitat fragmentation and urbanisation. *Diversity and Distributions*. 2024; 30:e13902: 14 pp. (in English) ["Aim: Human-induced environmental changes result in habitat loss and fragmentation, impacting wildlife population genetic structure and evolution. Urbanised and geographically peripheral areas often represent unfavourable environments, reducing connectivity among populations and causing higher population genetic differentiation and lower intra-population genetic diversity. We examined how geographic peripherality and anthropogenic pressures affect genetic diversity and genetic differentiation in the protected *C. mercuriale*, which has low dispersal capabilities and specific habitat requirements and whose populations are declining. Location: We studied two areas: one in semi-natural habitats at the periphery of the species geographic range (northern France) and the other more central to the species' range, in an urbanised area surrounding the city of Strasbourg (Alsace, eastern France). Methods: We genotyped 2743 individuals from 128 populations using 11 microsatellite loci. We analysed the spatial distribution of neutral genetic diversity (allelic richness, heterozygosity, levels of inbreeding and genetic relatedness), the extent of genetic differentiation and population affiliations (sPCAs) within the two areas. We also examined fine-scale patterns of gene flow in the urbanised area of Alsace by investigating patterns of isolation by distance and estimating effective migration surfaces (EEMS) method. Results: Northern peripheral populations showed lower levels of genetic diversity and higher levels of genetic differentiation than central Alsacian populations. Although located in anthropised habitats, geographically central Alsacian populations showed high levels of gene flow, with dispersal events mainly occurring overland and not restricted to watercourses. However, the highly urbanised city of Strasbourg negatively impacted nearby populations by reducing

levels of genetic diversity and increasing population genetic differentiation. Main Conclusions: These results showed the need for management action by restoring breeding sites and creating migratory corridors for peripheral southern damselfly populations. However, our results also highlighted the resilience of southern damselfly in central range populations facing strong urbanisation pressures." (Authors)] Address: Arnaud, J.-F., Univ. Lille, CNRS, UMR 8198 – Evo-Eco-Paleo, Lille 59000, France. Email: jean-francois.arnaud@univ-lille.fr

23863. Li, P.; Xiong, S.; Liu, J.; Wang, T.; Liu, Y.; Liu, K.; Wang, Y.; Wang, J. (2024): The spatiotemporal variation and ecological evaluation of macroinvertebrate functional feeding groups in the Upper Yellow River. *Biology* 13(10), 791: 17 pp. (in English) ["Simple Summary: To elucidate the characteristics of functional feeding groups among macroinvertebrates during various months in the upper Yellow River, and their relationship with environmental factors, 33 sampling points were strategically placed across both gorge and plain regions. Collectively, these areas hosted 65 taxonomic units (genus or species) of macroinvertebrates, among which the collector-gatherers were predominantly dominant. Notably, *Gammarus* sp. and *Limnodrilus hoffmeisteri*, among the collector-gatherers, emerged as the prevalent species across both the gorge and plain areas. Mantel tests indicated that dissolved oxygen, conductivity, and orthophosphate were significant environmental determinants influencing the functional feeding groups of macroinvertebrates. Evaluations based on the Hilsenhoff Biological Index and the Shannon–Wiener Index suggest that the water quality of the upper Yellow River is moderate. An analysis using functional feeding group parameters showed a progressive increase in the biomass of macroinvertebrates from upstream (gorge areas) to downstream (plain areas), accompanied by enhanced habitat stability. Cascade hydropower development was pinpointed as a crucial factor impacting habitat stability. These insights provide relevant data and a theoretical basis for the conservation of aquatic biological resources and watershed management in the upper Yellow River. Abstract: Against the backdrop of hydropower development in the upper Yellow River, comprehending the spatiotemporal variation and ecological evaluation of macroinvertebrate functional feeding groups (FFGs) is paramount for the conservation and restoration of aquatic biological resources in watersheds. Detailed surveys of macroinvertebrates were conducted in the gorge and plain areas of the upper Yellow River in July 2022 and March, May, and October 2023, culminating in the identification of 65 taxonomic units (genus or species) spanning 4 phyla, 14 orders, and 35 families. Of these, 41 taxonomic units were discovered in the gorge areas and 57 in the plain areas. Among the FFGs of macroinvertebrates in the upper Yellow River, collector-gatherers were overwhelmingly dominant, followed by scrapers, collector-filterers, predators, and shredders. Concerning river section types, dominant species in the gorge areas included *Gammarus* sp., *Limnodrilus hoffmeisteri*, and *Polypedilum* sp. among collector-gatherers, while in the plain areas, dominant species included *Ecdyonurus* sp. among scrapers, *Hydropsyche* sp. among collector-filterers, and *Gammarus* sp., *Limnodrilus hoffmeisteri*, and *Chironomus* sp. among collector-gatherers. A Mantel test revealed that dissolved oxygen, conductivity, and orthophosphate were the primary environmental factors affecting the FFGs of macroinvertebrates in the upper Yellow River, with variations observed in their effects across different months. The evaluation results of the Hilsenhoff Biological Index and Shannon–Wiener Index indicate that the water quality of the upper Yellow River is at a moderate level. An assessment of the upper Yellow River ecosystem using FFG parameters demonstrated that macroinvertebrate biomass

progressively increased from upstream (gorge areas) to downstream (plain areas) spatially, accompanied by increasing habitat stability, with cascade hydropower development identified as a key factor impacting habitat stability. These findings provide pertinent data and a theoretical foundation for the protection of aquatic biological resources and watershed management in the upper Yellow River." (Authors) The following taxa are listed in the supplemental material: *Davidius* sp., *Anisogomphus maacki*, *Deiella phaon*, *Anax nigrofasciatus nigrofasciatus*, *Ischnura labata* (= *I. elegans*), and *Calopteryx atratum* (= *Atrocalopteryx atrata*)] Address: Li, Peilun, Heilongjiang River Fisheries Research Inst., Chinese Academy of Fishery Sciences, Harbin 150070, China

23864. Liao, L.; Cheng, Q.; Zhang, X.; Qu, L.; Liu, S.; Ma, S.; Chen, K.; Liu, Y.; Wang, Y.; Song, W. (2024): Segmentation and visualization of the Shampula dragonfly eye glass bead CT images using a deep learning method. *Heritage Science* 12: 381: 15 pp. (in English) ["Micro-computed tomography (CT) of ancient Chinese glass dragonfly eye beads has enabled detailed exploration of their internal structures, contributing to our understanding of their manufacture. Segmentation of these CT images is essential but challenging due to variation in grayscale values and the presence of bubbles. This study introduces a U-Net-based model called EBV-SegNet, which enables efficient and accurate segmentation and visualization of these beads. We developed, trained, and tested the model using a dataset comprising four typical Shampula dragonfly eye beads, and the results demonstrated high-precision segmentation and precise delineation of the beads' complex structures. These segmented data were further analyzed using the Visualization Toolkit for advanced volume rendering and reconstruction. Our application of EBV-SegNet to Shampula beads suggests the likelihood of two distinct manufacturing techniques, underscoring the potential of the model for enhancing the analysis of cultural artifacts using three-dimensional visualization and deep learning." (Authors)] Address: Song, W., Beijing Engineering Research Center of Mixed Reality and Advanced Display, School of Optics and Photonics, Beijing Institute of Technology, Beijing, 100081, China. Email: swt@bit.edu.cn

23865. Liu, P.; Fang, R.; Zheng, D. (2024): A new burmaeshnid dragonfly (Odonata, Anisoptera, Aeshnoptera) from mid-Cretaceous Kachin amber, north Myanmar. *Zootaxa* 5538(1): 74-78. (in English) ["The fifth burmaeshnid dragonfly, *Neoaeschna kachinensis* gen. et sp. nov., is described based on the basal parts of a pair of fore- and hindwings from Kachin amber, indicating that Burmaeshnidae Huang, Cai, Nel & Bechly, 2017 is the most diverse family of true dragonflies in Kachin amber. The new dragonfly differs from the other genera in having one row of cells present in the postdiscoidal area basal of the midfork, the trigonal planate being obsolete, and one or two crossveins present basal of the CuP-crossing in the submedian space." (Authors)] Address: Zheng, D.-R., Dept of Earth Sciences, The Univ. of Hong Kong, Hong Kong Special Administrative Region, China; State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology and Center for Excellence in Life and Palaeoenvironment, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China

23866. Márquez-Rodríguez, J.; Duque-González, J.D.; Ferreras-Romero, M. (2024): Odonatological study in the Doñana area (SW Andalusia, Spain) in years with low rainfall. *Archivos Entomológicos* 30: 169-175. (in English, with Spanish summary) ["In this paper are presented 1,610 records of adult odonates belonging to ten species, four of

them zygopteran. *Ischnura graellsii* was the most abundant species. The most frequently collected anisopteran was *Sympetrum fonscolombii*. Eight and ten species were recorded in 2005 and 2006, respectively. Species found in 2006 not observed in the previous year were *Lestes virens* and *Orthetrum trinacria*. Exuviae of four species were also collected: *I. graellsii*, *Anax ephippiger*, *Orthetrum cancellatum*, and *S. fonscolombii*." (Authors)] Address: Márquez-Rodríguez, J., Lab. de Zoología. Facultad de Ciencias Experimentales. Universidad Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. Email: jmarrod1@admon.upo.es

23867. Márquez-Rodríguez, J.; Vega-Maqueda, M.A. (2024): Contribution to the knowledge of *Onychogomphus costae* Selys, 1885 (Odonata: Gomphidae) in the Sevillian-Cordovan countryside, Southern Spain. *Archivos Entomológicos* 30: 45-47. (in English, with Spanish summary) ["*O. costae* is a rare species ... with a very fragmented distribution in the Iberian Peninsula. This study updates its distribution in the provinces of Seville and Cordova, Southern Spain, based on a targeted survey carried out in 2016–2024 and the compilation of all available records [in total: three localities in 2015, 2016, and 2024]. The species currently seems to be widespread, with a distribution concentrated in the middle section of the Guadalquivir River and its tributaries in the Sevillian-Cordovan countryside. The species barely had records in this area until 2018, mainly due to its cryptic behaviour." (Authors)] Address: Márquez-Rodríguez, J., Lab. de Zoología. Fac.de Ciencias Experimentales. Univ.Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. Email: jmarrod1@admon.upo.es

23868. Márquez-Rodríguez, J. (2024): Contribution to the knowledge of *Lestes macrostigma* (Eversmann, 1836) (Odonata: Lestidae) in the metropolitan area of Seville, Southern Spain. *Archivos Entomológicos* 28: 257-260. (in English, with Spanish summary) ["*L. macrostigma* is a species ... that has a very fragmented distribution in the Iberian Peninsula. A rare colony was discovered in May 2024 in the metropolis of Seville, Southern Spain. Unlike other colonies known so far in the country, the species does not use *Bolboschoenus maritimus* (L.) to spawn, nor *Juncus maritimus* Lam. as it does in France. As a novelty, it has been located in a highly anthropized wetland in that metropolitan area, formed exclusively by *Typha latifolia* L. as an emerging macrophyte. A photographic record of the species observed at the end of spring is attached. ... The Lagoh shopping center, in Seville (Spain), includes a 6,000 m² lake (37°20'32"N, 5°59'11"W, 7 m s.n.m.), and was built in 2019. This sampling site is located next to the Centenario Bridge, an infrastructure that facilitates the daily traffic of 100,000 vehicles along the SE-30 ring road over the Guadalquivir River basin. The artificial lake has a peripheral belt of *Typha latifolia* L. two meters wide. On a sunny day (25/V/2024), about fifty individuals of *L. macrostigma* with reproductive behaviour flying and perching on macrophytes were observed during an hour at 12 am. Two days later, half of the specimens were counted, with some females laying eggs alone. No adults were detected in the first week of June, indicating the dispersion of the species to other wetlands. Other less abundant species with reproductive behaviour were *Ischnura graellsii*, *Crocothemis erythraea* or *Orthetrum cancellatum*. Isolated adults of *Anax parthenope*, *Trithemis annulata* and *T. kirbyi* were also identified. Three exuviae of *A. parthenope* were collected." (Author)] Address: Márquez-Rodríguez, J., Laboratorio de Zoología. Facultad de Ciencias Experimentales. Universidad Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. Email: jmarrod1@admon.upo.es

23869. Martin, R.L. (2024): Under-ice ecology of aquatic insects in north-temperate lentic ecosystems. PhD thesis,

Department of Ecology and Evolutionary Biology, University of Toronto: 195 pp. (in English) ["Winter in north-temperate lentic ecosystems is characterized by cold temperatures, limited light availability, and critically in aquatic ecosystems, periods of ice cover and hypoxia. Despite these challenging conditions, many aquatic invertebrates remain active throughout winter. Climate change is decreasing ice-coverage duration, with ice forming later and melting earlier. Current research on winter aquatic ecology is lacking, particularly on aquatic macroinvertebrates, a diverse group important to ecosystem function. My thesis examines how winter conditions shape aquatic invertebrate communities and the potential consequences of milder winters. My first set of experiments investigated why *Sympetrum vicinum* exhibit clutch-splitting behaviour, ovipositing eggs in both terrestrial and aquatic environments where the eggs then spend the winter. I concluded that the dragonflies engage in risk-spreading in response to unpredictable levels of danger present in each environment; in the aquatic environments egg-depredation by winter-active detritivores such as caddisflies, and in the terrestrial environment the risk that eggs will not be inundated by spring flooding and fail to hatch. Next I examined patterns of overwinter decline in dragonfly community samples from Ontario and Michigan, then tested hypoxia as a possible driver of decline. I concluded that a large-bodied top-invertebrate-predator species, *Anax junius*, is likely experiencing hypoxia-driven winterkill in some of its overwintering habitats. My third set of experiments examined the effects of a prolonged warm pre-winter period (late onset winter) on overwinter survival as well as spring dispersal ability and reproductive success in *Notonecta undulata*. I found that late-onset winter conditions increase male survivorship over winter, as well as advanced the timing of egg laying and dispersal in females, although total egg production and dispersal attempts were not affected. Finally, I used open and closed greenhouses to manipulate ice coverage duration on in-ground pond mesocosms. I found that closed greenhouses successfully advanced the date of ice-off as well as decreased ice thickness in comparison to the open greenhouses. My thesis provides new insight into how winter affects ecological processes such as behaviour, dispersal, reproduction, survival, and community structure, as well as predictions of how these processes might change in response to milder winters." (Author)] Address: https://tspace.library.utoronto.ca/bitstream/1807/13-9993/1/Martin_Rosemary_Louise_202406_PhD_thesis.pdf

23870. Miya, M.S.; Chhetri, A. (2024): Additional documentation of the Slender Skimmer *Orthetrum sabina* (Drury, 1770) preying on the Pied Paddy Skimmer *Neurothemis tullia* (Drury, 1773) in Nepal. *Journal of Threatened Taxa* 16(9): 25935-25938. (in English) ["*O. sabina* is one of the most common dragonflies found in Nepal, but its feeding behavior has not often been reported from there. An example of this species preying on *N. tullia* is reported from Maldi Lake, Nepal. This observation was made during a field survey of Odonata using direct observation along transects around the lake. It adds to our knowledge of the species' feeding behavior, elaborating the previous findings and providing scope for further ecological studies on Odonata." (Authors)] Address: Miya, M.S., Department of Biology, Western Kentucky University, Bowling Green, KY 42101, USA

23871. Mohamed, I.I. (2024): Behavioural Studies of *Enallagma vansomereni* (Odonata: Zygoptera, Coenagrionidae) in Qena Governorate (Egypt). *Egyptian Academic Journal of Biological Sciences. A, Entomology* 17(3): 39-49. (in English) ["In this study, the author utilized mark-recapture methods to examine the daily movement and survival probability

of *E. vansomereni*. A total of 2635 individuals (1770 males and 865 females) were marked and measured during the study. Of these, 1476 individuals (56.00%, comprising 1202 males and 274 females) were successfully recaptured. The daily movements of *Enallagma vansomereni* indicated that 1160 individuals were marked, with 1050 individuals observed moving either within or among the stations." (Author) The maximum distance was dispersing individuals was 360 m] Address: Mohamed, I.I., Zool. Dep, Fac. Science, South Valley Univ., Qena, Egypt. Email: ibrahim.esaa@sci.svu.edu.eg

