

# Odonatological Abstract Service

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## 2002

**22883.** Labandeira, C.C. (2002): Chapter 2. The history of associations between plants and animals. Herrera, C.M. & O. Pellmeyer (eds.): Plant-Animal interactions. An evolutionary approach. Blackwell: 26-74.,-248-261. (in English) [In fig. 2.19 examples of the fossil history of oviposition are documented: "(g) Oviposition scars of odonatan eggs, inserted as eccentric arcs (e.g. black arrow) on *Alnus* (Betulaceae), from the Middle Eocene (Lutetian) of Republic, Washington State (Lewis & Carroll 1991). (h) Oviposition scars on an unidentified leaf, similar to and approximately contemporaneous with those of (g), and presumably produced by an odonatan (Schaarschmidt 1992). The white arrow refers to an arcuate row of scars; this leaf is from the Middle Eocene (Lutetian) of Messel, Germany, (i) An angiosperm leaf (Juglandaceae) showing odonatan oviposition scars typical of the Coenagrionidae, from the Upper Miocene (Messinian) of Randecker Maar, Germany (Hellmund & Hellmund 1996). (j) Aleaf of the angiosperm *Carpinus grandis* (Betulaceae) exhibiting petiolar oviposition scars (arrows) typical of the odonatan family Lestidae, from the Middle Oligocene (Chattian) of Germany (Hellmund & Hellmund 1996). See Fig. 2.7 for scale-bar conventions." (Author)] Address: Labandeira, C., Dept of Paleobiology, Nat. Mus. of Natural History, Smithsonian Inst., Washington, DC 20560-0121 and Department of Entomology, University of Maryland, College Park, Maryland 20742 USA. E-mail: labandec@si.edu

## 2006

**22884.** Groenendijk, D.; Bouwman, J. (2006): Ecologische status van de Hoogveenglanslibel in Gelderland. Rapportnummer VS2006.033, Wageningen: 28 pp. (in Dutch) ["Introduction There are two populations of *Somatochlora arctica* in Gelderland. These are two of the five known populations of this endangered species in the Netherlands. The populations are located in the Wooldsche Veen and in the Tussenderveen in the Achterhoek. This project plan focuses on the protection of the raised bog dragonfly in the province of Gelderland and results from the work of the species protection plan for raised bog dragonfly (Ketelaar et al., 2005). This report reports on the ecological inventory planned for 2006. Ecology The bog dragonfly is a special species. It is one of the few dragonfly species in Europe about which relatively little is known. In this report, relatively extensive attention has been paid to ecology in Chapter 2. This information can also largely be found in the species protection plan.

The fieldwork in 2006 concentrated on the Wooldsche Veen and the Tussenderveen. The main goal was to locate the exact breeding locations in these reserves. Secondly, six other potentially suitable peat remains were searched for possible other populations in the province of Gelderland. The areas where historical observations of the raised bog dragonfly are known were also visited. Results: distribution and management The raised bog dragonfly has only been found in both known areas. The presence of the species could not be determined in the other areas. The population in the Tussenderveen is currently not threatened. Most importantly, breeding sites are monitored every three years. The core of the population in the Wooldsche Veen is located around the border with Germany. Management in the Wooldsche Veen must be aimed at combating desiccation and maintaining small peat pits with sufficient peat moss. Bottlenecks and measures The most important bottlenecks for *S. arctica* in Gelderland can be found in the Wooldsche Veen. Measures are planned in this area to combat dehydration. Once these measures are implemented, it is important to accompany these measures with knowledge of the ecology of the bog dragonfly. It is also recommended to remove small-scale storage of birch in the area. A concrete plan of action will be drawn up in consultation with the manager for both the Tussenderveen and the Wooldsche Veen." (Authors/google translate)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**22885.** Inoue, K.; Okazaki, M. (2006): Upright type emergence of *Macrodiplax cora*. *Gracile* 69: 19-26. (Japanese, with English summary) ["One of the present authors Okazaki stayed at Minami - daito jima (South Borodino Island) for several years to study dragonflies of this island, and discovered the fact that *Macrodiplax cora* (Brauer, 1867) emerges in upright type. We had an oral presentation on the first step information of this item on July 27, 2002 on occasion of the First SIOROEA (SIO Regional Office in East Asia) Symposium held in Korea, and on the advanced step information on June 1, 2003 on occasion of the 2003 Annual Meeting of the JSO (Japanese Society for Odonatology) held in Saga City. This is the first report with the detailed data. Photographs of emergence were taken by Okazaki on June 10, 11, 16, 17 and 19, 2000 and on June 6, 2002. Mr Fumihiko Yamada took photographs on April 30, 2001 in co-operation with Okazaki. The following data are the summary of these photographs. The results are listed in Table 1. The PA ranges between 0 and 120 degree with the mean value of 47.8- The RA ranges between 130 and 200 with the mean value

of 153.8. The BEA ranges between 110 and 140 with the mean value of 122.5. The TD ranges between 0 and 80cm with the mean value of 18.9cm. The exuvium with the PA of 120° was found on the leaf of an extruding plant, and might be moved by the wind. The Recess duration was 13 and 20 minutes in two cases, with the mean of 16.5 minutes. Emergence took place at night. The wing expansion started from the base, and then proceeded to the tips. This is the typical way always observed with the upright type emergence. From these features of emergence, it is revealed that *Macrodiplax cora* emerges basically in upright type, though the fact that the RA is bigger is very unique, and that emergence takes place at night is hanging type like. It should be emphasized that this species can emerge even on water surface if there is some substrate. This feature is common with some species in Gomphidae and Coenagrionidae, but never in Libellulidae and all hanging type emerging groups. *Macrodiplax cora* is widely distributed on the islands in the Pacific and Indian Ocean, and very light wings and body of this libellulid species enable to soar long distance over the ocean. When they land on the shore where some newly formed ponds exist, they can settle even if there is no substrates to support their hanging type emergence. So long as our knowledge prevails, every family in Odonata belongs to either of the two types of emergence except for Petaluridae in which *Petalula gigantea* is said to belong to hanging type. But now it is made clear that *Macrodiplax cora* alone emerges in upright type in Libellulidae which emerges in hanging type, then we have to consider to treat this species in Macrodiplactidae as stated in Fraser, 1957." (Authors) Author deceased

## 2007

**22886.** Bößneck, U.; Weipert, J. (2007): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil XII: Flora und Fauna des GLB „Dreienbrunnen“ und dessen unmittelbarer Umgebung. Veröffentlichungen des Naturkundemuseums Erfurt 26: 137-166. (in German) ["The nature reserves of the urban area of Erfurt (Thuringia), part XII: Flora and fauna of the reserve „Dreienbrunnen“ and his surrounded areas The paper presents the results of floristic and faunistic surveys from 2003 within the reserve „Dreienbrunnen“ of the state capital Erfurt. At all 499 species of animals and 157 plant species were recorded. Among them, 39 taxa are recorded as endangered on the Red Lists of Thuringia. ...." (Authors) The list includes 14 odonate species.] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Stauffenbergallee 18, D-99085 Erfurt, Germany. E-mail: ulrich.boessneck@erfurt.de

**22887.** Bouwman, J.; Groenendijk, D. (2007): [A dragonfly with sole rights to peat bog pools: the life of a peat bog specialist.] *Libelle met alleenrecht op veenputjes: Het leven van een hoogveenspecialist.* *Natura* (Utrecht) 104(4): 112-113. (in Dutch) ["In 2005, the Species Protection Plan for the raised bog dragonfly was published (KETELAAR et al, 2005). Thanks to the publication of this plan, extra attention has been paid to this special species in recent years. This article examines the lifestyle and habitat of a species that occurs precisely in places where most other dragonflies drop out, namely raised bogs." (Authors/google translate)] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**22888.** Cotrel, N.; Rouillier, P. (2007): Bilans de 15 années d'inventaire des Odonates en Deux-Sèvres. *Nature entre Deux-Sèvres* 1: 44-55. (in French) ["Since the 1990s, the

period of publication of the first specific naturalist guides, around fifty naturalists from Deux-Sèvres and elsewhere have launched an ambitious project: updating Gelin's catalog of 1908. Thus, nearly 7,000 observations, covering 1,141 inventories between 1992 and 2006 made it possible to carry out the first collective inventory, and the largest, on the Odonates of Deux-Sèvres. The new species described over this period bring the number of dragonflies and damselflies known in the department to 58. This work paves the way for better preservation of this order." (Author/google translate)] Address: <https://www.dsne.org/wp-content/uploads/2021/01/15ansODO.pdf>

## 2008

**22889.** Lin, Yanhan; Xie, Qing; Shi, Binghong; Weng, Guolan (2008): Predatory strategy of Odonata larvae. The 49th scientific exhibition for elementary schools and high schools: 29 pp. (in Chinese) ["The main purpose of this experiment is to explore the conditions under which *Anax guttatus* attacks and the predatory strategies adopted when facing prey from the perspective of behavioral ecology. The results of this experiment found that *A. guttatus* attack is negatively correlated with the size and distance of the prey. The range of attacks is mostly within the reach of the labium, supporting the fact that the *A. guttatus* is a sit and waiting predator. Larvae will make choices when faced with prey of different sizes. Because extremely small or very large prey are difficult to hunt, and hunting large prey consumes more time and cost, so dragonflies will take risks (failure, injury, time cost) in hunting. and gain (energy). When dragonflies face environments with different prey densities, different strategies such as active, conservative, and passive will appear depending on the size of Odonata. Based on the above experimental results, it can be concluded that *A. guttatus* can make the most appropriate trade off in its predatory behavior, choosing to obtain the highest energy with the lowest risk and cost, and is one of the best predators in the ecology." (Authors/Google translate)] Address: <https://www.ntsec.edu.tw/article/FileAtt.aspx?id=5248>

**22890.** Rust, C. (2008): Aktuelles aus dem Elsass. Ein Vergleich der Libellenfunde links und rechts des Oberrheins. *Mercuriale* 8: 5-16. (in German, with French summary) ["This article compares the level of knowledge about dragonflies between Alsace and Baden-Württemberg (Upper Rhine Plain and Black Forest) and presents the first distribution maps of selected dragonfly species. In order to improve the poor level of knowledge about the insect fauna and the exchange between insect experts in Alsace, the IMAGO association was founded in 2004. In order to revise the red lists and create the first distribution maps, we would be grateful for as many reports of finds on the Alsatian insect fauna as possible. Therefore, a call for participation is made and ideas for excursions to Alsace are suggested." (Author/google translate)] Address: Rust, C., 44, rue de Zillisheim, 68350 Didenheim, France. E-mail: chrigrust@yahoo.de

## 2009

**22891.** Barbarin, J.-P.; Teynié, A. (2009): Inventaires naturalistes des rivières de la Sarthe, de l'Huisne et du Loir, Département de la Sarthe (72). Étude réalisée par la Société d'Histoire naturelle Alcide-d'Orbigny, Rapport rendu en Décembre 2009. Etude commandée par L'association de sauvegarde des Moulins et Rivières de la Sarthe, Le vieux Moulin, 72190 Neuville sur Sarthe, France: 31 pp. (in French) [Verbatim/Google translate: "Summary of observations: On the

Sarthe River, all sites combined, we encountered 18 species. The greatest diversity was encountered upstream of Moulin de Val, in the Mancelles Alps where all 18 species are present. At the Moulin de Chadennière, 8 species are present. Out of all the species, four of them have a strong heritage value. These are *Gomphus vulgatissimus*, *Oxygastra curtisii*, *Libellula fulva*, *Boyeria irene* and *Cordulegaster boltonii*. All these species are the subject of a detailed sheet below. Only *Cordulegaster boltonii* is not presented in detail because it is a species well represented on French territory and whose ecology means that it cannot really be linked to the problem of dams since it is present in many different biotopes, from small streams to rivers up to 8 m wide. The other species are widely distributed in rivers, the two most common being the *Calopteryx* which can be found in very large numbers on a river. Concerning the Dormouse, 9 species were noted on the river itself and three additional species were observed on the nearby limestone hillsides. Among these *Coenagrion scitulum*, species on the regional Red List. It is not presented in the following sheets because we cannot link it, given its ecology, with certainty with the river." The following taxa are treated in detail: *Boyeria irene*, *Gomphus vulgatissimus*, *Oxygastra curtisii* and *Libellula fulva*.] Address: <https://side.developpement-durable.gouv.fr/PAE/doc/SYRACUSE/349116>