23872. Moore, M.P.; Nalley, S.E.; Hamadah, D. (2024): An evolutionary innovation for mating facilitates ecological niche expansion and buffers species against climate change. *Proceedings of the National Academy of Sciences* 121(10): e23-13371121: 8 pp. (in English) ["One of the drivers of life's diversification has been the emergence of "evolutionary innovations": The evolution of traits that grant access to underused ecological niches. Since ecological interactions can occur separately from mating, mating-related traits have not traditionally been considered factors in niche evolution. However, in order to persist in their environment, animals need to successfully mate just as much as they need to survive. Innovations that facilitate mating activity may therefore be an overlooked determinant of species' ecological limits. Here, we show that species' historical niches and responses to contemporary climate change are shaped by an innovation involved in mating—a waxy, ultra-violet-reflective pruinescence produced by male dragonflies. Physiological experiments in two species demonstrate that pruinescence reduces heating and water loss. Phylogenetic analyses show that pruinescence is gained after taxa begin adopting a thermohydrally stressful mating behavior. Further comparative analyses reveal that pruinose species are more likely to breed in exposed, open-canopy microhabitats. Biogeographic analyses uncover that pruinose species occupy warmer and drier regions in North America. Citizen-science observations of *Pachydiplax longipennis* suggest that the extent of pruinescence can be optimized to match the local conditions. Finally, temporal analyses indicate that pruinose species have been buffered against contemporary climate change. Overall, these historical and contemporary patterns show that successful mating can shape species' niche limits in the same way as growth and survival." (Authors)] Address: Moore, M.P., Dept of Integrative Biology, University of Colorado Denver, Denver, CO 80217, USA

23873. Morii, Y. (2024): Several new records of the northernmost, easternmost, and high-altitude areas of *Epiophlebia superstes* (Selys 1889) in the Japanese archipelago. *Aquatic Animals* 2024 | November 10 | Morii AA2024-29: 7 pp. (in Japanese, with English summary) ["Among the enigmatic taxa of *Epiophlebia* (Odonata: Epiophlebiidae), *E. superstes* in the Japanese archipelago is the only exception for which a great deal of ecological and morphological knowledge has been accumulated. Recently, a comprehensive review paper was published that reviewed the extensive literature on the observational record of *E. superstes* in Japan and estimated the environmental factors that limit their distribution range. In this study, I report several new collection records related to the distribution limits of *E. superstes* (the northernmost, and easternmost distributions, and highest areas on each of the four main islands of Japan). This new information on the distribution of *E. superstes* may help to better understand its potential habitat and range and may provide valuable data for the conservation of this species in the future." (Authors)] Address: Morii, Y., Laboratory of Evolutionary Biology, Department of Biology, Faculty of Agriculture and Life Science, Hirosaki University, Hirosaki, Aomori 036-8561, Japan. Email: yutamorii@gmail.com

23874. Moscato, G.; Romano, G.P. (2024): Biomimetic wings for Micro Air Vehicles. *Biomimetics* 2024, 9(9), 553; <https://doi.org/10.3390/biomimetics9090553>: 20 pp. (in English) ["In this work, micro air vehicles (MAVs) equipped with bio-inspired wings are investigated experimentally in wind tunnel. The starting point is that insects such as dragonflies, butterflies and locusts have wings with rigid tubular elements (corrugation) connected by flexible parts (profiling). So far, it is important to understand the specific aerodynamic effects of corrugation and profiling as applied to conventional wings for the optimization of low-Reynolds-number aerodynamics. The present study, in comparison to previous investigations on the topic, considers whole MAVs rather than isolated wings. A planform with a low aperture-to-chord ratio is employed in order to investigate the interaction between large tip vortices and the flow over the wing surface at large angles of incidence. Comparisons are made by measuring global aerodynamic loads using force balance, specifically drag and lift, and detailed local velocity fields over wing surfaces, by means of particle image velocimetry (PIV). This type of combined global–local investigation allows describing and relating overall MAV performance to detailed high-resolution flow fields. The results indicate that the combination of wing corrugation and profiling gives effective enhancements in performance, around 50%, in comparison to the classical flat-plate configuration. These results are particularly relevant in the framework of low-aspect-ratio MAVs, undergoing beneficial interactions between tip vortices and large-scale separation." (Authors)] Address: Moscato, G., Department Mechanical & Aerospace Engineering, University La Sapienza, 00184 Roma, Italy

23875. Mukherjee, A.; Adhurya, S.; Roy, S.; Pal, S.; Bhowmicka, G.D.; Mukhopadhyay, S.K. (2024): Odonata assemblages at two urban wetlands in West Bengal, India. *International Journal of Odonatology* 27: 199-212. (in English) ["Adult Odonata represent valuable indicators of natural habitat quality, ecosystem integrity, and pollution status in freshwater ecosystems. This study aimed to investigate how varying climatic condition, sub-habitat types, and physicochemical ambience of wetlands impact Odonata diversity. We compared the abundance and richness of Odonata in two urban wetlands and their surrounding areas: Purulia Sahebbandh (PS) located amidst Purulia town and faced higher anthropogenic threats, and Adra Sahebbandh (AS) located in a slightly remote location. Sampling was conducted over a period of one year (December 2018 to November 2019) using the Pollard walk method and direct search technique. A total of 47 Odonata species were recorded, including 33 species of Anisoptera and 14 species of Zygoptera. AS exhibited significant higher overall abundance compared to PS, with the monsoon season showing the highest abundance in both wetlands. Water-associated vegetation zones harbored the highest species richness. Species richness and abundance significantly differed among most of the sub-habitat types. Physicochemical factors such as pH, electrical conductivity, salinity, nitrate and phosphate concentrations, and dissolved oxygen significantly influenced Odonata abundance and species richness. The urban location, pollution load, and lack of natural vegetation in PS's surrounding areas likely contributed to the lower Odonata abundance. Implementing sustainable management measures for wetlands and their surroundings is crucial to enhancing ecosystem services and supporting Odonata populations." (Authors)] Address: Adhurya, S., Durgapur Wildlife Information & Nature Guide Society, Durgapur 713206, West Bengal, India, 713206. Email: sagaradhurya@gmail.com

23876. Nagaraj, K. (2024): The study of diversity of Odonata (Dragonflies and damselflies) fauna of Angod village, district - Uttara Kannada, India. *Poomaprajna International Journal*

of Basic & Applied Sciences (PIJBAS) 1(1): 59-70. (in English) ["Purpose: The purpose of this checklist is to provide comprehensive documentation of Odonata species observed in the study area, thereby contributing to the existing biodiversity records. It aims to facilitate understanding of species distribution and abundance, which is crucial for informing conservation efforts and habitat management. Additionally, this checklist serves as a baseline for future ecological research and monitoring programs, enabling comparisons over time. It acts as a valuable resource for educators, researchers, and enthusiasts in the study of Odonata, while also enhancing taxonomic clarity and supporting accurate species identification within the region. Methodology: During June and July 2021, field surveys were conducted to observe dragonflies and damselflies using the Pollard Walk Method (PWM), with observations made twice daily—once in the morning from 7:00 am to 8:00 am and again in the evening from 5:00 pm to 7:00 pm—targeting their peak activity periods. No specimens were collected or disturbed, and individuals that were challenging to identify in the field were photographed or observed carefully until sufficient data were gathered, adhering to ethical guidelines and ensuring minimal impact on the species and their habitats. Results & Findings: The survey in Angod recorded 14 species of dragonflies and 5 species of damselflies, demonstrating the region's odonate diversity. Dragonflies were predominantly observed near open water sources such as ponds, streams, and agricultural fields, while damselflies favoured more shaded areas with dense vegetation near still water bodies. The survey found that dragonflies were generally more adaptable to a variety of habitats, whereas damselflies exhibited specific preferences for calm, undisturbed waters. This variation in habitat selection suggests different ecological roles played by Odonata in the local ecosystem. The presence of these species highlights the richness of the Western Ghats and underscores the importance of protecting aquatic habitats to maintain biodiversity. Originality/Value: This research offers a unique contribution to the study of odonate diversity in the relatively unexplored region of Angod, located within the Western Ghats of India, a biodiversity hotspot. Unlike previous studies that often focus on more widely surveyed regions, this study provides the first detailed documentation of odonate species in Angod. The methodology, involving non-invasive photographic documentation during key activity periods, ensures minimal disturbance to the species and their habitats." (Author) The list of species includes North American and European species.] Address: Nagaraj, K., Lecturer, Dept Chemistry, Poomaprajna College, Sangameshwarpete, Chikkamagaluru, Karnataka, India

23877. Narangarvuu, D.; Enkhdul, T.; Erdenetsetseg, E.; Enkhrii-Ujin, E.; Irmuunzaya, K.; Batbayar, G.; Oyundelger, K.; Yam, R.S.; Pfeiffer, M. (2024): Mining and urbanization affect river chemical water quality and macroinvertebrate communities in the upper Selenga River basin, Mongolia (revised version). *Environmental Monitoring and Assessment* 196, article number 1091: 17 pp. (in English) ["Mongolia is a country with a quickly growing economy mainly based on the mining of gold, copper, coal, and other minerals. Mining, urbanization, and agriculture impact the water quality in the upper Selenga River basin in northern Mongolia, which is the center of the Mongolian economy. Previous measurements of pollution loads were alarming, but restricted to chemical measurements. Here, for the first time, we combine freshwater biomonitoring and laboratory water quality data across a broad gradient of water quality and land use intensity. We track the effects of different types of pollution on aquatic invertebrates and test their use as bioindicators. We collected water samples, environmental parameters, and macroinvertebrates at

36 sampling sites at the rivers of Tuul, Kharaa, and Orkhon and their tributaries Sugnugur, Boroo, Sharyn Gol, Gatsuur, and Yeröö. PCA of catchment water quality distinguished three groups of pollutants prevalent at the sites, (1) nutrients, (2) salt ions (Cl⁻, Na⁺, Mg²⁺, SO₄²⁻, Ca²⁺) and mining by-products (B, Sr, U, Mo), and (3) (heavy) metals, which often exceeded regulatory standards. We recorded a total of 59 macroinvertebrate taxa belonging to 31 families in seven insect orders plus Amphipoda and Gastropoda. Species diversity declined with higher impact. Five environmental factors structured macroinvertebrate community composition in RDA: elevation of sample location, site total nitrogen, dissolved oxygen, electrical conductivity, and water chemistry. We conclude that macroinvertebrate communities are an appropriate and inexpensive tool for monitoring water quality in Mongolia and suggest government action to establish a long-term monitoring program.... Odonata were found to be significantly ($p < 0.05$) positively correlated with high concentrations of Mo ($R = 0.39$), U ($R = 0.34$), and Zn ($R = 0.34$)."] (Authors) Lestes, Gomphus, Stylurus] Address: Narangarvuu, D., Dept of Biology, National University of Mongolia, Ulaanbaatar, Mongolia. Email: garvuu@num.edu.mn

23878. Nel, A.; Wang, Y.-H.; Huang, D.-Y. (2024): The third mesomegaloprepid damselfly from the mid-Cretaceous Kachin amber (Odonata: Zygoptera). *Mesozoic* 1(3): 283-287. (in English) ["Mesomegaloprepus liea sp. nov., the third species of the family Mesomegaloprepidae, is described from mid-Cretaceous Kachin amber. To date, this family is only known from the Cretaceous Burma paleo-island (also referred to as the Burmese terrane), although it probably originated in the Gondwana continent during the early Cretaceous. It possibly knew a phenomenon of endemism diversification." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

23879. Neupane, K.; Subedi, R.; Miya, M.S. (2024): An attempt to prepare a checklist of Odonata (Dragonflies and Damselflies) in Syangja District of mid-hills Nepal. *Journal of Entomology and Zoology Studies* 12(4): 141-147. (in English) ["... limited research has been conducted in various regions of Nepal on Odonata, and there has been no specific study in the Syangja District. Therefore, this study aimed to create a checklist of Odonata explored from Putalibazar and Waling Municipalities of the Syangja District of mid-hills Nepal. Data was collected through direct observation method; along diverse potential habitats such as water bodies, forests, settlements, and agricultural lands. The study documented a total of 33 species of Odonata from 25 genera and eight families. Among these, 20 species were Anisoptera, and 13 were Zygoptera. The family Libellulidae had the maximum species richness (N=18), followed by Coenagrionidae (N=5). The study presented only a preliminary checklist of Odonata in the area, suggesting the need for further exploration of the region to discover more species." (Authors)] Address: Neupane, K., Nepal Adarsha Campus, Tribhuvan Univ., Waling, Syangja, Nepal

23880. Novaga, R.; Corso, A.; Romano, A. (2024): New records of four Odonata species of Community interest in central and southern Italy, with conservation notes. *Fragmenta entomologica* 56(2): 205-216. (in English) ["This paper provides new data on the following four species of dragonflies and damselflies (Odonata Coenagrionidae, Gomphidae, Synthemiidae [?], Cordulegastridae), which contribute to updating their known distribution in central-southern Italy: Coenagrion castellani Roberts 1948, Lindenia tetraphylla (Vander Linden 1825), Oxygastra curtisii (Dale, 1834) and Cordulegaster trinacriae Waterston, 1976. These species

are all included in Annexes II and IV of the Habitat Directive 92/43/EC. New sites of *C. castellani* and *C. trinacriae* were discovered in the Latium, Campania, Abruzzo and Molise regions, while the presence of *O. curtisii* was observed in Molise and southern Latium, after a 70-year absence of records. *Lindenia tetraphylla* was observed at two new sites in southern Apulia. The presence of populations morphologically attributable to *C. trinacriae* was confirmed in southern Latium, reaching at least the Liri river (FR). Some bibliographic sites of *C. castellani*, *C. trinacriae* and *L. tetraphylla* were also confirmed. All the sites were listed and mapped, accompanied by brief data on habitat types and on their inclusion within Natura 2000 network sites. Information on persistent threats to these sites is provided, along with conservation notes." (Authors)] Address: Riccardo Novaga Viale dello Statuto 37, 04100 Latina (LT)

23881. Nowak, M.; Weihrauch, F. (2024): Forest dragonfly encounters desert dragonfly: *Aeshna cyanea* syntopic with *Orthetrum ransonnetii* on Fuerteventura, Canary Islands (Odonata: Aeshnidae). *Odonatologica* 53 (3-4): 297-306. (in English) ["*A. cyanea* is a new addition to the fauna of Fuerteventura, Canary Islands. In this study the circumstances surrounding the discovery of an emerging female, with exuvia collected, in a permanent pool in arid environment, in the Barranco de Rio Cabras, are described. The breeding record, syntopy with typical desert species (e.g., *Orthetrum ransonnetii*) and potential explanations for this unusual occurrence are discussed." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

23882. Nur Khafi, A.M.; Megasari, D.; Windriyanti, W.; Ningrum, L.W. (2024): Odonata diversity (Anisoptera & Zygoptera) at Purwodadi Botanical Garden, East Java, Indonesia. *Agrovigor* 17(2): 64-70. (in English) ["11 odonate species are listed and discussed."] Address: Megasari, D., Agrotechnology Study Program, Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia. Email: dita.megasari.agrotek@upnjatim.ac.id

23883. Oliphant, Z.H.; Hyslop, E.J. (2024): Functional organisation, predator-prey interactions, and gut content analysis for selected groups of benthic macroinvertebrates in high elevation ponds in St. Ann Parish, Jamaica. *Caribbean Journal of Science* 54(1): 298-322. (in English) ["Information regarding freshwater ponds is sparse for the Caribbean and specifically for Jamaica. Although a variety of studies have highlighted the taxonomic composition of riverine habitats for Jamaica, there are few published studies which have focused on lentic habitats and none have examined the functional organisation, predator-prey interactions or diet of pond invertebrates in such systems. The study aimed to address that information deficit. From January 2014 to April 2015, eight high elevation ponds were sampled in the parish of St. Ann, Jamaica. The macroinvertebrate community of each was organised into four functional feeding groups: collector, grazer, predator, and shredder. Shredders and grazers were poorly represented in the ponds based on count and productivity. Collectors were dominant in count and P/B ratios, while predators had the highest biomass proportion (68.1%; 42.09 gm⁻²) and production (210.95 g m⁻²yr⁻¹) in the sample area. The predator to non-predator ratio by count never exceeded 1:1. With predator biomass and productivity being high, the macroinvertebrate community remained stable due to prey taxa having higher P/B ratios than their respective predators. The study also highlighted the role of large invertebrates such as Odonata, as top predators in ponds that are devoid of insectivorous fish. Through dietary analyses, the baetid *Callibaetis* was noted to feed primarily on algae attached to surfaces,

leading to its re-classification from collector to grazer. The gut content analyses for odonates showed that although there is inter-predation, these organisms primarily consumed the taxa which were most abundant in the sample area (*Ostracoda*, *Ephemeroptera*, and *Chironomidae*). This research represents the first of its kind to examine functional organisation of the invertebrate community in a pond system within Jamaica and allows for comparison with how communities in primarily temperate locations, where data are more available, are organised.... The diet composition was analysed for *Anax junius*, *Micrathyrus aequalis*, *Erythrodiplax* sp., *Erythrodiplax justiniana*, and *Tramea* sp., *Enallagma* sp., and *Telebasis* sp. Selected gut contents of the Odonata are shown in Fig. 5, and percentages of food categories occurring in the guts in Fig. 6." (Authors)] Address: Oliphant, Zahra, The University of the West Indies, Mona, Kingston, Jamaica, West Indies. Email: zahra.oliphant@gmail.com