**22892.** Groenendijk, D. (2009): SBP hoogveenglanslibel: Uitvoering en coördinatie 2009. Rapport VS2010.019, De Vlinderstichting, Wageningen: 14 pp. (in Dutch) [*Somatochlora arctica*, The Netherlands: <https://assets.vlinderstichting.nl/docs/a2a0ef65-ea8a-401d-9e96-d08736a65ccb.pdf>] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**22893.** Zessin, W.; Hippke, M. (2009): Ordnung: Odonata (Libellen). Sonderheft der Mitteilungen der Naturforschenden Gesellschaft Mecklenburg zur Fauna und Flora des Schlossparkes Ludwigslust, Ludwigslust: 208-211. (in German) [Mecklenburg-Vorpommern, Germany "27 species were counted in the "Schlosspark Ludwigslust" landscape protection area. Some are included in the Red List of dragonflies from Mecklenburg-Western Pomerania (RL): *Anax imperator* (RL 3), *Leucorrhinia dubia* (RL 2), *Leucorrhinia rubicunda* (RL 3). The species *Calopteryx splendens*, *Lesites viridis*, *Sympetma fusca* and *Sympetrum pedemontanum* belong to RL 4 (advance warning list)."] (Authors/-Google translate)] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

## 2010

**22894.** Hallmann, E.; Vanderkerkhove, K.; Namiotko, L.; Namiotko, T. (2010): Wybiórcze oddziaływanie drapieżnych owadów (Odonata-Anisoptera i Hemiptera) na drobne skorupiaki (Ostracoda) zbiorników okresowych. Benthic fauna of Polish national parks. ISBN 978-83-62298-09-9: 89- (in Polish, with English summary) [Verbatim/google translate: "The aim of the study was to analyze the selective predation of *Anax imperator* and adult *Plebejus minutissima* (Hemiptera: Heteroptera) larvae on the body size of females of *Heterocypris incongruens* (HI), a geographically parthenogenetic species of ostracod (Ostracoda: Cyprididae) inhabiting periodically drying reservoirs. water. The body size of HI (expressed as the length and height of carapace shells) in the control sample (n=125) without the presence of predators was compared with the size of individuals that survived after 9 days of the experiment in various experimental variants:

prey-predators (n=31-130). among others in the presence of 4 adult marshmallows and 1 dragonfly larva. HI that survived in the presence of dragonflies were significantly (Kruskal-Wallis and Dunn tests: p<0.05) higher (on average by 7.7%) than those that survived in the presence of dragonflies. The result indicates that *A. imperator* larvae preferentially hunt larger HI individuals, while *P. minutissima* preferentially hunt smaller HI individuals. The selectivity of predators towards the body of prey may be related to a species-specific compromise between the ease of detection and the ease of catching and eating the prey. *A. imperator* larvae preyed mainly on larger HI because such prey are easier to observe and still easy to capture. The much smaller marshmallows, which cannot easily capture and hold large HIs and which rely heavily on mechanoreceptors to detect prey, preyed primarily on smaller HIs. Such selective pressure from predators may help maintain average body size in their prey." (Authors)] Address: Hallmann, Ewelina, Studenckie Kolo Naukowe Hydrobiologii i Ochrony Wód Uniwersytetu Gdańskiego, c/o Katedra Genetyki, Pracownia Limnozoologii, ul. Kladki 24, 80-822 Gdańsk, Poland. E-mail: biohost@wp.pl

## 2011

**22895.** Betard, F. (2011): Potentialités écologiques des carrières de quartzite après exploitation: l'exemple de la carrière de Cheffois (Vendée, France). *Physio-Géo* 5: <http://physio-geo.revues.org/1667>; DOI: 10.4000/physio-geo.1667: 21 pp. (in French, with English summary) ["In abandoned quarries of massive rocks, the aridity and oligotrophic character of soils, combined with the presence of rock walls and water bodies in the deeper excavations, are favourable to the expression of a renewed, original biodiversity. An ecological survey carried out on the quartzite quarry of Cheffois, located in the southern Armorican Massif, revealed the biological richness of this type of seminatural environment. The results of our inventory have led to distinguish six types of neoformed habitats in old segments of the quarry: (1) a large water pit, (2) a wet tile zone, (3) a dry tile zone, (4) quarry faces with changing microclimatic conditions, (5) waste embankments, and (6) an underground cavity. These different sectors of the quarry are themselves divided into a mosaic of small habitats, promoting high biodiversity with the development of many plant and animal species, including some with high conservation value. Replaced into the geographic context of the Vendean "Bas-Bocage", the ecological contribution of the quartzite quarry is evaluated and tested against with losses in biodiversity caused by the opening of the extractive site. With other quartzite quarries located nearby, they together form a network of partially flooded quarries that could contribute to the creation of an ecological corridor, into a landscape matrix currently marked by losing biodiversity." (Author) A few odonate species are mentioned including *Oxygastra curtisii*.] Address: Betard, F., Université Paris-Diderot Sorbonne Paris Cité, Laboratoire PRODIG, UMR 8586 CNRS, 75205 Paris, France. Email: francois.betard@univ-paris-diderot.fr

**22896.** Hannigan, E.; Mangan, R.; Kelly-Quinn, M. (2011): Evaluation of the success of mountain blanket bog pool restoration in terms of aquatic macroinvertebrates. *Biology and Environment: Proceedings of the Royal Irish Academy* 111B: 95-105. (in English) ["Peatlands in Ireland have been subject to peat extraction and drainage for many years, with detrimental effects on the flora and fauna of the ecosystem, blanket bog has been listed for protection under Annex 1 of the EU habitats directive, making the conservation of intact bogs as well as the restoration of degraded sites a priority.

In order to assess how effective a restoration measure this has been it is important to look at the biodiversity within the site. This study compared the macroinvertebrate and microcrustacean communities in open-water habitats of an intact and a restored mountain blanket bog in County Wicklow over a number of seasons. It also examined the hydrochemistry of both treatments. Hydrochemically there was no difference between the restored and intact pools. Neither was there any significant difference between the two in terms of taxon richness, abundance, community composition or structure. Season was found to significantly affect the structure of the invertebrate communities in both areas. It is not known how long it takes a peatland to return to its natural state. However, we can conclude that the restoration measures implemented fifteen years ago have provided an aquatic habitat similar to that of the intact site. ... A total of 28 taxa were found across both site types and methods. Twenty-four taxa were found in the restored pools compared to 21 in the controls. The community was dominated by Diptera (63%–67%) in both sets of pools ... Other groups were recorded in smaller numbers including Ephemeroptera (16% —21 %), Trichoptera (9%-14%), Odonata (1%-4%), Coleoptera (0.8%-0.9%) and Hemiptera (0.3%) in both sets of pools." (Authors) *Enallagma cyathigerum*, *Coenagrion puella/pulchellum*, *Aeshna juncea*, *Sympetrum danae*] Address: Hannigan, Edel, Freshwater Biodiversity, Ecology & Fisheries Research Group, School of Biology & Environmental Sciences, Science Centre West, Univ.College Dublin, Belfield, Dublin 4, Ireland. Email: mail: edel.hannigan@hotmail.com

**22897.** Jakob, C. (2011): Résultats du suivi écologique en parallèle à des opérations de démoustication au BTI sur le périmètre du Parc Naturel Régional de Camargue. Partie odonates. Parc naturel régional de Camargue. Rapport final 2007 à 2011: 18 pp. (in French) ["Conclusion an outlook: The study demonstrated a negative, significant and increasing impact of BTI on the species richness and cumulative abundance of Odonates. This result is all the more important as currently, few studies are available on the long-term monitoring of the effects of BTI on non-target Odonates in a deltaic context. If the experimental treatment continues in 2012, continuation of monitoring, as carried out in 2011, is proposed in the 7 sampling areas of the 6 sites, during the 3 seasons of Odonata activity. Beyond that, it would be interesting to add several transects and/or emergence traps in different permanent stagnant and low-current environments of each monitored site, such as the edges of shaded canals (habitat for species such as *Calopteryx* sp.; *Oxygastra curtisii*), or edges of reed beds and permanent bodies of water in order to broaden knowledge of the indirect impact of BTI. This is particularly worth monitoring, because it is possible that a change in the composition and abundance of prey populations could have an impact on larval development, or even the emergence of adults. This work is of particular interest to the PNAO. Chosen for their optimal cost/benefit ratio, the methods used nevertheless take a very long time to implement. Exploring additional habitats will require spending more time. Different possibilities for the field phase could then be developed, for example by taking into account more years/study areas. Monitoring the phenology of certain species could also help to determine possible repercussions of the experimental treatment with BTI at the larval scale (autochthony)."] (Author/Google translate) [https://libellules.pnaopie.fr/wp-content/uploads/2023/06/Rapport-final-demoustic-Odonates-20111104\\_C.Jakob\\_.pdf](https://libellules.pnaopie.fr/wp-content/uploads/2023/06/Rapport-final-demoustic-Odonates-20111104_C.Jakob_.pdf) Address: Jakob, Christiane, Tour du Valat, Le Sambuc, 13200 Arles, France. Email: christianejakob@oranae.fr

**22898.** Kruger, A. (2011): Tadpole behavioral response to visual and chemical cues of larval dragonfly predator, *Anax* spp. CIEE - Fall, 2011 - Monteverde, Costa Rica: 163-173. (in English, with Spanish summary) ["The ability of a prey species to respond quickly and efficiently to predator presence influences the prey species' survival. Predators of anuran larvae are known to elicit behavioral changes in their prey. This study examined the behavioral response of two anuran larvae, *Chaunus marinus* and *Rana forreri*, to visual and chemical cues of a known predatory larval *Anax* spp. Previous studies have shown that tadpoles aggregate and decrease their level of movement in response to predator presence. Each tadpole species was exposed to *Anax* spp. visual cues, chemical cues, and a combination of visual and chemical cues. Tadpole level of activity and spatial distribution were measured at various time points throughout exposure. The study also examined tadpole behavioral response to different numbers of predators in treatments of one hour. Neither anuran larvae species showed a pattern of clumping or decreased level of movement in response to *Anax* spp. presence in any of the three treatments. These results differ from those found with tadpoles and their predators in temperate zones. The lack of response of *C. marinus* and *R. forreri* to *Anax* spp. visual and chemical cues suggests that these species use different mechanisms to assess risk associated with predator presence and that the predator-prey relationship between tadpole species and *Anax* spp. in the tropics is different than that of the temperate zones."] (Author)] Address: Kruger, A., Department of Biology, Northeastern University, Boston, USA.

**22899.** Torralba-Burrial, A. (2011): Les Ilibélules d'Asturies. Cartafueyos Asturianos de Ciencia y Teunoloxía. Ciencias 1/2011: 54-79. (in Spanish) [<https://core.ac.uk/download/pdf/71852673.pdf>] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

## 2012

**22900.** David, S.; Jansky, V (2012): Revize sbírky vážek (Odonata) M. Trpiše deponované v Prírodovedném muzeu Slovenského národného múzea v Bratislave (predbežné sdelení). *Zoológia* 2012, 18. Feriancove dni: 44-46. (in Slovakian, with English summary) ["The Trpis's odonatological collection of the Slovak National Museum is one of the oldest and biggest in Slovakia. After the revision part of the collection, 906 dragonfly specimens from 39 species that originate from Slovakia were found in tins collection. Odonata has preserved in 75 % ethanol in test tubes. There are 467 items (tubes), which contain 2 to 4 specimens usually. We have found out 106 items incorrectly determined, ... e.g. *Nehalennia speciosa*, *Coenagrion armatum*, *C. ornatum*, *Aeshna caerulea*."] (Authors)] Address: Jánsky, V., Slovenské národné múzeum - Prírodovedné múzeum, Vajanského nábr. 2, 810 06 Bratislava, Slovakia. Email: entomo@snm.sk