23884. Oliveira de Souza, K.; Joaquim Junior, E.A.; Vieira Bernardo, A.I.; de Almeida, G.L.; Vieira, A.D.; de Andrade, J.F.; Ferreira, L.G.; de Souza, R.A.; Avelino-Capistrano, F. (2024): Larvas de Odonata (Insecta) em um trecho do rio Marambaia, ilha da Marambaia, Rio de Janeiro, Brasil: distribuição e preferência por substratos - Odonata larvae (Insecta) in Marambaia river, Marambaia Island, Rio de Janeiro, Brazil: distribution and substrate preference. *Entomology Beginners* 5: e070: 4 pp. (in Portuguese, with English summary) ["Odonata is an important order of hemimetabolic insects with a significant popular representation. The larvae are aquatic and can inhabit lotic and lentic environments. The objective of this study was to verify the distribution of Odonata larvae on different substrates, characterize the pattern of larval distribution, and assess habitat preference of individuals regarding substrates in a section of the Marambaia River, on Marambaia Island, Rio de Janeiro. Marambaia Island is located in Sepetiba Bay and is an important area of preserved Atlantic Forest under the jurisdiction of the Marine Corps. Monthly collections were conducted between July 2018 and June 2019 in three 100 m areas along a continuous 1 km stretch. Manual collections were made on five different substrates: sand, bottom detritus, retained detritus, fixed rock, and rolled rock. A total of 154 larvae were collected, identified, and distributed among six families and six genera: *Limnetron* (Förster, 1907) (Aeshnidae) (n = 14), *Argia* (Rambur, 1842) (Coenagrionidae) (n = 105), *Brechmorhoga* (Kirby, 1894) (Libellulidae) (n = 5), *Progomphus* (Selys, 1854) (Gomphidae) (n = 7), *Heteragrion* (Selys, 1862) (Megapodagrionidae) (n = 18), *Perilestes* (Selys, 1862) (Perilestidae) (n = 5). The segment with the highest abundance was Segment 2. *Argia* was the most abundant genus (68.2% of samples), showing a preference for rock substrate; *Heteragrion*, *Limnetron*, and *Perilestes* preferred substrates with detritus; *Brechmorhoga* and *Progomphus* preferred sand substrates, which is consistent with literature data." (Authors)] Address: Oliveira de Souza, Karoline, Universidade Federal Rural do Rio de Janeiro, Seropédica, RJ, Brasil. 2. Centro Universitário São José, Rio de Janeiro, RJ, Brasil. Email: karolineoliveiras@outlook.com

23885. Onen, H.; Kaddumukasa, M.A.; Kayondo, J.K.; Akol, A.M.; Tripet, F. (2024): A review of applications and limitations of using aquatic macroinvertebrate predators for biocontrol of the African malaria mosquito, *Anopheles gambiae* sensu lato. *Parasites & Vectors* 17, 257: 14 pp. (in English) ["Macroinvertebrate predators such as backswimmers (Heteroptera: Notonectidae), ... Odonata: Aeshnidae), and predatory diving beetles (Coleoptera: Dytiscidae) naturally inhabit aquatic ecosystems. Some aquatic ecosystems inhabited by these macroinvertebrate predator taxa equally form malaria vector

larval habitats. The presence of these predators in malaria vector larval habitats can negatively impact on development, adult body size, fecundity, and longevity of the malaria vectors, which form important determinants of their fitness and future vectorial capacity. These potential negative impacts caused by aquatic macroinvertebrate predators on malaria vectors warrant their consideration as biocontrol agents in an integrated program to combat malaria. However, the use of these macroinvertebrate predators in malaria biocontrol is currently constrained by technical bottlenecks linked to their generalist predatory tendencies and often long life cycles, demanding complex rearing systems. We reviewed the literature on the use of aquatic macroinvertebrate predators for biocontrol of malaria vectors from the *An. gambiae* s.l. complex. The available information from laboratory and semi-field studies has shown that aquatic macroinvertebrates have the potential to consume large numbers of mosquito larvae and could thus offer an additional approach in integrated malaria vector management strategies. The growing number of semi-field structures available in East and West Africa provides an opportunity to conduct ecological experimental studies to reconsider the potential of using aquatic macroinvertebrate predators as a biocontrol tool. To achieve a more sustainable approach to controlling malaria vector populations, additional, non-chemical interventions could provide a more sustainable approach, in comparison with the failing chemical control tools, and should be urgently considered for integration with the current mosquito vector control campaigns." (Authors)] Address: Onen, H., Dept of Zoology, Entomology & Fisheries Sciences, College of Natural Sciences, School of Biosciences, Makerere University, P.O Box 7062, Kampala, Uganda. Email: honen@uvri.go.ug

23886. Orr, A.G.W. (2024): A review of present knowledge of larvae of the Calopterygoidea (Zygoptera) of the Oriental realm, including keys to families and known genera. *Zootaxa* 5497(2): 209-243. (in English) ["Literature on larvae of Calopterygoidea occurring in the Oriental Realm is comprehensively reviewed and assessed with a view to enabling workers in the region to identify larvae to genus level, and to navigate and interpret existing literature, which is scattered and uneven in quality. A family key and, where necessary and possible, generic keys for each family are provided, with the most significant gaps in our knowledge identified. Larvae of all 11 families except Priscagrionidae (2 genera) are known but larvae of many genera remain unknown and a few known genera cannot be determined with confidence by morphological characters. In total, larvae of 28 of 50 genera occurring in the region are known but apart from monotypic or ditypic families these are variably known: ratios of 'genera with larva known' to 'total known genera' are Calopterygidae (11/12), with confident generic determination of most specimens; Euphaeidae (6/8) with fair confidence of determination; Chlorocyphidae (6/16) with genera usually not clearly identifiable, hence no generic level key is provided for this family, although known intergeneric and interspecific variation is discussed." (Author) The following species are figured: *Anisopleura furcata* Selys 1891, *Anisopleura subplatystyla* Fraser 1927, *Archineura incarnata* (Karsch 1891), *Atrocalopteryx atrata* (Selys, 1853), *Bayadera strigata* Davies & Yang, 1996, *Caliphaea angka* Hämäläinen, 2003, *Calopteryx japonica* Selys 1869, *Devadatta argyroides* (Selys, 1859), *Dysphaea gloriosa* Fraser 1938, *Echo modesta* Laidlaw 1902, *Echo uniformis* Selys 1879, *Euphaea decorata* Hagen in Selys, 1853, *Euphaea superba* Kimmings 1936, *Heliocypha biseriata* (Selys, 1859), *Heterophaea barbata* (Martin 1902), *Libellago hyalina* (Selys 1859), *Matrona basilaris* Selys 1853, *Matronoides cyaneipennis* Förster 1897, *Mesopodagrion tibetanum* McLachlan 1896, *Mnais andersoni* McLachlan in Selys 1873,

Mnais gregoryi Fraser 1924, *Mnais tenuis* Oguma, 1913, *Neurobasis chinensis* (Linnaeus, 1758), *Philoganga montana* (Hagen in Selys, 1859), *Philoganga vetusta* Ris 1912, *Philosina alba* Wilson, 1999, *Philosina buchi* Ris 1917, *Podolestes orientalis* Selys 1862, *Pseudolestes mirabilis* Kirby 1900, *Psolodermus mandarinus* McLachlan 1870, *Rhinagrion borneense* (Selys 1886), *Rhinagrion mima* (Karsch 1891), *Rhipidolestes aculeatus* Ris 1912, *Vestalaria venusta* (Hämäläinen, 2004), *Vestalis amoena* Selys, 1853, *Vestalis gracilis* (Rambur, 1842)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith Univ., Nathan, Australia. Email: agorr@bigpond.com

23887. Osozawa, S.; Nel, A. (2024): Paleopteran molecular clock: Time drift and recent acceleration. *Ecology and Evolution* 14(9), e70297: 24 pp. (in English) ["Applying BEAST v1.10.4, we constructed a Bayesian Inference tree comprising 322 taxa, primarily representing Paleoptera (Odonata and Ephemeroptera; Pterygota), Zygentoma and Archaeognatha (Apterygota; paraphyly), and Neoptera (Plecoptera; Pterygota), based on a 2685 bp sequence dataset. Our analyses revealed that robust dating required the incorporation of both Quaternary and pre-Quaternary dates. To achieve this, our dating incorporated a 1.55 Ma (Quaternary) geological event (the formation of the Ryukyu Islands) and a set of chronologically well-founded fossil dates, spanning from up to 400 Ma (Devonian) for the stem Archaeognatha, 320 Ma (Carboniferous) for the crown Paleoptera, 300 Ma (Carboniferous) for the crown Ephemeroptera, and 280 Ma (Permian) for the crown Odonata, down to 1.76 Ma (Quaternary) for *Calopteryx japonica*, encompassing a total of 22 calibration points (events: 6, fossils: 16; Quaternary: 7, pre-Quaternary: 15). The resulting dated tree aligns with previous research, albeit with some dates being overestimated. This overestimation was mainly due to the lack of Quaternary calibration and the exclusive dependence on pre-Quaternary calibration, though the application of maximum age constraints also played a role. Our minimum age dating demonstrates that the molecular clock did not uniformly progress, rendering rate dating an inapplicable approach. We observed that the base substitution rate is time-dependent, with an exponential increase evident from around 20 Ma (Miocene) to the present time, exceeding an order of magnitude. The extensive radiation and speciation of Insecta and Paleoptera, potentially resulting from the severe climatic changes associated with the Quaternary, including the commencement of glacial and interglacial cycles, may have significantly contributed to this increase in base substitution rates. Additionally, we identified a potential peak in base substitution rates during the Carboniferous period, around 320 million years ago, possibly corresponding to the Late Paleozoic Ice Age." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. E-mail: anel@mnhn.fr

23888. Páll-Gergely, B.; Krell, F.T.; Ábrahám, L.; Bajomi, B.; Balog, L.E.; Boda, P.; Csuzdi, C.; Dányi, L.; Fehér, Z.; Hornok, S.; Horváth, A.; Kóbor, P.; Koczor, S.; Kontschán, J.; Kovács, P.; Kovács, T.; Lukátsi, M.; Majoros, G.; Murányi, D.; Németh, T.; Perneckner, B.; Puskás, G.; Rózsa, L.; Soltész, Z.; Szita, E.; Szuts, T.T.; Tóth, B.; Toke, A.; Vas, Z.; Zsuga, K.; Zsupos, V.; Csabai, Z.; Móra, A. (2024): Identification crisis: a fauna-wide estimate of biodiversity expertise shows massive decline in a Central European country. *Biodiversity and Conservation* 33: 3871-3903. (in English) ["Expertise in biodiversity research (taxonomy, faunistics, conservation with taxonomic background) appears to decline worldwide. While the "taxonomic impediment" is discussed extensively in the literature, much fewer papers focus on the identification crisis, i.e., the decreasing number of experts who can identify species,

and the decline of species-based biodiversity research. As a test case to explore the gravity of the identification crisis, we chose Hungary, a Central European country with a strong history of comprehensive taxonomic expertise and research output. We set out to answer two main questions. (1) What proportion of the Hungarian fauna could currently be identified by Hungarian experts, and what factors determine which groups are covered; and (2) what are the trends of biodiversity research in Hungary, and what are the underlying reasons for these trends? We show that Hungary lacks active biodiversity experts for almost half of the nearly 36,000 animal species recorded in the country, and more than a quarter of the fauna have only one or two active experts available. We also show that faunistic research experienced a golden era between ca. 1990 and 2010. Since then, however, there has been a strong decline, with the number of active experts and published papers decreased to a level like that of the 1970s. Multiple factors are identified causing this trend, such as increased pressure to publish in high impact journals and increasing administrative duties of professional scientists. The next generation of biodiversity experts needs to be fluent in modern techniques and publication strategies but also maintain robust morphology-based knowledge to be equipped for identification tasks of difficult taxa. Despite being disadvantaged by exclusive application of citation-based evaluation, we do need more positions and focused grants for biodiversity researchers to maintain the country's knowledge base and to avoid being increasingly dependent on—equally declining—foreign expertise." (Authors) The paper includes a few references to Odonata.] Address: Pall-Gergely, B. Dept of Zoology, Plant Protection Institute, HUN-REN Centre for Agricultural Research, Brunszvik u. 2., Martonvásár 2462, Hungary. Email: pallgergely2@gmail.com

23889. Papazian, M.; Filippi, G. (2024): Contribution à la connaissance des Odonates de l'archipel de Sao Tomé-et-Príncipe 5. Présence de *Zyxomma atlanticum* Selys, 1889 (Odonata Libellulidae). *L'Entomologiste* 80(1): 75-79. (in French, with Spanish, English and Portuguese summaries) ["A new expedition was carried out in São Tomé in February 2023 as part of São Tomé and Príncipe "Archipelago of Biodiversity" project. The primary objective was to promote investigations on several hydrophilic continua, in particular by going up a small river, the Rio Gumbela, near Ponto do Sul, not far from Porto Alegre and the mangroves of Malanza. The result was the collection of *Zyxomma atlanticum* Selys, 1889 during a night hunt, using a light trap." (Authors) The paper includes a checklist of the regional odonate fauna and a table with morphological structures to discriminate between *Z. atlanticum* and *Tholymis tillarga*] Address: Papazian, M., Opie Provence – Alpes-du-Sud, Muséum d'histoire naturelle de Marseille, palais Longchamp, f-13233 Marseille cedex 20, France. Email: papazianmichel@orange.fr

23890. Park, J.S.; Kim, J.M.; Jeon, H.G.; Kim, S.S.; Pyo, J.-Y.; Kim, I. (2024): Discovery of the vagrant darter, *Sympetrum vulgatum* (Odonata: Libellulidae) in Korea. *International Journal of Industrial Entomology and Biomaterials* 48(3): 114-123. (in English) ["Among the 17 species of *Sympetrum* found on the Korean peninsula *Sympetrum vulgatum* Linnaeus, 1758 had not been recorded since its first record in 1932 by Doi, suggesting the potential for misidentification. We observed a total of four specimens on September 21, 25, 30, and November 1 2022 in Goseong, Gangwon-do and collected each one male and female. We described the morphological and ecological characteristics of this species, conducted molecular analysis using mitochondrial COI, and addressed the controversial past record regarding its presence on the Korean

Peninsula. ... *Sympetrum vulgatum*, which was recorded by Doi (1932) has long been included in the national species list in South Korea. However, there have been no additional discovery records after the first erroneous record of the species. Consequently, we assert that the discovery of this species in Goseong, Gangwon Province, in September 2022 constitutes the first confirmed record of *S. vulgatum* in South Korea. In Japan, the species has been collected in coastal regions bordering the East Sea. In this study, we also collected this species at a coastal area adjacent to the East Sea. Thus, we believe that this species could have been migrated from the Russian Far East. Collectively, the focus of this study lies on elucidating the first true entity of *S. vulgatum* in South Korea through actual sampling, morphological examination, tracing species record, genetic analysis, and ecological description of the species. Through this study, it has become clear that *S. vulgatum* inhabits South Korea. However, there is no available information on the ecology, such as distribution and habitat, of *S. vulgatum* in South Korea. Various ecological studies of *S. vulgatum* in South Korea are needed in the future to update the species distribution information and to track changes in biodiversity due to factors such as climate change." (Authors)] Address: Kim, I., Dept Applied Biology, College of Agriculture & Life Sciences, Chonnam National Univ. Gwangju 61186, Republic of Korea. Email: ikkim81@chonnam.ac.kr

23891. Parr, A.; Schmitz, M. (2024): Trans-Atlantic vagrancy in *Anax junius* (Odonata: Aeshnidae). *Odonatologica* 53(3-4): 329-341. (in English) ["Late October 2023 saw an influx of the migratory Nearctic *A. junius* into both the Isles of Scilly in south-western Britain and the Île d'Ouessant in north-western France, with at least eleven dragonflies being reported and with further sightings likely to involve additional individuals. This species has only been observed in the Western Palearctic since 1998, and all known records from the region are documented and discussed; such records are currently restricted to the autumn months, and come predominantly from south-western Britain and western France, with at least one sighting also on the Azores. Meteorological conditions preceding arrivals have been dominated at mid latitudes by mobile westerly airflows across the entire Atlantic, and it is thought the dragonflies arrive in Europe via wind-assisted non-stop flights directly across the ocean, with a likely journey time of approximately four days." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