## 2013

**22901.** Wiederman, S.D.; O'Carroll, D.C. (2013): Selective attention in an insect visual neuron. *Current Biology* 23(2): 156-161. (in English) ["Animals need attention to focus on one target amid alternative distracters. Dragonflies, for example, capture flies in swarms comprising prey and conspecifics [1], a feat that requires neurons to select one moving target from competing alternatives. Diverse evidence, from functional imaging and physiology to psychophysics, high-

lights the importance of such "competitive selection" in attention for vertebrates [2,3,4,5]. Analogous mechanisms have been proposed in artificial intelligence [6] and even in invertebrates [7,8,9], yet direct neural correlates of attention are scarce from all animal groups [10]. Here, we demonstrate responses from an identified dragonfly visual neuron [11,12] that perfectly match a model for competitive selection within limits of neuronal variability ( $r^2 = 0.83$ ). Responses to individual targets moving at different locations within the receptive field differ in both magnitude and time course. However, responses to two simultaneous targets exclusively track those for one target alone rather than any combination of the pair. Irrespective of target size, contrast, or separation, this neuron selects one target from the pair and perfectly preserves the response, regardless of whether the "winner" is the stronger stimulus if presented alone. This neuron is amenable to electrophysiological recordings, providing neuroscientists with a new model system for studying selective attention." (Authors)] Address: O'Carroll, D.C., Adelaide Centre for Neuroscience Research, School of Medical Sciences, The University of Adelaide, Adelaide, SA 5005, Australia. E-mail: david.ocarroll@adelaide.edu.au

#### 2014

**22902.** Kiauta, B. (2014): Paberki about the dragonflies of Ljubljana. *Trodotiv: Bilten slovenskih terenskih biologov in ljubiteljev narave* 3(2): 16-18. (in Slovene) [In the period 1763-2014, 49 species of dragonflies were recorded on the territory of today's municipality of Ljubljana. The first of these - *Libellula quadrimaculata* - was already reported "from the ditches around Ljubljana" by I. A. Scopoli (1763), and the last species found so far - *Ophiogomphus cecilia* - was found in 2010 by A. Šalamun and M. Kotarac on the Ljubljana near Vevce.] Author deceased

**22903.** Vinko, D.; Bedjanic, M. (2014): Določevalni ključ: Kraljestvo modrih raznokrilih kačjih pastirjev Slovenije [Determining key: The kingdom of the blue winged dragonflies of Slovenia]. *Trodotiv: Bilten slovenskih terenskih biologov in ljubiteljev narave* 3(2): 31-37. (in Slovene) [In Slovenia, seven libellulid species are occurring. They all are introduced, providing information on morphology, habitat, phenology, and distribution maps.] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, SLOVENIA. Email: damjan.vinko@gmail.com

#### 2015

**22904.** Ott, J. (2015): POLLICHIA machte beim GEO-Tag der Artenvielfalt im Umweltbildungszentrum „Libellula“ im Karst bei Trippstadt/Pfalz mit. *Pollichia-Kurier* 31(3): 13-15. (in German) [Rheinland-Pfalz, Germany, 13-06-2015, inventarisation of the local fauna, including the record of *Cordulegaster boltonii*.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

#### 2016

**22905.** Salem, M.; Stimson, D.; Winter, J.; Wong, E. (2016): Familiar versus cryptic substrate preference of Odonata Anisoptera nymphs in Douglas Lake. University of Michigan, Biological Station EEB 381: *General Ecology* June 16, 2016, Professor Joel T. Iken: 22 pp. (in English) ["Organisms that are subject to predation must evolve strategies to avoid predators or face extinction. Those that lack the physiology to escape at high speeds or employ physical defenses must

rely on methods such as burrowing or the use of camouflage. Dragonfly nymphs, unlike their brightly-colored adult counterparts, are dully colored and must attempt to blend in with the aquatic substrate which they inhabit. Because they display cryptic coloration, dragonfly nymphs show certain preferences and aversions to different substrate types based on where they were reared and where their ability to avoid predators is greatest. This study aimed to determine the relative contributions of crypsis and habituation in nymph substrate preference. We found that familiarity played an equal, if not greater, role than crypsis in Odonate nymph substrate choice. Further studies are required to refine this understanding of cryptic and habitual behavior." (Authors)] Address: <https://deepblue.lib.umich.edu/handle/2027.42/134727>

**22906.** Weber, F.R.; Trockur, B. (2016): Wiederfund von *Ceragrion tenellum* in Rheinland-Pfalz (Odonata: Coenagrionidae). *Pollichia-Kurier* 1/2016: 18-21. (in German) ["On July 18, 2015, the first author discovered a single male *Ceragrion tenellum* at Siebenbornweiher in the Hunsrück (Rhineland-Palatinate, Germany). This is only the second record for Rhineland-Palatinate after 1980. The body of water is an artificially created rafting pond with two tributaries, the Siebenborn and Winkelbach. The nearest known occurrences are in North Rhine-Westphalia and Baden-Württemberg." (Authors)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: BerndTrockur@gmx.de

#### 2017

**22907.** Varshney, P.K. (2017): *Bibliographia Odonata Indica*. A regional bibliography of the damsel- and dragonflies of India. *Bionotes* 19(3): 106-112. (in English) [Odonatological bibliography of VII. Southern India (Karnataka, Kerala, Tamil Nadu, Puducherry); VIII. Islands (Andaman Is., Nicobar Is., Lakshadweep Is., Minicoy Is., Maldives); IX. Works of wider coverage (World; AU India; More than a region; Reviews; Museum collns.; etc.); X. Neighbouring countries (Bangladesh; Bhutan; Myanmar; Nepal; Pakistan including "Pakistan occupied Kashmir"; Sri Lanka)] Address: Varshney, P.K., National Bureau of Fish Genetic Resources, (ICAR), Lucknow, Uttar Pradesh, India. E-mail: pkvarshney1@gmail.com