23892. Parr, A.J. (2024): Migratory and dispersive Odonata in Britain: the events of 2023. *Journal of the British Dragonfly Society* 40(2): 109-120. (in English) ["The 2023 dragonfly season saw a number of major migration events, with the highlight clearly being the appearance of at least seven, and probably many more, individuals of the North American *Anax junius* on the Isles of Scilly during late October and the first days of November. A substantial influx of *Anax ephippiger* seen during April and May was another highlight, to be followed by smaller scale arrivals during the autumn. The first successful breeding of *A. ephippiger* in Britain was also confirmed when, following oviposition noted during late spring, an exuvia was found at Windmill Farm Nature Reserve in Cornwall on 22 September. *Sympetrum fonscolombii* arrived in good numbers during spring and early summer, with several instances of successful local breeding then being identified as the season progressed; the first second-generation individuals appeared as early as 10 August. *Anax parthenope* had a record-breaking year in Britain, though much of this was likely due to the rapidly growing local breeding population. The amount of fresh immigration that took place is difficult to determine, but

with a record as far north as the Orkney Islands, it is likely to still have been substantial. The present status of *Aeshna* affinis) in Britain is similar to that of *A. parthenope* but, while the local breeding population appeared to do fairly well, the current reporting year saw relatively little obvious further immigration by the species. Finally, the rapid range expansion of *Aeshna isoceles* in Britain continued apace. This once rare and highly localised species was seen as far away from its East Anglian strongholds as Teesside and Cumbria. Little is as yet known about the drivers for this expansion, but records from the south coast of England, at least, might perhaps reflect immigration from the Continent." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

23893. Patenall, M.E.; Hannan, N.M.; Gao, V.; Kheyrollah Pour, H.; Gray, D.K. (2024): Do gravel highways affect water quality and invertebrate communities in Arctic lakes? *Arctic, Antarctic, and Alpine Research* 56(1): 18 pp. (in English) ["Gravel roads are a common feature in developed areas of Canada's Arctic. These roads can be a source of calcareous dust that drifts to roadside lakes, causing significant changes in conductivity, calcium, and pH levels. In this study, we examined if road proximity was associated with differences in water quality and invertebrate communities in lakes along the Dempster and Inuvik-Tuktoyaktuk Highways in the Northwest Territories, Canada. We collected biological and water quality data from 18 lakes selected using a stratified random sampling design, with distance from the road (0–300 m, 300–600 m, and >600 m) and region of study (boreal forest, tundra) as the two factors. We hypothesized that lakes closer to the road would exhibit differences in water quality and invertebrate communities associated with road dust pollution and other stressors caused by roads. We found no clear differences in water quality or invertebrate communities among lakes based on distance from the highways. In addition, while there were differences between regions, these did not appear to be related to the effects of the roadways. Our results suggest that variability in lake morphometry and water quality in this region might be more important than the influence of roads." (Authors) Odonata are treated at order or sub-order level.] Address: Patenall, Madeline, Department of Biology, Wilfrid Laurier University, Waterloo, Ontario, Canada. Email: pate5220@mylaurier.ca

23894. Paul, G.; Suresh, P.; Philip, N.S. (2024): Morphometric description of the final instar nymphs and exuviae of Odonata: *Tramea limbata* Des. *International Journal of Tropical Insect Science* 44: 1971-1980. (in English) ["We present the distinctive morphological characteristics of *T. limbata* from other species of the *Tramea* family. While the adult species is well documented, the nymph of *T. limbata* is not described in the literature. The nymphs of *T. limbata* are robust, greenish-yellow and translucent aquatic insects while alive, and their exuviae are straw-brown. The exuvial characteristics match well with the final instar and are sufficient to identify the species. Notably, in *T. limbata*, compared to *T. binotata* and other species, the appendages exhibit distinct patterns; the tibia and tarsus are adorned with comb-like tufts of setae, and the femur bears stout spines. Also, the lack of spiniform setae on the dorsal region of the tergum of abdominal segments, particularly segments 6 to 9, gives them a smooth appearance. Another characteristic of *T. limbata* is that the epiproct and paraproct are half the length of the cerci. The labium is spoon-shaped with a pair of labial palps with ten short inner palpal setae, 12 long outer palpal setae, and a pair of movable palpal hooks at the distal margin. Premental setae are 16 in number on either side. The anterior margin

of the head of *T. limbata* is characterised by ten crenulations ending in short, stout spiny setae, extending up to the width of the lower jaw. These features help to distinguish *Tramea limbata* nymphs from strikingly similar nymphs of other *Tramea* species, and their exuvia provides a noninvasive approach to conservation studies." (Authors)] Address: Paul, Geetha, Dept of Zoology, Bishop Heber College, (Autonomous), (Affiliated to Bharathidasan University), Tiruchirappalli, 620017, Tamil Nadu, India

23895. Petrulevicius, J.F. (2024): A new species of *Treintamilun* (Odonata: Frenguelliidae) from the early Eocene of Laguna del Hunco, Patagonia, Argentina. *Palaeoentomology* 7(6): 715-718. (in English) ["The Frenguelliidae *Petrulevicius* & Nel, 2003 is an endemic family of Odonata recorded from the Eocene of Patagonia, Argentina. They are only present in the lower Eocene (52 Ma) of Laguna del Hunco, the middle Eocene (47 Ma) of Río Pichileufú, and Arroyo Chacay (no absolute dating). The family consists of four genera and six species, namely *Frenguella patagonica* *Petrulevicius* & Nel, 2003, *F. iglesiasi* *Petrulevicius* & Nel, 2013, *Treintamilun vuelvenlucha* *Petrulevicius*, 2017, *Nelala chori* *Petrulevicius*, 2019, *N. chacay* *Petrulevicius*, 2023, and *Chacayala campeona* *Petrulevicius*, 2022." (Author)] Address: Petrulevicius, J.F, CONICET - División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Paseo del Bosque s/n, La Plata (1900), Argentina. E-mail: levicius@fcnym.unlp.edu.ar

23896. Petzold, F. (2024): Besprechung/Review: Frank, M. & A. Bruens *Die Libellen Deutschlands. Entdecken – Beobachten – Bestimmen.* Wiebelsheim 2023. Quelle & Meyer, 416 Seiten, über 1.500 farbige Abbildungen, 82 Verbreitungskarten. ISBN 978-3-494-01845-4. *Landschaftspflege und Naturschutz in Thüringen* 60(2): 85. (in German) [Review] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: falk_petzold@web.de

23897. Petzold, F. (2024): Der Östliche Blaupfeil (*Orthetrum albistylum*) in Brandenburg (Odonata). *Entomologische Nachrichten und Berichte* 68: 193-195. (in German, with English summary) ["The first records of *O. albistylum* in Brandenburg were made in 2016 in the post-mining landscape of the Welzow-Süd opencast mine. In 2023, further reproduction has been recorded on the river Oder near Wellmitz, approx. 64 km northeast of the 2016 locality. The site on the Oder is a current-calmed groyne field with a large, muddy shallow water zone. The occurrence of *O. albistylum* in Brandenburg is most probably related to the area expansion of the species in neighbouring Poland." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: falk_petzold@web.de

23898. Piccoli, G.C.; Antikeira, P.A.P.; Srivastava, D.S.; Romero, G.Q. (2024): Trophic cascades within and across ecosystems: The role of anti-predatory defences, predator type and detritus quality. *Journal of Animal Ecology* 93(6): 755-768. (in English) ["Species in one ecosystem can indirectly affect multiple biodiversity components and ecosystem functions of adjacent ecosystems. The magnitude of these cross-ecosystem effects depends on the attributes of the organisms involved in the interactions, including traits of the predator, prey and basal resource. However, it is unclear how predators with cross-ecosystem habitat interact with predators with single-ecosystem habitat to affect their shared ecosystem. Also, unknown is how such complex top-down effects may be mediated by the anti-predatory traits of prey and quality of the basal resource. We used the aquatic invertebrate food

webs in tank bromeliads as a model system to investigate these questions. We manipulated the presence of a strictly aquatic predator (damselfly larvae) and a predator with both terrestrial and aquatic habitats (spider), and examined effects on survival of prey (detritivores grouped by anti-predator defence), detrital decomposition (of two plant species differing in litter quality), nitrogen flux and host plant growth. To evaluate the direct and indirect effects each predator type on multiple detritivore groups and ultimately on multiple ecosystem processes, we used piecewise structural equation models. For each response variable, we isolated the contribution of different detritivore groups to overall effects by comparing alternate model formulations. Alone, damselfly larvae and spiders each directly decreased survival of detritivores and caused multiple indirect negative effects on detritus decomposition, nutrient cycling and host plant growth. However, when predators co-occurred, the spider caused a negative non-consumptive effect on the damselfly larva, diminishing the net direct and indirect top-down effects on the aquatic detritivore community and ecosystem functioning. Both detritivore traits and detritus quality modulated the strength and mechanism of these trophic cascades. Predator interference was mediated by undefended or partially defended detritivores as detritivores with anti-predatory defences evaded consumption by damselfly larvae but not spiders. Predators and detritivores affected ecosystem decomposition and nutrient cycling only in the presence of high-quality detritus, as the low-quality detritus was consumed more by microbes than invertebrates. The complex responses of this system to predators from both recipient and adjacent ecosystems highlight the critical role of maintaining biodiversity components across multiple ecosystems." (Authors)] Address: Antiqueira, P.A.P., Laboratório de Interações Multitróficas e Biodiversidade, Inst. de Biologia (IB), Univ. Estadual de Campinas (UNICAMP), Campinas, Brazil. Email: pabloantiqueira@gmail.com

23899. Piersanti, S.; Salerno, G.; Krings, W.; Gorb, S.; Rebora, M. (2024): Functional morphology of cleaning devices in the damselfly *Ischnura elegans* (Odonata, Coenagrionidae). *Beilstein J. Nanotechnol.* 15: 1260-1272. (in English) ["Among the different micro- and nanostructures located on cuticular surfaces, grooming devices represent fundamental tools for insect survival. The present study describes the grooming microstructures of *I. elegans* adult stage. These structures, situated on the foreleg tibiae, were observed using scanning electron microscopy, and the presence and distribution of resilin, an elastomeric protein that enhances cuticle flexibility, were analyzed using confocal laser scanning microscopy. Eye and antennal grooming behavior were analyzed to evaluate the particle removal efficiency in intact insects and in insects with ablated grooming devices. The grooming devices are constituted of long setae from which a concave cuticular lamina develops towards the medial side of the leg. Each seta shows a material gradient of resilin from its basal to the distal portion and from the seta to the cuticular lamina. The removal of the grooming devices induces a strong increase in the contaminated areas on the eyes after grooming. Further studies on insect grooming can provide valuable data on the functional morphology of insect micro- and nanostructures and can represent a starting point to develop advanced biomimetic cleaning tools." (Authors)] Address: Piersanti, Silvana, Dipto di Chimica, Biologia e Biotecnologie, University of Perugia, Via Elce di Sotto 8, 06121 Perugia, Italy

23900. Pires, M.M.; Calvão, L.B.; Mendoza-Penagos, C.C.; Perico, E.; Juen, L. (2024): New record of *Cyanallagma demoiselle* Denck, Ehlert & Pinto, 2023 (Odonata, Zygoptera, Coenagrionidae) in southern Brazil. *CheckList* 20(5):

1076-1082. (in English) ["During a field expedition in the municipality of Araquari, state of Santa Catarina, southern Brazil, adults of *C. demoiselle* were collected. This species was recently described and reported to date for the southeastern Atlantic Forest in Brazil. Here, we recorded this species as well as its respective genus for the first time for the state of Santa Catarina, increasing its distribution range of the species to southwards and raising the number of Odonata species recorded for this state to 151." (Authors)] Address: Pires, M.M., Lab. de Ecologia e Evolução, Programa de Pós-graduação em Ambiente e Desenvolvimento, Univ. do Vale do Taquari, Lajeado, RS, Brazil. Email: marquespiresm@gmail.com

23901. Pugach, A.S.; Pyshkin, V.B. (2024): To the study of taxonomic diversity of Odonata fauna (Insecta: Odonata) of the Crimean Peninsula. In: Collection of materials of the II Conference of the faculty, graduate students, students and young scientists named after A.G. Gurvich. Collection of materials. Simferopol, 2024: 35. (in Russian) [This is a good example of Russian science when they will have "liberated" the world from the west. This study is ignoring the most relevant study of the odonate fauna of Crimean Peninsula done by Khrokalo, L.; Prokopov, G. (2009): Review of the Odonata of Crimea (Ukraine). *IDF-Report* 20: 1-32. Doing a simple Google research with only the two keywords 'Odonata' and 'Crimnea', you will get in twice on search numbers one and two. Verbatim: "Dragonflies (Odonata) are the most ancient order of insects, fossil species of which are known from the Carboniferous period of the Paleozoic era. Today, on our [sic] peninsula they are found in the steppe and mountains near rivers, lakes and along the edges of forests. They are very mobile, flying in the summer during the light and warm time of the day. Dragonflies are insects with bright colors, a metallic shiny body, two pairs of large transparent wings, often different in shape, and widely spaced at rest. These large, bright and beautiful insects have long attracted the attention of entomologists. The beginning of a systematic study of the diversity of the peninsula's odonatofauna is associated with the works of A.A. Brauner (1902) and A.N. Bartenev (1911). Descriptions of dragonflies of the Crimean Peninsula can be found in the works of V.G. Pliginsky (1913), G.A. Artobolevsky (1915), A.A. Shorygina (1926). At the present stage of studying the diversity of the Crimean odonatofauna, a great contribution was made by S.M. Gorb (2000), N.I. Matushkina (2002), V.B. Pyshkin (2015). The database "Odonata" created at the Department of Ecology and Zoology includes information on 50 species, for which their locations on the peninsula are reliably known. All of them are united into 2 suborders, 6 superfamilies, 7 families, which include 18 genera. The taxonomic richness of Anisoptera is represented by 48 taxa. Three superfamilies (Lestoidea, Calopterygoidea and Coenagrionoidea) and four families (Lestidae, Calopterygidae, Coenagrionidae, Platycnemididae) of this suborder unite 25 species. The largest family of Zygoptera – Coenagrionidae on the peninsula is represented by 7 genera with 12 species. The most diverse genus is *Coenagrion* Kirby, 1890 with 5 species: *C. scitulum* Rambur, 1842; *C. lunulatum* Charpentier, 1840, *C. armatum* Charpentier, 1840; *C. puella* Linnaeus, 1758; *C. pulchellum* Van. Linden, 1825. The remaining families on the peninsula are represented by the genera *Calopteryx* Leach, 1815, *Lestes* Leach, 1815, *Sympecma* Burmeister, 1839, *Platycnemis* Burmeister, 1839 with a few species *C. virgo* Linnaeus, 1758, *C. splendens* Harris, 1782, *P. pennipes* Pallas, 1771 which are widespread and often found on the peninsula. The taxonomic richness of Anisoptera is slightly less on the peninsula - 43 taxa. The suborder is represented by 25 species from the subfamilies: Aeshnoidea and Libelluloidea. The most diverse in systematic terms is

the superfamily Aeshnidae, uniting two families: Aeshnidae and Gomphidae with two subfamilies in each. The greatest number of species of dragonflies in Crimea belong to the subfamily Aeshninae. These are species of the genus *Aeshna* Fabr. 1775: *A. juncea* L. 1758, *A. mixta* Latr. 1805, *A. grandis* L. 1758, *A. isosceles* Müll. 1767, *A. cyanea* Müll. 1764, *A. viridis* Ever. 1836, *A. grandis* L. 1758; and the genus *Anax* Leach, 1815: *An. imperator* Leach. 1815, *An. parthenope* Selys 1839. The Gomphidae family is represented by two species: *Gomphus vulgatissimus* L. 1758 and *Onychogomphus forcipatus* L. 1758. Family: Libellulidae, superfamily Libelluloidea on the peninsula is represented by two families: Libellulinae and Sympetrinae, which unite 15 species: *L. quadrimaculata* L. 1758, *L. depressa* L. 1758, *O. cancellatum* L. 1758, *O. brunneum* F. 1837, *C. erythraea* Brulle, 1832, *S. striolatum* Charpentier, 1840, *S. meridionale* Selys, 1841 and others." (Authors/google translate)] Address: Pyskin V.B., associate professor of the Dept of Ecology and Zoology Institute of Biochemical Technologies, Ecology & Pharmacy, Kazan Federal University, Russia. Email: amizon09@mail.ru

23902. Purba, T.U.; Suartini, N.M.; Watiniasih, N.L. (2024): Dragonfly diversity (Order: Odonata) in Semara Ratih tourism area Taro village Gianyar-Bali. *Simbiosis* 12(1): 10-20. (in Indonesian, with English summary) [The study was carried out in January-February 2023 resulting in Copera marginipes, Agriocnemis pygmaea, A. femina, Ischnura senegalensis, Orthetrum testaceum, O. sabina, Potamarcha congener, Neurothemis ramburii, N. terminata, and Pantala flavescens.] Address: Purba, T.U., Program Studi Biologi, Fak. Matematika dan Ilmu Pengetahuan Alam, Univ. Udayana, Bali, Indonesia – 80361. Email: made_suartini@unud.ac.id

23903. Quandahor, P.; Kim, L.; Kim, M.; Lee, K.; Kusi, F.; Jeong, I.-h. (2024): Effects of agricultural pesticides on decline in insect species and Individual numbers. *Environments* 2024, 11, 182. <https://doi.org/10.3390/environments11080182>: 18 pp. (in English) ["As agricultural production increases, the use of chemical fertilisers, herbicides, and other synthetic pesticides has equally increased over the years. Inadequate pesticide application description and monitoring has generated a heated debate among governmental organisations, agricultural industries, and conservation organisations about pesticide effects on insect species richness and abundance. This review is therefore aimed at summarizing the decline in insects' species and individual numbers as a result of extensive pesticide utilisation and recommends possible management strategies for its mitigation. This review revealed an average pesticide application of 1.58 kg per ha per year, 0.37 kg per person per year, and 0.79 kg per USD 1000 per year. Insects have experienced a greater species abundance decline than birds, plants, and other organisms, which could pose a significant challenge to global ecosystem management. Although other factors such as urbanisation, deforestation, monoculture, and industrialisation may have contributed to the decline in insect species, the extensive application of agro-chemicals appears to cause the most serious threat. Therefore, the development of sustainable and environmentally friendly management strategies is critical for mitigating insect species' decline." (Authors) The study also refers to three Odonata publications.] Address: Jeong, I.-h., Crop Protection Division, National Institute of Agricultural Sciences, Rural Development Administration, Wanju 55365, Republic of Korea. Email: ihjeong1@korea.kr

23904. Rashied, S.; Zia, A.; Minhas, R.A.; Aslam, S.; Bhatti, A.R.; Ali, G. (2024): Diversity of the Anisoptera and Zygoptera (Odonata: Insecta) of State Biosphere Reserve Neelum

of Azad Jammu and Kashmir, Pakistan. *Pakistan J. Zool.* 56(5): 2293-2299. (in English) ["State Biosphere Reserve Neelum (SBRN) is located in northern side of state Azad Jammu and Kashmir (AJK) Pakistan. It is a representative region having an important geographical position being located at Line of Control. It shares its border with Indian Occupied Kashmir and due to prevailing of uncertain ground conditions in the past did not allow to get explore this area for the Odonata species complex. In study area first time detailed surveys were conducted for exploring the diversity of Anisoptera and Zygoptera during the summer season of 2018-2019. A total 346 specimens were collected yielding 20 anisopterous species under 13 genera of 5 families and 7 zygopterous species under 4 genera of 3 families. Among these 8 anisopterous species and 7 zygopterous species were first time recorded from the SBRN. According to the results of surveys, the Libellulidae and Coenagrionidae families looked to be the most prominent. For proper identification help was taken from National Insect Museum, NARC, Islamabad, Pakistan." (Authors)] Address: Rashied, Shahida, Dept of Zoology, University of Azad Jammu and Kashmir, Muzaffarabad, Azad Jammu & Kashmir, Pakistan. Email: zoo2k18@gmail.com

23905. Rodríguez, S.; Huerta, A.; Palma, Á.; Vicencio, F.; Araya, J.E. (2024): Utilizing insects as bioindicators: An approximation for conservation in urban lentic ecosystems in central Chile. *Insects* 2024, 15, 831. <https://doi.org/10.3390/insects15110831>: 21 pp. (in English) ["Simple Summary: This study considered using insect families [including Aeshnidae, Coenagrionidae] as bioindicators to establish the health status of an ecosystem's lentic bodies. The water quality in urban lentic bodies in the Metropolitan Region, Chile, was evaluated using aquatic insect family assemblages and physicochemical variables for conserving aquatic life. The eudominant insect families were Corixidae (associated with very bad water quality), Chironomidae (very bad), and Baetidae (good). The TSS (total suspended solids), P (phosphorus), and EC (electrical conductivity) were strongly positively correlated and negatively associated with DO (dissolved oxygen) levels. The TSS level was the most significant influential factor. Based on the nitrogen and phosphorus levels in the three water bodies, all of them were eutrophic. Given the diversity and complexity of ecosystems, studies should delve deeper into wetlands to establish methods that contribute to determining water quality, using insects as bioindicators and physicochemical variables. Considering the diversity of these water bodies, it is possible to determine not only the water quality but also the conservation state of the whole environment. Abstract: This study considered using insect families as bioindicators to establish the health status of an ecosystem of lentic bodies. The water quality in urban lentic bodies in the Metropolitan Region, Chile, was evaluated from aquatic insect family assemblages and physicochemical variables for conserving aquatic life. Evaluations were carried out in parallel at four sampling stations of three water bodies (Batuco Wetland, Carén Lagoon, and Chada Reservoir) in a 2–3-year series, spring (2015, 2017, and 2018) and fall (2016 and 2018), with three replicates. Families were randomly sampled and aquatic insects were identified; abundance and richness differences were compared with non-parametric tests. Physicochemical variables were measured using portable multiparametric and laboratory chemical analyses to determine the water quality. A Canonical Correspondence Analysis was applied for insect families and the physical–chemical variable. In order to categorize the health of these water bodies based on aquatic insect composition and abundance, the Family Biotic Index (FBI), British Biological Monitoring Work Party (BMWP), and Stream Invertebrate Grade Number—Average Level

(SIGNAL), adapted for Chile by Figueroa et al. (2007), were calculated. The eudominant insect families were Corixidae and Chironomidae in Batuco, Chironomidae and Corixidae in Carén, and Corixidae in Chada. Baetidae was dominant in Carén and Chada. The water bodies were classified in descending order of water quality by Chilean physicochemical standards: Chada > Carén > Batuco. The TSS (total suspended solids), phosphorus, and electrical conductivity were strongly positively correlated and negatively associated with dissolved oxygen. The TSS level was the most significant influential factor. The BMWP value and the SIGNAL differed from the FBI, but the first was more restrictive, contributing to the conservation of these ecosystems. Based on the nitrogen and phosphorus levels in the water bodies, all of them were eutrophic. Given the ecosystem diversity and complexity, studies should delve deeper into wetlands to establish methods that contribute to determining water quality, using insect families as bioindicators and physicochemical variables." (Authors). Odonata are treated at family level.] Address: Huerta, Amanda, Departamento de Silvicultura y Conservación de la Naturaleza, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Universidad de Chile, Santiago P.O. Box 9206, Chile. Email: ahuerta@uchile.cl

23906. Rogers, S.; Bulluck, L.P.; Bukaveckas, P.A. (2024): Substantial pulses of aquatic insects emerge from tidal freshwaters along the James River Estuary, Virginia, USA. *Freshwater Science* 43(1): 65-82. (in English) ["Tidal freshwaters in upper estuarine reaches provide important ecosystem services but are threatened by relative sea-level rise and pollution from increased development. Tidal freshwaters are highly productive and support estuarine and riparian food webs alike. Aquatic insects are common prey subsidies crossing into riparian habitats; however, the magnitude, timing, and composition of insect emergence in tidal systems has received little attention. Our objective was to better understand the magnitude and variability of aquatic insect emergence in tidal freshwaters. To do so, we quantified insect emergence from tidal creeks and estuarine shorelines of the James River Estuary, Virginia, USA, and characterized spatial and temporal patterns in the amount of emergent biomass. We continuously monitored insect emergence from 7 April to 8 November 2019 with floating emergence traps to estimate daily emergence, then used generalized additive mixed models to analyze spatial and temporal variation in daily emergence rates. We estimated aquatic insect biomass to emerge at a mean rate (± 1 SE) of 15.6 ± 2.0 g dry mass $m^{-2} y^{-1}$, which is among the highest of previously published estimates from nontidal systems (mean ± 1 SE = 12.9 ± 6.2 g dry mass $m^{-2} y^{-1}$). Spatial variability in emergence was highly taxon specific. Diptera and Trichoptera had more biomass emerging from the subtidal than intertidal zone, Odonata biomass emerged more from tidal creeks than along the estuarine shoreline, and the amount of Trichoptera biomass increased—whereas Ephemeroptera decreased—with distance from the estuarine shoreline. The magnitude and composition of emergent taxa varied throughout the sampling period, with sequential peaks in biomass that altered the prey available to riparian consumers. Our results suggest that tidal freshwaters export substantial quantities of aquatic insects, which are valuable prey items for riparian consumers in these systems." (Authors)] Address: Rogers, Samantha, Integrative Life Sciences Doctoral Program, Virginia Commonwealth University, 1000 West Cary Street, Richmond, Virginia 23284 USA. Email: slrogers27@gmail.com

23907. Rohlf, F.J.; Futuyma, D. (2024): Robert Reuven Sokal. January 13, 1926–April 9, 2012, Elected to the NAS, 1987.

A Biographical Memoir. National Academy of Sciences. Biographical Memoirs. <https://www.nasonline.org/directory-entry/robert-r-sokal-g3wdid/>: 5 pp. (in English) ["Robert (Bob) R. Sokal was a pioneering biologist and biostatistician whose innovative work in numerical taxonomy and biostatistics has left a lasting impact on the scientific community. Born in Vienna, Austria, Sokal's career spanned several decades during which he made significant contributions to the fields of taxonomy, ecology, ecological genetics, human variation, and statistical biology.... His thesis, upon which his first publication would be based, was on the anatomy of the head of a dragonfly species." (Authors) Sokal, R.R. (1947): The anatomy of the head capsule of the dragonfly *Pantala flavescens* Fabricius (Anisoptera: Odonata). *Notes d'entomologie chinoise* 11: 157-223.] Address: <https://www.nasonline.org/wp-content/uploads/2024/09/Sokal-Robert.pdf>

23908. Roobas, B. (2024): High elevation wintertime records of *Orthetrum ransonnetii* (Odonata: Libellulidae) from north-western Saudi Arabia. *Notulae odonatologicae* 10(4): 145-151. (in English) ["A breeding population of *O. ransonnetii* is here reported from 1 500–1 800 m in the granite mountains of north-western Saudi Arabia in early February 2024. This eremic species has a vast range in the arid regions from the Canary Islands across North Africa and Arabia to south-west Asia, but its occurrence is patchy, with long series of records from the Dead Sea Rift Valley and the Sinai Peninsula, the Hajar Mountains of the United Arab Emirates and northern Oman, and the north-west and central Sahara in Morocco and Algeria, but limited records from the remainder of its range and only a single previous record from Saudi Arabia. The wintertime high-elevation records discussed here fill a large observational gap within the species' distribution range and provide additional evidence for the recently recognised ecological plasticity of the species." (Author)] Address: Roobas, B., Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates. Email: binishroobas@hotmail.com

23909. Roobas, B.; Feulner, G.R. (2024): A record of cannibalism in *Agriocnemis pygmaea* (Rambur, 1842) (Zygoptera: Coenagrionidae): a mature female consuming a mature male, Yala National Park, Sri Lanka. *Agrion* 28(2): 35-36. (in English) ["A mature female *A. pygmaea* was observed and photographed consuming a mature male conspecific near midday along a riverbank in Yala National Park, Sri Lanka, in mid-January 2024. This is believed to be the first such published record for *A. pygmaea*. Disturbed initially, the predator was able to fly for several meters carrying her prey, nearly equal in size. Intraspecific predation is rare among adult odonates and usually involves teneral prey. A number of conceptual explanations for cannibalistic behavior among adult Odonata have been postulated in the literature and are briefly reviewed, but none can be convincingly advocated to explain the limited observation reported here." (Authors)] Address: Roobas, B., Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates. Email: binishroobas@hotmail.com

23910. Roobas, B.; Feulner, G.R. (2024): First records of *Diplacodes trivialis* (Rambur, 1842) (Odonata: Libellulidae) in the United Arab Emirates. *Agrion* 28(2): 37-47. (in English) ["*D. trivialis* is an inconspicuous but widespread and common dragonfly known to be resident from the Indian subcontinent and the Far East to tropical Australia and western Oceania. Between late December 2023 and late January 2024, *D. trivialis* was found for the first time in the United Arab Emirates (UAE), in small numbers at intermittent sites along the full 85km length of the Hajar Mountains in the north-eastern part of the country, all of them sparsely vegetated

waste ground peripheral to dams in mountain front areas. All individuals initially observed were mature males, except for two pruinosed females, one of which copulated while under observation. From the nature and distribution of the UAE sites, *D. trivialis* was considered likely to be present in similar habitats in neighbouring northernmost Oman. Successive major rainstorms in mid-February, mid-March and mid-April 2024 greatly reduced sightings of most dragonflies, including *D. trivialis*; the last sighting was of two individuals (one a juvenile male) on 21 March. The mid-April storm was record-breaking for the UAE and frustrated definitive follow-up investigation in its aftermath. Thus the initially-suspected establishment of *D. trivialis* in the UAE remains to be confirmed. *D. trivialis* is recognised to have significant migratory potential but the UAE records represent the north-westernmost for the species, by far. The exact timing and circumstances of its arrival are uncertain. The only prior Arabian record is from November 2019, of a single individual at Masirah Island, off the southern coast of Oman, reckoned to be a storm-driven vagrant. Just a few records exist from Pakistan and none from Iran, which separate the Indian range of *D. trivialis* from the UAE by way of mainland Asia. The advent of *D. trivialis* in the UAE is considered unlikely to have pre-dated early 2019, but could have occurred at a date thereafter without attracting immediate attention, not least due to the many disruptions that attended the Covid-19 emergency, beginning in early 2020 and continuing through most of 2021. Global climate change must be suspected as an ultimate cause by reason of changing weather patterns which might have favoured active or passive migration. Independent of how it reached the UAE, the dispersal and apparent initial success of *D. trivialis* have almost certainly been facilitated by the proliferation of dams in mountain wadis, mostly within the past twenty-five years. With this in mind, the possibility that *D. trivialis* could be or become a resident species is being monitored." (Authors)] Address: Feulner, G.R., Dubai Natural History Group, PO Box 9234, Dubai, UAE. Email: grfeulner@gmail.com

23911. Sawant, D.; Joshi, S.; Pawar, U.; Naik, P.; Khan, F.; Nawge, V.; Kunte, K. (2024): *Devadatta adii* sp. nov. (Odonata: Zygoptera: Devadattidae) from Upper Siang District, Arunachal Pradesh, India. *Zootaxa* 5519(4): 571-589. (in English) ["We erect a new species *Devadatta adii* sp. nov. based on five males and five females collected from Upper Siang District, Arunachal Pradesh, India. The males of the new taxon are unique in terms of having a golden yellow lateral pterothorax, strongly curved cerci and filamentous genital ligula. We also provide illustrations of male thorax and caudal appendages of *Devadatta* spp." (Authors)] Address: Sawant, D., Government Medical College and Hospital, Sindhudurg, 416534, Maharashtra, India. Email: dattaprasad.101@gmail.com

23912. Shaikh, S.R.; Raman, C.V. (2024): Taxonomic studies of dragonflies from Tahsil. *Research Hub* 5(1): 106-110. (in English) [Sironcha is a town and municipal council in Gadchiroli district of Maharashtra state. The following species are documented: *Bradiniopyga geminate*, *Pantala flavescens*, *Orthetrum pruinatum*, *Diplacodes trivialis*, *Rhyothemis variegata*, *Ictinogomphus rapax*, *Paragomphus lineatus*, and *Anax parthenope*.] Address: Shaikh, S.R., Science college, Sironcha, India. Email: shafi442504@gmail.com

23913. Shipley, J.R.; Oester, R.; Mathieu-Resuge, M.; Parmar, T.P.; Kowarik, C.; Kainz, M.J.; Martin-Creuzburg, D.; Obrist, M.K.; Graham, C.H.; Gossner, M.M.; Matthews, B.; Twining, C.W. (2024): Consumer biodiversity increases organic nutrient availability across aquatic and terrestrial ecosystems. *Science* 386(6719): 335-340. (in English) [Switzerland;

"Human land-use intensification threatens arthropod (for example, insect and spider) biodiversity across aquatic and terrestrial ecosystems. Insects and spiders play critical roles in ecosystems by accumulating and synthesizing organic nutrients such as polyunsaturated fatty acids (PUFAs). However, links between biodiversity and nutrient content of insect and spider communities have yet to be quantified. We relate insect and spider richness to biomass and PUFA-mass from stream and terrestrial communities encompassing nine land uses. PUFA-mass and biomass relate positively to biodiversity across ecosystems. In terrestrial systems, human-dominated areas have lower biomass and PUFA-mass than more natural areas, even at equivalent levels of richness. Aquatic ecosystems have consistently higher PUFA-mass than terrestrial ecosystems. Our findings reinforce the importance of conserving biodiversity and highlight the distinctive benefits of aquatic biodiversity." (Authors) Taxa - including Odonata - are treated at order level.] Address: Shipley, J.R., Swiss Federal Research Institute for Forest, Snow, and Landscape Research WSL, Birmensdorf, Switzerland