**22908.** Varshney, P.K. (2017): *Bibliographia Odonata Indica*. A regional bibliography of the damsel- and dragonflies of India. *Bionotes* 19(1): 10-16. (in English) ["This bibliography covers publications from the year 1758 to 2016. I am aware that this bibliography is not exhaustive. If any correction and additions are brought to my notice, they will be incorporated next time. I will also welcome additions if published by others. The regions classified in this bibliography are neither strictly political state-wise, nor physical terrain-wise, but a broad division based on adjacent geographical entity. I hope that readers can easily find the region/locality of their interest. The sequence is as follows: I. Western Himalaya (Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Shiwaliks). II. Northern India (Punjab, Chandigarh, Haryana, Delhi, Uttar Pradesh). III. Eastern India (Bihar, Jharkhand, Odisha, West Bengal except Darjeeling, Sunderban). IV. North-eastern India and eastern Himalaya (Sikkim, Darjeeling, Arunachal Pradesh, Assam, Nagaland, Mizoram, Meghalaya, Manipur, Tripura). V. Western India (Rajasthan, Thar Desert, Gujarat, Maharashtra except Vidarbha, Goa). VI. Central India (Madhya Pradesh, Vidarbha, Chhattisgarh, Telangana, Andhra Pradesh). VII. Southern India (Karnataka, Kerala, Tamil Nadu, Puducherry). VIII. Islands: (Andaman Is., Nicobar Is. Lakshadweep Is., Minicoy Is.). IX. Works of

wider coverage (World; All India; More than a Region; Reviews; Musea Colin, etc). X. Neighbouring countries (Bangladesh; Bhutan; Myanmar, Nepal; Pakistan including Kashmir; Sri Lanka.) Address: Varshney, P.K., National Bureau of Fish Genetic Resources, (ICAR), Lucknow, Uttar Pradesh, India. E-mail: pkvarshney1@gmail.com

**22909.** Varshney, P.K. (2017): Bibliographia Odonata Indica. A regional bibliography of the damselfly and dragonflies of India. Bionotes 19(2): 47-51. (in English) [The following regions are treated: IV. North eastern India and eastern India (Sikkim, Darjeeling, Arunachal Pradesh, Assam, Nagaland, Mizoram, Meghalaya, Manipur, Tripura); V.: Western India (Rajasthan, Thar desert, Gujarat, Maharashtra except Vidarbha, Goa); VI: Central India (Madhya Pradesh, Vidarbha, Chhattisgarh, Telangana, Andhra Pradesh)] Address: Varshney, P.K., National Bureau of Fish Genetic Resources, (ICAR), Lucknow, Uttar Pradesh, India. E-mail: pkvarshney1@gmail.com

## 2018

**22910.** Louboutin, B.; Jaulin, S.; Houard, X. (2018): Étude des populations d'Agrion de Mercure et de la gestion de ses habitats rhodaniens sur le secteur de Donzère (26) et Vivers (07). Troisième année d'étude et synthèse. Opie. Rapport d'étude pour la Compagnie nationale du Rhône: 52 pp. (in French) Coenagrion mercuriale ["This study, which was carried out over three consecutive years, enabled us to distinguish the real breeding areas and areas of stable abundance from less favourable or even unfavourable sites. Compared with the first year of monitoring, when we found evidence of breeding in almost half of the stretch of river monitored, this second and third year have shown that the stretches that can be considered to be in a good state of conservation and with high numbers of fish each year are fairly localised. The favourable and unfavourable ecological factors already defined and described in 2015 and 2016 are confirmed and correspond to what is described in the literature on the species. As far as potential aquatic plants for egg-laying are concerned, the well-known *Berula erecta* is regularly used, but we were able to see quite significant differences from one sector to another. *Callitriche*, for example, is potentially one of the main supports used by the species on the île des îles, while *Sparganium cf. erectum* is also used locally on the Contre-Canal. More surprisingly, *Ludwigia peploides* also appears to be used here as a support for egg-laying by several species of Coenagrionidae, including *C. mercuriale*. This invasive species largely dominates vast stretches and is often the only egg-laying medium available. It may be reassuring to note that *C. mercuriale*, like other companion species, is maintaining itself and reproducing in the invaded sectors. However, this species competes strongly with native aquatic plants, making habitats more uniform and clogging them up. With regard to the state of conservation of the five river annexes monitored, we can emphasise that the Perriers cone and the Pierrelatte canal appear to be generally degraded. Populations of *C. mercuriale* still exist locally, but in smaller numbers or with greater fluctuations than in other, better-preserved sectors. Organic pollution, with the development of duckweed and filamentous algae, siltation, poor runoff and overgrowth in these areas are threatening the survival of the populations. It would seem important to implement management measures to improve water quality and habitats in at least some parts of these areas. In addition, the sectors confirmed as being the most favourable should be conserved and preserved

from any pollution or heavy intervention. A back channel at Donzère is cited as one of the most remarkable breeding sites for *C. mercuriale* in the region (Faton in Deliry 2008). The management recommendations defined previously therefore remain valid: - combat pollution, eutrophication and silting up; - control overgrowth of habitats (maintain sunlight); - maintain or increase a strip of grass at least 10 metres high (buffer zone with crops and travel corridor); - moderate cleaning and mowing in the event of advanced silting up, to be carried out in rotation in successive sections over several years and to a limited depth; - avoid mechanical intervention on the vegetation (e.g., using brushcutters) during the main period of emergence of *C. mercuriale* and many other Odonates (early May to late July). It appears that the sectors currently most favourable for *C. mercuriale* are among the most diverse in terms of dragonfly species. Management geared towards maintaining these habitats should therefore benefit a wide range of species. In this way, we can speak of an 'umbrella species'. It is also important to highlight the presence of other odonates that are not protected but which are of major conservation concern at regional and national level: *Sympetrum depressiusculum* and *S. pedemontanum*, whose populations and breeding habitats have yet to be identified in the study area. It will also be necessary to consider the other ecological challenges of the river's tributaries, so as not to focus solely on *C. mercuriale* along the entire length of the river. For example, certain natural riparian woodlands and dense reedbeds, even if they cause harmful shading for many odonates, may be worth preserving locally for other insects, beavers or specialised avifauna." (translated using DeepL)] Address: Opie, BP n°30, 78041 Guyancourt cedex, France. Email: xavier.houard@insectes.org; [https://libellules.pnaopie.fr/wp-content/uploads/2023/06/2017\\_opie\\_c-mercuriale-suivi.pdf](https://libellules.pnaopie.fr/wp-content/uploads/2023/06/2017_opie_c-mercuriale-suivi.pdf)

**22911.** Wilson, K.D.P. (2018): New records of *Camacinia harterti* Karsch, 1890 and a review of old records. Agrion 22(2): 64-71. (in English) ["The early pre-1910 records of *C. harterti* are reviewed and both Sikkim, India and northern Vietnam are added to the historic range of this rare libellulid, known from the Oriental region. Details of four new recent records of *C. harterti* from Brunei, China (Guangdong & Yunnan) and many new records from northern Vietnam have confirmed its presence in Vietnam and, added considerably to the known range of this rare and hitherto poorly known species. Details of these records are provided and the male figured and redescribed. Its IUCN Data Deficient Red List status is briefly reviewed and it is recommended that its current status should be revised to Vulnerable] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