23914. Silva, I.; Dias-Oliveira, T.M.; Jacques, G.; Souza, M.M. (2024): Predação de *Allopodagrion contortum* (Odonata) pela aranha *Alpaida truncata* (Araneidae) - Predation of *Allopodagrion contortum* (Odonata) by the spider *Alpaida truncata* (Araneidae). *Acta Biológica Catarinense* 11(4): 4-8. (in Portuguese, with English summary) ["... November 10, 2023, in the Serrinha locality (21°29'30"S 44°52'56"W), in an area of gallery forest (cerrado physiognomy), in the municipality of Luminárias, south of the state of Minas Gerais, Brazil, a transition region between the Atlantic Forest and Cerrado biomes." (Authors/google translate)] Address: Silva, I., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas, Campus Inconfidentes, Praça Tiradentes, n. 416, Centro - CEP 37576-000, Inconfidentes, MG, Brasil. Email: igor2.silva@alunos.ifsuldeminas.edu.br

23915. Silva Oliveira, J.; Hughes, R.M.; Terra, B. (2024): Fish and macroinvertebrates respond differently to seasonal drying in tropical non-perennial streams. *Austral Ecology* 49(7), e13558: 18 pp. (in English) ["Surface water drying challenges the persistence of lotic biological assemblages in non-perennial streams and rivers. However, the effects of natural hydrological disturbances on an assemblage depend on individual species characteristics. In this study, we investigated the structure and association of fish and macroinvertebrate assemblages during two phases in non-perennial streams (flowing vs. disconnected pools). We sampled fish and macroinvertebrate assemblages in five non-perennial stream reaches located in the Caatinga (Brazilian semi-arid region). Fish species were resistant to hydrological dynamics in the streams. On the other hand, some macroinvertebrate taxa from the flowing phase disappeared, and new taxa colonized the disconnected pools. The absence of lotic insects following flow cessation and the colonization of disconnected pools by lentic taxa facilitated macroinvertebrate assemblages persistence in these dynamic streams. Our study showed that fish and macroinvertebrate assemblages respond differently to the same natural flow cessation, which leads us to predict that flow changes will yield different assemblages, depending on the taxa. Thus, it is crucial to consider multi-assemblage responses to effectively manage and conserve non-perennial stream ecosystems in a tropical semi-arid region." (Authors) Taxa - including Odonata - are treated at family level.] Address: Silva Oliveira, Júlia, Programa de Pós-Graduação em Ecologia e Conservação, Centro de Ciências Biológicas e da Saúde, Universidade Estadual da Paraíba, Rua Baraúnas, n. 351 - Complexo Três Marias, Prédio de Biologia, Bairro

Universitário, Campina Grande, PB, Brazil. Email: juliasilvo-liveira@gmail.com

23916. Siregar, N.S.; Dimenta, R.H.; Sari, N.F. (2024): Design of an e-encyclopedia of the order of Odonata from Sumatra as student teaching material. *JPBIO (Jurnal Pendidikan Biologi)* 9(1): 111-122. (in English) ["This research discusses the design of the E-Encyclopedia of the Order of Odonata as teaching material for junior high school students. This research aims to introduce how to design an Eencyclopedia of the Order of Odonata from Sumatra which can be used as teaching material for junior high school students, especially children aged (13-15 years) in the Sumatra region. The urgency is that junior high school children become familiar with the various types of the Odonata Order from Sumatra so that the identity of the Odonata Order is maintained and maintained. This research is design research consisting of three phases, namely Preliminary research, Prototyping phase, and assessment phase. The design of the E-Encyclopedia of the Odonata Order from Sumatra is an effort to develop media in studying various types of the Odonata Order from Sumatra whose development is viewed from language, material, and media. Through the development activities carried out, an Encyclopedia Product of the Order of Odonata from Sumatra was obtained as suitable teaching material." (Authors)] Address: Dimenta, R.H., Department of Biology Education, Labuhan Batu University, Indonesia. Email: rivohasperdimenta@ulb.ac.id

23917. Sitati, A.; Yegon, M.J.; Masese, F.O.; Graf, W. (2024): Ecological importance of low-order streams to macroinvertebrate community composition in Afromontane headwater streams. *Environmental and Sustainability Indicators* 21, 100330: 11 pp. (in English) ["Highlights: • First-order tributaries support high macroinvertebrate diversity and heterogeneous communities in Afromontane headwater streams. • First-order streams provided unique habitats for a variety of uniquely specialized taxa. • Scrapers were the most abundant functional feeding group in the second-order stream while shredders were abundant in the first order streams. Abstract: Low-order streams contribute to the abiotic and biotic character of large rivers and are renowned for harboring unique forms of aquatic flora and fauna. However, most studies on headwater streams mainly focus on the mainstems and overlook the contribution of the tributary systems. Moreover, low-order streams are generally overlooked in legislation and bioassessment programs, and consequently not protected in many countries. To contribute to the recognition of the ecological importance of low-orders streams, this study focused on determining whether river network characteristics and associated physico-chemical parameters can be used to effectively predict the variabilities in macroinvertebrate assemblage characteristics between first-order and second-order streams in the headwaters of the Nzoia River Basin, Kenya. The study quantified the structural and functional community composition, diversity, similarity, and richness of macroinvertebrate communities between the two river systems. Dissolved oxygen, coarse particulate organic matter, conductivity, stream width, depth, discharge and flow velocity were the main predictors of the diversity and distribution of macroinvertebrates in the first order and second-order streams. The first order streams recorded higher abundance of macroinvertebrates than the second-order streams. Taxa from families Ephydriidae, Elmiidae, Gomphidae, and genera Euthraulus, Neoperla, Orthotrichia and Prosopistoma were limited to the second-order stream sites while families Ceratopogonidae, Pisuliidae, Dytiscidae and genus Trichosetodes occurred exclusively in the first-order stream sites. Collector-filterers and collector-gatherers

were the most abundant functional feeding groups (FFGs) in the two river systems. Scrapers were abundant in the second-order stream while shredders were abundant in the first order streams. The distinctness in the structural and functional composition of macroinvertebrates between the two river systems suggests that linkages among streams in a network as exemplified in the Nzoia River Basin, support and foster biodiversity." (Authors)] Address: Yegon, Mourine, Department of Fisheries & Aquatic Sciences, School of Environmental Sciences & Natural Resource Management, University of Eldoret, Kenya. Email: mourineyegon@gmail.com

23918. Sniegula, S.; Stoks, R.; Golab, M.J. (2024): Insect responses to seasonal time constraints under global change are facilitated by warming and counteracted by invasive alien predators. *Scientific Reports* volume 14, Article number: 24565 (2024): 17 pp. (in English) ["In seasonal environments, organisms with complex life cycles not only contend with seasonal time constraints (TC) but also increasingly face global change stressors that may interfere with responses to TC. Here, we tested how warming and predator stress imposed during the egg and larval stages shaped life history and behavioural responses to TC in the temperate damselfly *Ischnura elegans*. Eggs from early and late clutches in the season were subjected to ambient and 4 °C warming temperature and the presence or absence of predator cues from perch and signal crayfish. After hatching, larvae were retained at the same thermal regime, and the predator treatment was continued or not up to emergence. The late eggs decreased their development time, especially under warming and when not exposed to predator cues. However, the late eggs increased their development time when exposed to predator cues, especially to crayfish cues. The TC decreased survival of late larvae that were as eggs exposed to crayfish cues, indicating a carry-over effect. The TC and warming additively reduced late larvae development time to emergence. Independent of the TC, predator cue effects on development time were stronger during the egg than during the larval stage. The late individuals expressed lower mass at emergence, which mirrored the size difference between field-collected mothers. Warming caused a higher mass at emergence. The late individuals increased their boldness and showed a higher number of moves, whereas warming caused a decreased boldness. There was no predator cue effect on larval behaviour. The results indicate that late individuals compensate for late season egg laying, which is facilitated under warming but counteracted under predation risk, especially when imposed by the crayfish." (Authors)] Address: Sniegula, S., Inst. Nature Conservation Polish Acad. of Sciences, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: szymon.sniegula@gmail.com

23919. Sommerhäuser, M.; Große-Kreul, C.; Buch, C.; Burfeid-Castellanos, A.; Jacobs, G.; Januschke, K.; Korte, T.; Kühnapfel, K.-B.; Lorenz, A.; Rautenberg, T.; Scharbert, A.; Volken, P. (2024): Die Artenvielfalt der neuen Emscher-Mündung. *Natur in NRW* 3/2024: 31-35. (in German) [Nordrhein-Westfalen, Germany "On the "Day of the Living Emscher" on June 17 and 18, 2023, experts from science and volunteers examined the communities in the newly created Emscher estuary. Over 24 hours, a total of more than 800 species of flora and fauna were identified. The results show a wealth of species that is typical of floodplain landscapes in their early stages of development, nutrient-rich flowing and still waters, and self-dynamic shore areas. This underlines the importance of the newly created floodplain landscape and the water-ecological connection to the Rhine for the repopulation of the Emscher. Some species finds illustrate the consequences of climate change and the spread of non-native species. Future,

systematic studies of the new Emscher estuary should provide an in-depth long-term picture of the newly emerging biodiversity. Odonata: On the day of the study, a total of nine dragonfly species were found, most of which are common and widespread, and which mostly prefer eutrophic, open waters. At the same time, they already indicate the habitat diversity of the Emscher estuary. *Calopteryx splendens* was a typical flowing water species, while eight species were found that mainly prefer standing waters or generally inhabit a wide range of water types. *Libellula depressa* and *Orthetrum cancellatum* prefer shallow, open, warm and largely vegetation-free standing waters as pioneers, as they occurred several times in the newly created floodplain. *Anax imperator*, *Crocothemis erythraea* and *Erythromma viridulum* mainly use larger, open, vegetation-rich standing waters. *E. viridulum*, *C. erythraea* and *Anax parthenope* are also heat-loving species that have only immigrated to the Rhineland in the last few decades. Due to the mapping date at the end of June, it is possible that some phenologically early or late species were not recorded due to their different (main) flight times.) Verbatim/Google translate]] Address: Carla Große-Kreul, Emscher-genossenschaft. Email: grosse-kreul.carla@eglv.de

23920. Song, Z.; Liu, W.; Huang, L.; Yuan, M.; Shang, S.; Liu, W.; Cui, S. (2024): Novel atmospheric pressure drying method for silica-based aerogel insulation: Inspired with the adult process of damselflies. *Ceramics International* 50(18), Part B: 34205-34217. (in English) ["Highlights: • A novel atmospheric pressure drying of aerogels preparation inspired by biology. • Stabilization of aerogel structures with CO₂ instead of low surface tension solvents. • The preparation cycle time is shortened by 1–6 times, the cost is reduced by 38.2 %. • Thermal conductivity of 0.0264 W/(m·K) and hydrophobic temperature resistance of 400 °C. • Aerogel composites have outstanding thermal insulation and moisture resistance. Abstract: The high production cost and extremely weak mechanical properties of SiO₂ aerogels have been two major challenges hindering its widespread application. Atmospheric pressure drying (APD) has always been regarded as the optimal process to reduce costs. However, traditional APD is cumbersome, still uses a large amount of expensive raw materials, and is extremely immature. In this study, a novel APD was developed, inspired by the wing changes during adult damselfly process. Inorganic silica source/water was used as the raw material, and CO₂ was used instead of low surface tension solvent to stabilize the aerogel skeleton structure in situ, and ultimately aerogel material was obtained. The thermal conductivity of pure aerogels was as low as 0.0264 W/(m·K), the porosity reached 94.7 %, and the preparation cycle was only 28.5 h. The thermal stability of the skeleton structure and the chemical stability of surface were investigated and showed the hydrophobicity to withstand temperatures up to 400 °C. Aerogel composites feature low thermal conductivity of 0.0283 W/(m·K), and prominent thermal insulation properties over a wide temperature range of 50–300 °C. For traditional APD, this method shortens preparation cycle by 1–6 times. Compared with the commercial aerogel, the cost is reduced by 38.2 %, and the process is simple and environmentally friendly under the premise of ensuring excellent performance." (Authors)] Address: Cui, S., State Key Laboratory of Materials-Oriented Chemical Engineering, College of Materials Science & Engineering, Nanjing Tech University, Nanjing, 211816, China. Email: scui@njtech.edu.cn

23921. Susanto, M.A.D.; Sidiq, F.; Islamia, S.; Pratama, M.I. (2024): Diversity and conservation status of dragonflies (Odonata) at three streams in Donomulyo Sub-district, Malang District, Indonesia. *Nusantara Bioscience* 16(1): 139-147. (in

English) ["The aquatic environment is currently experiencing massive threats, especially from anthropogenic activities. Polluted effluent discarded in streams damages the existing ecosystems and negatively impacts various organisms. Donomulyo, a sub-district in Malang District of East Java Province, Indonesia, has many rivers and streams that are pivotal for local people and wildlife. Water quality in these aquatic bodies can be monitored using bioindicators. Odonata are bioindicators indicating environmental change in rivers and streams. Unfortunately, there has been no data regarding Odonata in the Donomulyo streams. Hence, this research aims to determine the diversity of dragonfly species at three streams in Donomulyo and its meaning for the environmental status. The research was conducted at Sengik, Kedungceleng, and Kedungsalam streams using a Visual Encounter Survey (VES) to count individuals of each dragonfly species. This study recorded 258 individuals identified into 25 species of 4 families. ... The three streams studied in this research generally had moderate Odonata diversity (2.02 < H' < 2.41), indicating good habitat conditions. ... According to the International Union for Conservation of Nature (IUCN) 2023 assessment, only *Copera vittata javana* possessed discernible status as Not Evaluated (NE), which is considerably higher than the other 24 species that are Least Concern (LC) (Table 2). Moreover, 9 species are categorized as stable populations as indicated in the IUCN database, including *Gynacantha subinterrupta*, *Agrionoptera insignis*, *Neurothemis ramburii*, *N. terminata*, *Orthetrum sabina*, *Pantala flavescens*, *Pseudagrion microcephalum*, *P. prunosum*, and *Prodasineura autumnalis*. Meanwhile, 13 species which comprise of *Camacinia gigantea*, *Orthetrum glaucum*, *O. prunosum*, *Potamarcha congener*, *Rhodothemis rufa*, *Trithemis aurora*, *T. festiva*, *Agriocnemis femina*, *A. pygmaea*, *Heliocypha fenestrata*, *Pseudagrion rubriceps*, *Copera marginipes*, and *Nososticta insignis* are with unknown population trend. Only *Crocothemis servilia* and *Orthetrum testaceum* were assessed to have an increased population trend." (Authors)] Address: Susanto, M.A.D., Dept of Biology, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya. Jl. Veteran, Malang 65145, East Java, Indonesia

23922. Susanto, M.A.D.; Gama, Z.P.; Leksono, A.S. (2024): Habitat characteristics and threats of little-known endemic dragonfly, *Neurothemis feralis* (Burmeister, 1839) (Odonata: Libellulidae) in East Java, Indonesia. *Biodiversitas* 25(7): 2907-2920. (in English) ["*N. feralis* is a dragonfly with limited distribution and is found only in the lowlands of Java, Sumatra, Krakatau, and Bangka. Its habitats that traverse anthropogenic area face various threats from human activities. Despite the imminent of its depopulation, many essential information regarding the biology of *N. feralis* remain scarce, deem it with data deficient conservation status according to the International Union for Conservation of Nature (IUCN) Red List. This study aims to study habitat characteristics of *N. feralis* for future conservation purposes. This study was conducted in Surabaya, Sidoarjo, and Gresik, East Java Province, with a five-month study period of July-November 2023. The results showed that *N. feralis* prefers locations with 36-64% air humidity, 29.2-35.8°C air temperature, and 16970-36400 lux light intensity. Air humidity positively correlated with the abundance of *N. feralis*, while high temperatures and light intensity tend to have negative impact. The coverage of vegetation with 20-100 cm height was found as another habitat component that positively affects its abundance, while the loss of this coverage understandably negate the dragonfly abundance. Vegetation provides habitat for *N. feralis*, as well as its prey, competitors and even predators. Despite *N. feralis* population can still be observed from urban areas with up to 82.40% residential allotment (within 500 m radius of the study

site), the disappearance of its population is likely if believably impending if anthropogenic activities (e.g., land conversion and vegetation burning) continue to occur." (Authors)] Address: Susanto, M.A.D., Graduate Program of Biology, Faculty of Mathematics & Natural Sciences, Universitas Brawijaya. Jl. Veteran, Malang 65145, East Java, Indonesia. Email: muhammadzmidwi@gmail.com

23923. Swinemar, D.T. (2024): The shifting trophodynamics in four southern Nova Scotia lakes after the introduction of Chain Pickerel (*Esox niger*). MSc thesis, Saint Mary's University, Halifax, Nova Scotia: 131 pp. (in English) ["Invasive fish species *E. niger* was first reported within Kejimikujik National Park and Historical Site in 2018. I used stable carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) ratios to assess food web structure and trophodynamics in four lakes ranging over an invasion spectrum: Loon Lake (first Chain Pickerel report in 2018), Grafton Lake (2019), Big Dam West Lake (2020) and Cobrielle Lake (2021). It was shown that *E. niger* can be grouped into two clusters based on their feeding habits, CP1 and CP2; $4.2\text{cm} = \text{TL} = 10.9\text{cm}$ and $20.2\text{cm} = \text{TL} = 58.6\text{cm}$. Mixing model results indicate CP1 individuals feed primarily on Odonata with a mean dietary proportion of 0.736 ± 0.079 . Those assigned to CP2 feed primarily on native fish with a mean dietary proportion of 0.724 ± 0.032 . Post-invasion there was a consistent decrease in overall trophic position for fish and Odonata prey items." (Author)] Address: https://library2.smu.ca/bitstream/handle/01/32068/Swinemar_Delbert_MASTERS_2024.pdf?sequence=1&isAllowed=y

23924. Takemura, K.; Motomura, T.; Iwasaki, W.; Morita, N.; Kikunaga, K. (2024): Dragonfly-inspired compound eye lens with biomimetic structural design. *Adv. Mater. Interfaces* 2024, 2400480: 7 pp. (in English) ["Compound eye biomimetics are extensively studied owing to their high level of functionality. However, optimizing material-dependent parameters, such as refractive index, is essential for maximizing lens function. Therefore, metal films are deposited on *Pantala flavescens* compound eyes using a magnetic mirror magnetron cathode, which deposits films at low temperatures without plasma impingement. By increasing the thickness of the film on the compound eye surface, a compound eye mold is successfully fabricated with high heat tolerance. Lens fabrication is achieved using a high-temperature-curable resin. The resulting lens comprises numerous uniformly shaped functional units. This method offers a highly reproducible lens-pouring molding technique using various materials, marking a significant advancement in developing imaging devices and sensors that accurately replicate the functionalities of dragonfly eyes." (Authors)] Address: Takemura, K., Sensing System Research Center National Institute of Advanced Industrial Science and Technology (AIST) 807-1 Shuku-Machi, Tosu, Saga 841-0052, Japan. Email: Takemura.kenshin@aist.go.jp

23925. Theischinger, G.; Kalnins, M.; Marinoiv, M. (2024): Two new species of *Anax* Leach, 1815 from the Solomon Islands and Tonga (Odonata: Aeshnidae). *Zootaxa* 5519(2): 215-242. (in English) ["Species of the cosmopolitan genus *Anax* Leach, 1815 are among the largest dragonflies and the most powerful flyers. Within the genus the proportion between body length and wing and the body shape of both sexes are of great taxonomic importance. Here we describe two new *Anax* species: *Anax insulanus* sp. nov., from the Solomon Islands and *A. tonga* sp. nov., from Tonga. To distinguish both species from a very similar sympatric congener we compare the S3 Index which is defined as the relative length and width at its narrowest point of abdominal segment 3. *Anax fumosus* Cebalense Lieftinck, 1942 is raised to species level. Diagnostic

characters of male and female (if available) are illustrated. A key is presented for the identification of the males of the 14 species of *Anax* known to occur in the Australian, the Oceanian and the south of the Indomalayan Biogeographical Realms." (Authors)] Address: Kalnins, M., Dept of Biosystematics, Institute of Life Sciences and Technology, Daugavpils University, Parades Street 1A, Daugavpils, Latvia, LV-5401. Email: martins.kalnins@biology.lv

23926. Tyagi, B.K. (2024): WWF's Dragonfly Festival 2023 in partnership with the I.D.S. *Bradinopyga* 7 & 8(11-13): 139-141. (in English) [The WWF introduced the 6th edition of the Dragonfly Festival 2023 in partnership with Indian Dragonfly Society, running from September to November 2023 and aiming to foster connections nationwide among dragonfly enthusiasts.] Address: Tyagi, B.K., Centre for Research in Medical Entomology (ICMR), 4-Sarajini Street, Chinna Chokkikulam, Madurai 625005 (Tamil Nadu), India. Email: abktyagi@gmail.com

23927. Tyrrell, M. (2024): Wing protection during emergence in *Brachytron pratense* Müller (Hairly Dragonfly). *Journal of the British Dragonfly Society* 40(2): 79-83. (in English) ["Observations are reported showing how a recently emerged adult (i.e. teneral) *B.* oriented its body parallel to the direction of the wind during wing hardening, and then re-oriented it back, once the wings were sufficiently hardened, to maximise sun warming. It is considered that this behaviour is aimed at reducing the risk of wing damage through contact, albeit at increased risk of the teneral being dislodged." (Authors)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northamptonshire, NN9 6JH, UK.

23928. Tyrrell, M. (2024): Recent colonisation of the River Ise in Northamptonshire by *Libellula fulva* Müller (Scarce Chaser) and *Calopteryx virgo* (Linnaeus) (Beautiful Demoiselle), and the decline in *Platynemis pennipes* (Pallas) (White-legged Damselfly). *Journal of the British Dragonfly Society* 40(2): 64-78. (in English) ["The River Ise in Northamptonshire has varied habitat ranging from well-lit open stretches to fully tree-shaded sections, as well as slow-flowing, silty-based sections to fast-flowing gravelly-bottomed stretches. Water flow is engineered in sections, such as under road bridges, through urban areas and with weirs, to increase flow rates to prevent flooding. There are also naturally fast-flowing areas. The river has had a long-standing population of *P. pennipes*, and has recently been colonised by both *L. fulva* and *C. virgo*. Currently the most abundant species is *Calopteryx splendens*. In some areas of the Lower Ise Valley, *C. virgo* and *L. fulva* can be seen in close proximity to each other at the peak of their seasons, making this an interesting river to study. In the Upper Ise Valley, *C. virgo*, is now present in all suitable sections, but *L. fulva* is absent. This paper explores the habitats of this river and the colonisation by both new species, and details the decline in abundance (but not distribution) of *P. pennipes*." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northamptonshire, NN9 6JH, UK.

23929. Uhrhan, M.J.; Bompfrey, R.J.; Lin, H.-T. (2024): Flow sensing on dragonfly wings. *Annals of the New York Academy of Sciences* 1536(1): 107-121. (in English) ["One feature of animal wings is their embedded mechanosensory system that can support flight control. Insect wings are particularly interesting as they are highly deformable yet the actuation is limited to the wing base. It is established that strain sensors on insect wings can directly mediate reflexive control; however, little is known about airflow sensing by insect wings. What information can flow sensors capture and how can flow sensing benefit flight control? Here, we use *Sympetrum*

striolatum as a model to explore the function of wing sensory bristles in the context of flight control. Combining our detailed anatomical reconstructions of both the sensor microstructures and wing architecture, we used computational fluid dynamics simulations to ask the following questions. (1) Are there strategic locations on wings that sample flow for estimating aerodynamically relevant parameters such as the local effective angle of attack? (2) Is the sensory bristle distribution on dragonfly wings optimal for flow sensing? (3) What is the aerodynamic effect of microstructures found near the sensory bristles on dragonfly wings? We discuss the benefits of flow sensing for flexible wings and how the evolved sensor placement affects information encoding." (Authors)] Address: Uhrhan, Myriam, Department of Bioengineering, Imperial College London, Exhibition Rd, London SW7 2AZ, UK. Email: myriam.uhrhan18@imperial.ac.uk

23930. Valuev, V.A. (2024): [To dragonflies (Insecta, Odonata) of the central and northern parts of the Republic of Bashkortostan (Southern Urals, 2015-2023)]. Materials on the flora and fauna of the Republic of Bashkortostan 43: 3-20. (in Russian) ["From 2015 to 2023, 36 species of dragonflies belonging to 17 genera and 8 families were registered. The most common species were *Sympetrum flaveolum*, *S. vulgatum*, *S. sanguineum*, *Platycnemis pennipes* and *Calopteryx splendens*." (Author)] Address: Valuev, V.A., Institute of Ecological Expertise & Bioinformation Technologies, Ufa District, Republic of Bashkortostan, Russia. E-mail: ValuyevVA@mail.ru

23931. Veras, D.S.; Ribeiro Ferreira, M.F.; Lustosa, G.S.; Sousa, M.M.; Juen, L. (2024): Heterogeneity in altered streams does not increase the richness of stream specialist species of Odonata in the Maranhense Cerrado. *Journal of Insect Conservation* 28: 665-674. (in English) ["The Brazilian Cerrado is a biodiversity hotspot that has suffered significant vegetation loss in the states that make up the so-called MATOPIBA region in recent years an area currently experiencing soybean cultivation expansion in Brazil. This expansion can change the environmental conditions of freshwater streams, as they receive the impacts of activities occurring in their drainage basin. In this study, we assessed how anthropogenic activities impact the conservation status and environmental heterogeneity of streams and how these modifications affect the proportion between abundance and species richness among the suborders of Odonata (Anisoptera and Zygoptera). We also assessed whether conserved streams had a greater number of specialist species when compared to altered streams. To assess these objectives, we collected data from 24 streams within matrices presenting a gradient in their integrity and vegetation cover conditions. Altered areas showed a tendency higher to heterogeneity compared to preserved streams. As expected, we observed that the proportion of abundance and species richness of Zygoptera was higher in preserved streams, while for Anisoptera, it was higher in altered streams. Despite altered sites having higher environmental heterogeneity, we failed to register of a greater number of specialist species in these areas. This implies that the presence of riparian forests is essential for maintaining habitat integrity supporting the maintenance of species that are more sensitive to changes in environmental gradients. Implications for insect conservation: We underscore the significance of permanent protection areas in maintaining the habitat integrity of streams and preserving the diversity of Odonata species, particularly for Zygoptera." (Authors)] Address: Veras, D.S., Laboratório de Ecologia de Comunidades, Instituto Federal do Maranhão, Campus Caxias, Rodovia MA- 340, Km 02, Gleba Buriti do Paraíso, Povoado Lamego, Zona Rural, Caxias, CEP 65600-000, MA, Brasil

23932. Viana, C.G.; Pereira-Moura, L.; Veras, D.S. (2024): Adult emergence of *Phyllocyca Calvert*, 1948 (Odonata: Gomphidae) in artificial environments. *Acta Limnologica Brasiliensia*, 2024, vol. 36, e36. <https://doi.org/10.1590/S2-179-975X3024>: 10 pp. (in English, with Portuguese summary) ["Aim: This study aimed to analyze aspects of adult emergence of *Phyllocyca* in artificial environments. Samplings were conducted in Sanharó stream, Caxias municipality, Maranhão State, Brazil. Methods: Specimens were examined under a stereomicroscope and identified to the lowest possible taxonomic level. Polystyrene boxes were used as rearing sites, and the following methods were analyzed: a) sand; b) strips of filter paper simulating substrate; c) without substrate. For emergence, the rearing sites had their lids removed and were placed inside larger jars with mesh windows, less water, with most of the substrate exposed above the water level. To verify the difference between treatments, the Log-rank test and Kaplan-Meier survival curves were used. Results: The curves indicated that emergences occurred more frequently in the initial days of rearing. There was an absence of statistical difference between groups. Despite that, all treatments showed success in emergence, with larvae without substrate emerging more quickly. Conclusions: By exploring the use of different substrates in Odonata rearing, this research provides guidelines for optimizing laboratory conditions, helping to overcome experimental challenges and supporting new studies and inventories." (Authors)] Address: Viana, Carolina, Lab. de Ecologia de Comunidades, Inst. Federal de Educação, Ciência e Tecnologia do Maranhão – IFMA, Campus Caxias, MA-349, Km 02, Gleba Buriti do Paraíso, s/n, CEP 65604-500, Caxias, MA, Brasil

23933. Viganò, M.; Pompilio, L.; Bazzi, G.; Bionda, R.; Clemente, F.; Pilon, N.; Zuffi, E.; Assandri, G. (2024): The EU conservation priority dragonfly *Oxygastra curtisii* in the Italian Lake District: a review and new data (Insecta: Odonata). *Fragmenta entomologica* 56(2): 193-204. (in English) ["*O. curtisii* is an Odonate species of EU conservation priority ('Habitat' directive Annex II and IV). In Italy, knowledge about its distribution is fragmentary. We updated and reviewed data on its distribution (geographic and altitudinal) and ecology (habitat preferences and phenology) in the Italian Lake District (an area of >5000 km² in NW Italy) and evaluated the adequacy of the Natura 2000 Network in protecting the species. We found the species to be present and rather widespread at the main pre-Alpine lakes (Lakes Maggiore, Lugano, Orta, Como, and Iseo, with the exclusion of Lake Garda), and several other smaller lakes. Based on current knowledge, a line running roughly north to south from Lake Moro to Lake Iseo is the easternmost limit of the species' range in northern Italy. While the flight period runs from the last decade of May to the second decade of August, it peaks between the second decade of June and the second decade of July. Our study showed the importance of two habitats whose significance for *O. curtisii* had been previously overlooked: lakes, which are an important habitat for reproduction, and grassland on the mountain slopes surrounding the lakes, which serve as an important pre-breeding and foraging habitat for immatures. Only 40% of known breeding localities are included in the Natura 2000 network, highlighting the potential vulnerability of this localized species in the area. In light of this, we believe it is essential to expand the Natura 2000 network to include more sites where this species is present, including foraging and pre-breeding areas, and to begin as soon as possible monitoring efforts to better assess the size of the *O. curtisii* population in the Italian Lake District." (Authors)] Page 194: "...and recently disappearing from the Germany-Luxembourg border, presumably due to the invasion of the

American crayfish *Pacifastacus leniusculus* (Ott 2018)." Such information is completely wrong. The species is well represented along the river Our north of Vianden, and the alleged threat by crayfish is definitely not based on any study at the river Our. The extirpation of the local population below the reservoir of Vianden was caused by an artificial flood wave. In 2023 there was observed a single specimen below the dam of the reservoir signalling a possible re-colonisation of the lower part of the river Our.] Address: Assandri, G., Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale "Amedeo Avogadro", Alessandria, Italy. Email: giacomo.assandri@uniupo.it

23934. Vilela, D.S.; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2024): The Odonata of the Chapada dos Guimarães National Park, Mato Grosso state, Brazil, with an updated species list for the state. *Odonatologica* 53 (3-4): 265-296. (in English) ["We present the first comprehensive inventory of the Odonata of the Chapada dos Guimarães National Park, Mato Grosso state, Brazil, established in 1989. In total, we collected 576 specimens from 94 species, 42 genera and nine families, with 25 species representing records new to Mato Grosso state. At least 285 Odonata species are now recorded from the state. Our results highlight the importance of protected areas for species conservation and suggest that additional collections inside and outside the National Park may increase the number of recorded species in that region." (Authors)] Address: Vilela, D.S., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas – Campus Inconfidentes, Inconfidentes, Minas Gerais, Brazil. Email: deeogoo@gmail.com

23935. Vilela, D.S.; Dias-Oliveira, T.M.; Souza, M.M.; Medina-Espinoza, E.F.; Juen, L. (2024): The females of *Epipleoneura capilliformis* (Selys, 1886) and *E. albuquerquei* Machado, 1964 (Odonata: Protoneurinae): description and diagnosis. *Zootaxa* 5507(1): 187-193. (in English, with Portuguese summary) ["We describe, illustrate and diagnose two hitherto unknown females of the genus *Epipleoneura* Williamson, 1915: *E. capilliformis* (Selys, 1886) and *E. albuquerquei* Machado, 1964. Both females are diagnosed based on the prothoracic hind lobe morphology: in *E. capilliformis*, the hind lobe is trilobed, with an elevated median portion, unique within the known females of the genus. Females of *E. albuquerquei* have an entire, posteriorly oriented (i.e. not partitioned into additional lobes) hind lobe, similar to *E. haroldoi* Santos, 1964, although more concave.] Address: Vilela, D.S., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas – Campus Inconfidentes, Inconfidentes, Minas Gerais, Brazil. Email: deeogoo@gmail.com