## 2019

**22912.** Hu, C.; Kong, S.; Wang, R.; Zhang, F. (2019): Radar measurements of morphological parameters and species identification analysis of migratory insects. Remote Sensing 2019, 11(17), 1977: 19 pp. (in English) ["Migratory insect identification has been concerning entomology and pest managers for a long time. Their nocturnal behavior, as well as very small radar cross-section (RCS), makes individual detection challenging for any radar network. Typical entomological radars work at the X-band (9.4 GHz) with a vertical pencil beam. The measured RCS can be used to estimate insect mass and wingbeat frequency, and then migratory insects can be categorized into broad taxon classes using the estimated parameters. However, current entomological radars cannot achieve species identification

with any higher precision or confidence. The limited frequency range of current insect radars have precluded the acquisition of more information useful for the identification of individual insects. In this paper, we report an improved measurement method of insect mass and body length using a radar with many more measurement frequencies than current entomological radars. The insect mass and body length can be extracted from the multi-frequency RCSs with uncertainties of 16.31% and 10.74%, respectively. The estimation of the thorax width and aspect ratio can also be achieved with uncertainties of 13.37% and 7.99%, respectively. Furthermore, by analyzing the statistical data of 5532 insects representing 23 species in East China, we found that the correct identification probabilities exceed 0.5 for all of the 23 species and are higher than 0.8 for 15 of the 23 species under the achievable measurement precision of the proposed technique. These findings provide promising improvements of individual parameter measurement for entomological radars and imply a possibility of species identification with higher precision." (Authors) Data were obtained from *Pantala flavescens* and *Enallagma cyathigerum*.] Address: Hu, C, Radar Research Lab, School of Information & Electronics, Beijing Insti. of Technology, Beijing 100081, China

## 2020

**22913.** Jose, J.; Chandran, V.A (2020): Introduction to Odonata. With Identification Keys for Dragonflies & Damselflies Found in Kerala. Version 2.0. Published by Society for Odonate Studies: 386 pp. (in English) [[https://www.researchgate.net/publication/351903315\\_Introduction\\_to\\_Odonata\\_With\\_Identification\\_Keys\\_for\\_Dragonflies\\_Damselflies\\_Found\\_in\\_Kerala](https://www.researchgate.net/publication/351903315_Introduction_to_Odonata_With_Identification_Keys_for_Dragonflies_Damselflies_Found_in_Kerala)] Address: Society for Odonate Studies, Reg. No: KTM/TC/8/2019, Kuzhimattom PO, Kottayam, Kerala – 686533, India. Email: [info@odonatesociety.org](mailto:info@odonatesociety.org). Website: [www.odonatesociety.org](http://www.odonatesociety.org)

**22914.** Kano, K. (2020): Memory of dragonflies. Bunkado Printing Co., Ltd.: 307 pp. [Publisher: "The book is a collection of ecological photographs (with commentary) of dragonflies (164 species) taken by the author over a period of about 40 years. Many species depend on their unique environment. While many species are dependent on their unique environment, an increasing number are threatened with extinction due to environmental degradation. This collection also includes photographs taken in environments where the dragonflies can no longer be seen. Many of the photographs are carefully selected and you will be amazed at the cuts that capture unusual ecological behaviour. The book is a collection of carefully selected photographs, and you will be amazed at the cuts that capture rare ecological behaviour. The list of works (author's reports) at the end of the book, the list of books with photographs provided by the author in the past, the Iriomote Island and Amami The book can also be regarded as an important source of information on dragonflies." (Translated with DeepL) ISBN: 978-4901208475

**22915.** Sellier, Y.; Puech, L.; Lelarge, K. (2020): Évaluation de l'état de conservation des populations de leucorrhines au sein du site Natura 2000 des Landes du Pinail. Programme d'étude PoitouCharentes Nature. Édité par GEREPI. Vouneuil-sur-Vienne, France: 17 pp. (in French, with English summary) ["The Pinail Special Area of Conservation is a site of 925 ha dominated by a mosaic of moors and wetlands, half wooded, constituting one of the last bastions for various populations of rare and protected species. A scientist monitoring the populations of *Leucorrhinia caudalis* and *L. pectoralis*, two endangered species of odonates, was

undertaken in order to assess their conservation status on the one hand, and to improve knowledge of their ecology on the other, according to a common protocol deployed on the 5 sites of presence in Poitou-Charentes. The population of *L. caudalis* du Pinail would have an inadequate conservation status in view of its low occurrence at the site, in contrast to *L. pectoralis*, which has a larger population size and distribution giving it a status considered favorable. However, the state of knowledge remains insufficient to evaluate precisely this state of conservation, even if environmental variables identified could favour the definition of the expression potential of these populations. As it stands, a degradation of the conditions favorable to leucorrhines has been observed with the closure of the environment induced by a lack of management of the ponds included in healths but especially in undergrowth. With a strong conservation responsibility for these protected species, conservation measures could be developed at the Pinail scale in articulation with current and future dynamics (Natura 2000, Ramsar, Territorial Contract Vienna Downstream, climate change adaptation plan, etc.)." (Authors)] Address: Association GEREPI, Moulin de Chitré, 86210 Vouneuil sur Vienne, France