23936. Vilenica, M.; Brigic, A.; Ergovic, V.; Koh, M.; Alegro, A.; Šegota, V.; Rimac, A.; Rumišek, M.; Mihaljevic, Z. (2024): Taxonomic and functional Odonata assemblage metrics: macrophyte-driven changes in anthropogenically disturbed floodplain habitats. *Hydrobiologica* 851: 3787-3807. (in English) ["Floodplains are heterogeneous systems adjacent to large rivers periodically flooded by water originating from the river's lateral flow. During floods, the water flows into the surrounding channels, ponds and lakes, creating an integrated dynamic system characterized by a mosaic of lotic and lentic habitats and by the exchange of nutrients and inhabiting organisms between the main river and its floodplain. This study included a total of 14 sampling sites in a floodplain of the Danube River, designated as a Ramsar site. Seven study sites were in near natural condition, while seven others were separated from the Danube floodplain by an embankment and thus were anthropogenically disturbed (e.g. by hydro-morphological alterations and pollution from agricultural fields). Odonata nymphs were

sampled over a two-year period in each season using a benthos hand net. A total of 20 Odonata species were recorded. Some of the documented species are of national and/or international conservation concern, which confirms the conservation value of the habitats studied. Species richness, abundance, taxonomic and functional diversity of Odonata were significantly higher at the anthropogenically disturbed sites than at the near natural sites within the studied floodplain area and correlated positively with macrophyte assemblage metrics (species richness, abundance, diversity). The macrophyte assemblage metrics, water transparency, copper and nitrate concentrations and oxygen saturation in the water were key environmental factors shaping Odonata assemblages in the studied floodplain. As Odonata are used as bioindicators of freshwater status worldwide, the presented results could be used in the protection of endangered wetland ecosystems and their biota. The importance of aquatic macrophytes for the conservation of the local Odonata diversity should be considered in the management of anthropogenically disturbed habitats in protected areas." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Trg Matice Hrvatske 12, 44250, Petrinja, Croatia

23937. Vilenica, M.; Micetic Stankovic, V.; Kucinic, M. (2024): Dragonfly functional diversity in Dinaric Karst Tufa-depositing lotic habitats in a biodiversity hotspot. *Diversity* 2024, 16(10), 645; <https://doi.org/10.3390/d16100645>: 15 pp. (in English) ["Functional diversity is a key component of biodiversity that reflects various dimensions of ecosystem functioning and the roles organisms play within communities and ecosystems. It is widely used to understand how ecological processes influence biotic assemblages. With an aim to increase our knowledge about dragonfly ecological requirements in tufa-depositing karst habitats, we assessed functional diversity of their assemblages, various life history traits (e.g., stream zonation preference, substrate preference, reproduction type), and relationship between functional diversity and physico-chemical water properties in three types of karst lotic habitats (springs, streams, and tufa barriers) in a biodiversity hotspot in the western Balkan Peninsula. Dragonfly functional diversity was mainly characterized by traits typical for lotic rheophile species with medium dispersal capacity. Among the investigated habitats, tufa barriers, characterized by higher (micro)habitat heterogeneity, higher water velocity, as well as lower conductivity and concentration of nitrates, can be considered as dragonfly functional diversity hotspots. Functional diversity and most of the life history traits were comparable among different substrate types in the studied habitats, indicating higher importance of habitat type in shaping dragonfly functional diversity patterns in karst lotic habitats. Our results should be considered in the management and conservation activities of vulnerable karst freshwater ecosystems and their dragonfly assemblages." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Trg Matice Hrvatske 12, 44250 Petrinja, Croatia

23938. von Euler, F.; Kosterin, O.E. (2024): Designation of the lectotype of *Somatochlora sahlbergi* Trybom, 1889 (Odonata: Corduliidae). *Odonatologica* 53(3-4): 439-445. (in English) ["In 1889, Filip Trybom described *S. sahlbergi*, based on three male syntypes and one female syntype, and *S. theeli*, based on two female syntypes, collected on the Swedish expedition to the Yenisey River in 1876. In 1931, K.J. Valle discovered that the type series of *S. sahlbergi* was heterogeneous since the female syntype was in fact another species, *S. alpestris*. At the same time, the two female syntypes of *S. theeli* appeared conspecific with the male syntypes of *S. sahlbergi*. Acting as the First Reviser, Valle chose the name

S. sahlbergi as valid for the species which was actually new to science, but there remained a formal uncertainty of its sense because of the heterogeneity of the type series. In order to formally justify the use of the established name *S. sahlbergi* for this species, we have designated a male syntype specimen, collected at Dudinskoe village (presently the town of Dudinka) on 30.vii.1876, as the lectotype of *S. sahlbergi*. (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Acad. of Sci., Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

23939. Vos, R. (2024): Hunt like a dragonfly and strike like a drone. Simulating games of pursuit and evasion to optimize quadcopter control for insect pest interception in greenhouses. MSc thesis, Faculty of Aerospace Engineering · Delft University of Technology: 78 pp. (in English) ["the need for insecticides and can contribute to sustainable agriculture. In this research, we analyze the feasibility of such solutions through simulated two-player differential games of pursuit and evasion with agents operating on minimalistic sets of biologically-plausible observations and optimized to control constrained vehicle models through deep multi-agent reinforcement learning. Our pursuer and evader agent, representing the quadcopter drone and insect pest respectively, are asymmetric in design, capabilities and objectives. Our results show that our quadcopter pursuer is consistently able to pursue and intercept a reactive insect-inspired evader as well as recordings of actual insect targets, achieving interception rates of 55% and 94% on these respective tasks. In comparison, pursuers alternatively optimized against non-reactive evaders or reactive drone-like evaders with symmetric capabilities, achieve an interception rate of only 42% for the same insect target recordings. Despite these promising results, we conclude that further research is needed to formally establish the superiority of multi-agent optimization in this asymmetric game scenario. Finally, we determine how emergent behavior and strategies resemble nature. During the confrontations, we observe that our pursuer mainly implements pure-pursuit as well as motion camouflage to some degree; drawing comparison to the hunting strategy of dragonfly."(Author)] Address: https://repository.tudelft.nl/file/File_3b3e785b-79d6-4c2f-b13a-0bb94b802d69

23940. Wang, J.J. (2024): Abstract: C09.00007: Evolution of flight: The size and energetic constraints on Giant Dragonfly flight. Bulletin of the American Physical Society. 77th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 24–26, 2024; Salt Lake City, Utah. Session C09: Interact: Swimming and Flying at Moderate and High Reynolds Numbers. 10:50 AM, Sunday, November 24, 2024. Room: Ballroom I: (in English) [Verbatim: "Giant dragonflies (griffenflies) were the largest insects in natural history and were precursors to modern dragonflies and other insects. The largest fossils show an impressive wing length of 30 cm. This gigantism is correlated with the increased oxygen levels during the Permian period (300-270 million years ago). The upper limit on size depends on body form, oxygen levels, metabolic rates, and muscle energetics. I use physical arguments to predict the size range, wing motion, and flight energetics of these insects. The predicted size range encompasses the fossil records found in the US, France, and Russia. I will further present computational results on flight energetics. These physical arguments also predict the size range of other flying insects due to oxygen fluctuations during their evolutionary history." (Author)] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

23941. Wang, L.; Yang, X.; Luo, Y.; Chen, H.; Li, J. (2024): Design of attitude control system for dragonfly-inspired flapping wing aerial vehicle. 34th Congress of the International Council of the Aeronautical Sciences, Florence, Italy, September 9-13, 2024: 13 pp. (in English) ["For general insect like tailless flapping wing aerial vehicle(FWAV), relying solely on the flapping motion of the wings should generate both lift and control torque. Due to the inherent instability of tailless FWAV, a wing control mechanism is needed to generate effective control torque to stabilize the aircraft. This article introduces a control system applied to a 65g level Dragonfly-Inspired FWAV, which can control pitch, roll, and yaw by changing the flapping frequency and the flapping plane angles of its two wings, so as to maintain a stable attitude of the aircraft during hovering. We first designed a compact and lightweight flapping mechanism, and then determined through force measurement and pole climbing experiments that it can generate sufficient lift. Subsequently, a control mechanism was designed to control the flapping plane angles. Single degree of freedom and three degree of freedom bench experiments were conducted to verify the effectiveness of the attitude control system." (Authors)] Address: Wang, L., School of Aeronautics, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China

23942. Wildermuth, H.; Borkenstein, A.; Schröter, A.; Jödicke, R. (2024): Repeated copulations in *Libellula quadrimaculata* (Odonata: Libellulidae). *Odonatologica* 53(3/4): 365-383. (in English) ["Libellulidae generally adopt a promiscuous reproductive strategy. Males and females mate several times and with several partners during their lives. The males attempt to copulate with as many females as possible, encourage them to lay eggs in their territories and deny rivals access to their females. On the other hand, the females seek to lay as many eggs as possible with good paternal genes in optimal habitats. The behaviour exhibited by both sexes appears to maximise lifetime reproductive success. In this study, we investigated the mating and guarding behaviour of *Libellula quadrimaculata* in small bog ponds. We focused on repeated extrapair and especially intrapair copulations at a given site as well as non-contact guarding when there was little interference by rival males. It was noticed that females were pursued by their partner after egg laying and when attempting to leave the water. Either they mated again, or the male tried to steer his partner back to the water. Two to six additional matings between oviposition bouts occurred during each encounter. A total of 54 intrapair copulations with subsequent oviposition were recorded. Attempts by a male to guide his mate back to his territory and encourage her to continue laying eggs were successful in 33 cases, while in 64 cases the female escaped. Thus, repeated copulations and retrievals are tactics used by a male to maximise laying of eggs he has fertilised by the female with whom he last mated. The costs and benefits of this behaviour are discussed from the perspective of both males and females." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

23943. Willrich, G.; Bittencourt de Farias, F.; dos Anjos, L.; Lima, M.R. (2024): Reproductive biology of the threatened Kaempfer's tody-tyrant (*Hemitriccus kaempferi*). *Ornithology Research* 32: 296-309. (in English) ["Knowledge on the reproductive biology of neotropical bird species is still scarce. Many species lack basic information regarding descriptions of nests and eggs, incubation and nestling periods, and parental care. In the present study we explore several aspects of the reproductive biology of *Hemitriccus kaempferi*, an endemic and threatened species of the Atlantic Forest biome,

based on banded individuals monitored during two seasons (between August and December 2016 and 2017). Fieldwork was conducted in two forest areas in the municipality of Joinville, Santa Catarina state, southern Brazil. A total of 21 individuals were captured and banded. We conducted a total of 178 h 04 min of focal-animal monitoring and 142 h of active nest searching, and found two nests. The nests resemble those already described for the genus; they are enclosed, with a lateral entrance, ovoid, and with superior and lateral fixation. The females were solely responsible for all the reproductive activities, including nest construction, egg incubation, and parental care. Clutch size varied from 1 to 2 eggs, which are cream coloured and covered by small brown spots. The incubation period was 21–22 days and the nestlings fledged after 19 days. We also present information regarding parental care, juvenile behaviour, and diet, which include 11 arthropod orders with a prevalence of Lepidoptera and Coleoptera. This study adds valuable information on the ecology and natural history of this endemic and enigmatic species, and can guide further studies on phylogenetically related species." (Authors)] Address: Willrich, Guilherme, Postgraduate Program in Biological Sciences, Dept of Animal & Plant Biology, Univ. Estadual de Londrina, Londrina, CEP 86051-970, PR, Brazil

23944. Wilson, K.D.-P. (2024): Aeshnid name changes and range expansion of Green-eyed Hawker (*Isoaeschna isoceles*). *Agrion* 28(2): 32-34. (in English) ["A recent molecular genetic study (Schneider et al. 2023) has determined that the species is indeed distinct from both *Aeshna* and *Anaciaeschna* and a new genus *Isoaeschna* Schneider, Vierstraete, Kosterin, Ikemeyer, Hu, Snegovaya & Dumont, 2023 has been established to receive the species.": *Isoaeschna isoceles* (Müller, 1767). "Migration/dispersal of *I. isoceles*: Kosterin (2018) and Onishko & Kosterin (2021) reported observing very high numbers of young adult *I. isoceles* engaged in a mass roosting event on a hillside (ca. 495-536m a.s.l.) above the city of Gelendzhik at the Russian Black Sea coast. On the 26 May 2018 Oleg Kosterin found hundreds of individuals roosting in clusters on branches and bushes during the morning and midday (Fig. 2). ... Kosterin (pers. comm. 2024) cautions that since the swarms he found at the Caucasus were observed at an altitude of just ca. 500 m, at the crest of a coastal mountain range, the gathering event could represent a very short two-way vertical migration i.e. those individuals may have migrated uphill for foraging from the nearest coastal plain only to return later as adults for breeding... *I. isoceles* range expansion: Since the turn of the century *I. isoceles* has been extending its range northwards. In June 2008 it was recorded from southern Estonia for the first time (Martin 2009, 2013). Populations have also increased recently in the Netherlands and Denmark and in southern Sweden it has markedly extended its range [Link]. Just recently, in early June 2024, *I. isoceles* was reported and photographed by Veijo Silvennoinen from Porvoo, Finland for the first time." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

23945. Worthen, W.B.; Guevara-Mora, M. (2024): A comparison of odonate communities in primary and secondary cloud forest at Santa Elena Cloud Forest Reserve, Monteverde, Costa Rica. *Notulae odonologicae* 10(4): 129-140. (in English) ["We compared the adult odonate communities in primary and secondary cloud forest sites at the Santa Elena Preserve in Monteverde, Costa Rica, during seven weekly visits from April to June 2023. There were no significant differences between primary and secondary forest sites in mean odonate abundance/site, mean abundance of each species/site, ACE incidence-based estimated species richness,

or Chao estimated Shannon Diversity. Pairwise community similarity values were calculated among all sites and sites within forest types were no more similar than sites from different forests. Similarity was not correlated with horizontal or elevational distances between sites in partial correlations. Community composition did not vary between secondary and primary forest sites in NMDS and PERMANOVA analyses. The adult odonate communities in primary and secondary forests were nearly indistinguishable, suggesting a recovery of odonate communities in this abutting 30-year-old secondary forest." (Authors)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC, 29613, USA

23946. Yu, P.; Godoy-Diana, R.; Thiria, B.; Kolomenskiy, D.; Engels, T. (2024): Abstract: ZC03.00004: A numerical study of the aerodynamic performance of damaged dragonfly wings in forward flight. *Bulletin of the American Physical Society. 77th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 24–26, 2024; Salt Lake City, Utah. Session C09: Interact: Swimming and Flying at Moderate and High Reynolds Numbers. 10:50 AM, Sunday, November 26, 2024. Room: Ballroom C: [Verbatim: Dragonfly wings often suffer damage from predators or by wear over their lifespan. The damage is more likely to start from the wing tip and trailing edge, but damage patterns vary, resulting in diverse aerodynamic effects. We generate a series of damaged dragonfly wings according to the probability maps reported by Rajabi et al. [10.1242/bio.027078], and conduct computational fluid dynamics (CFD) simulations to compare the influence of wing area loss on aerodynamic performance in forward flight, as well as the flow field for analyzing the mechanisms of force changes. The simulations are made using our open-source code WABBIT, developed by Engels et al. [10.4208/cicp.OA-2020-0246]. We find that a large area lost on the forewing can lead to a decrease of horizontal force in the ipsilateral hindwing when the wings approach, due to reduced forewing-hindwing interaction. Meanwhile, the forces on the forewing keep the same as intact wing when the ipsilateral hindwing is damaged tremendously.]*

23947. Yu, X.; Jin, H. (2024): A new species of *Philosina* Ris, 1917 (Zygoptera) from China. *International Journal of Odonatology* 27: 227-231. (in English) ["A new species *Philosina nigromacula* Yu & Jin, 2024 is described from Sichuan, southwest China, with paratypes from Sichuan and Jiangxi, east China. The new species is generally similar to *Philosina buchi* Ris, 1917 but has a different abdominal color pattern. There is a strange sack-like structure on the end of the male genital ligula in *P. buchi* and *P. nigromacula*, which is described and discussed for the first time. The fragmented distribution of *Philosina* Ris, 1917 is also discussed as well as possible reasons for the origins of the genus. The need for protection of the small number of species contained within the unique genus *Philosina* is also emphasized." (Authors)] Address: Yu, X., College of Life Sciences, Chongqing Normal University, Chongqing, 401331, China. E-mail: lannysummer@163.com

23948. Yusuf, M.; Saputra, F.; Imawan, B. (2024): Biodiversity Index at The Lake I Nyoman Sukadana PT Kilang Pertamina Internasional RU VII Kasim. *Envibility: Journal of Environmental and Sustainability Studies* 2(1): 34-43. (in Indonesian, with English summary) [23 odonate species are listed an analyzed (biodiversity index (H'), evenness (E), richness index (R)). Among other, the list of taxa includes *Ischnura heterosticta* or *Orthetrum villosovittatum* from the PNG/Australian region.] Address: Yusuf, M.; Email: muhammad.yusuf@arjunawijaya.co