## 2021

**22916.** Al-Shami, S.; Che Salmah, M.R.; Ab Hamid, S.; Huda, N.; Rusli, M.Z.; Adnan, A.; Ishadi, N.A.M.; Zakeyuddin, M.S.; Al-Qormuti, S.A.; Al-Mutairi, K.A.; Chee, Y. (2021): Congruence patterns of aquatic communities in a tropical river basin, Malaysia. *Acta Ecologica Sinica* 41(1): 50-56. (in English) ["The loss of aquatic biodiversity in tropical streams of SE Asia is evident due to increasing anthropogenic activities. Therefore, there is a necessity for immediate and feasible conservation plans. Effective conservation planning depends on successful application of surrogate groups. However, progress of this approach is hindered by the paucity of relevant reports based on cross-taxon congruence analysis. In this study, we investigated congruence patterns among aquatic groups (Plecoptera, Trichoptera, Ephemeroptera, Odonata and fish) in six rivers located in the Kerian River Basin (KRB), Malaysia. Species richness was significantly correlated among aquatic groups (except for Ephemeroptera and Trichoptera where  $r = 0.040$  and  $P = 0.202$ ). The strongest relationship in species richness was reported between Ephemeroptera and Plecoptera. The Mantel's  $r$  coefficient of similarity matrices (based on the Bray-Curtis distance measure) showed a positive correlation between the matrices of Ephemeroptera-Trichoptera and Plecoptera-Trichoptera. However, a negative relationship was reported between Odonata-fish matrices. The relationships between average Trichoptera-Odonata distance to the centroid (i.e. beta diversity) among the aquatic groups were also investigated. The strongest relationship in the average to the centroids was reported between Ephemeroptera and Odonata ( $R^2 = 0.424$ ,  $P < 0.05$ ). However, the weakest relationship was reported between Trichoptera and fish with  $R^2$  value of 0.024. It is concluded that richness of Plecoptera, Odonata and fish showed correlations patterns, and these can be used as surrogates for each other with some restrictions." (Authors)] Address: Al-Shami, S.A., Indian River Research and Education Center, IFAS, University of Florida, Fort Pierce, FL-34945, USA. Email: [salshami@ufl.edu](mailto:salshami@ufl.edu)

**22917.** Daugherty, A. (2021): E.B. Williamson – Letters from the Walls of Time. Transcription by Alan Daugherty. Wells County Historical Society: 103 pp. (in English) [<https://news-banner.com/wp-content/uploads/2021/09/9-13-WILLIAMSON-transcription-2021.pdf>]

- 22918.** Futahashi, R.; Yoshioka, T. & Sugimura, M. (2021): A record of the homeosis in *Anax parthenope* from Kochi Prefecture. Tombo 63: 63-64. (in Japanese, with English summary) ["An example of homeosis in a male *Anax parthenope* is reported. On the left side of abdominal segment 4, a light-blue spots were observed, usually found on abdominal segment 3, with a fine striped surface structure, suggesting that part of abdominal segment 4 was transformed into abdominal segment 3 in this individual." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 22919.** Hiratsuka, K.; Yokoyama, T. (2021): Records of the intermediate form between orange-wing and hyaline-wing forms of *Mnais costalis* Selys, 1869 from Sapporo, Hokkaido. Tombo 63: 66-67. (in Japanese, with English summary) ["Two males of the intermediate form between orange-wing and hyaline-wing forms of *M. costalis* are recorded from Sapporo, Hokkaido. One of them was identified as this species by DNA analysis. This is the first record from Hokkaido." (Authors)] Address: Yokoyama, T. Email: sidemt@jcom.zaq-ne.jp
- 22920.** Kishi, K.; Hori, O. (2021): An intergeneric tandem formation observed between a male *Lanthus fujiacus* (Fraser, 1936) and a female *Davidius fujiama* Fraser, 1936. Tombo 63: (in Japanese, with English summary) ["A case of intergeneric tandem formation was observed between a male *L. fujiacus* and a female *D. fujiama* on a paved road near Kanabara-gawa River, Tomi City, Nagano Prefecture, the Chubu District, Japan. The female showed unwilling attitude toward the male, resulting in separation." (Authors)] Address: Kishi, K., A-101, Mistral Shonan, 488-1, Ishokawa, Fujisawa. Kanagawa. 252-0815, Japan
- 22921.** Kita, H. (2021): Feeding behavior of *Sympecma paedisca* (Brauer, 1877) adult during overwintering. Tombo 63: 72-75. (in Japanese, with English summary) ["Overwintering in adult stage, *S. paedisca*, was observed to feed in February at West Tokyo. One male stayed at a small space in a sunny forest for 2 hours 40 minutes, took off 35 times, and succeeded in feeding small insects 4 times. It was speculated that the active behavior in winter may be triggered by the rise in the temperature of the ground surface due to sunshine." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan
- 22922.** Kotabe, A.; Futahashi, R. (2021): Records of two interspecific hybrids collected from Yaeyama Islands in 2020. Tombo 63: 51-54. (in Japanese, with English summary) ["A male interspecific hybrid between *Anax parthenope julius* Brauer, 1865 and *A. nigrofasciatus nigrofasciatus* Oguma, 1915 was collected from Iriomote Island in Okinawa Prefecture. *A. nigrofasciatus* is not distributed in Okinawa Prefecture, suggesting that one parent of the hybrid is originated from Taiwanese *A. nigrofasciatus*. In addition, a male interspecific hybrid between *Tamea Virginia* (Rambur, 1842) and *T. transmarina* Brauer, 1867 was collected in Ishigaki Island, Okinawa Prefecture." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 22923.** Miyahata, T.; Habu, Y.; Kita, H. (2021): A record of an apparent interfamilial copulation between *Leucorrhinia intermedia* Barteneff, 1910 and *Davidius moiwanus* (Okumura, 1935). Tombo 63: 77-78. (in Japanese, with English summary) ["We record an apparent copulation between a male *L. intermedia* and a female *D. moiwanus* in Kushiro City, Hokkaido. To our knowledge, this is the second observation of interfamilial apparent copulation in Japan." (Authors)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan
- 22924.** Nishiura, N. (2021): A record of *Melligomphus viridicostus* (Oguma, 1920) with white compound eyes in Sennan City, Osaka Prefecture. Tombo 63: 58-60. (in Japanese, with English summary) ["A female white-eyed mutant of *M. viridicostus* was photographed in Sennan City, Osaka Prefecture. This abnormality can be attributed to the deficiency of ommochrome pigments in the compound eyes. Other characteristics of this individual, such as body coloration and behavior, were the same as those of normal individuals." (Author)] Address: Email: nobu.n@hera.eonet.ne.jp
- 22925.** Okazaki, M.; Futahashi, R. (2021): The first record of *Gynacantha ryukyuensis* Asahina, 1962 from Kitadaito Island, Okinawa Prefecture, Japan. Tombo 63: 91-92. (in Japanese, with English summary) ["A male of *G. ryukyuensis* was collected on July 26, 2020 at Kitadaito Island, Daito Islands, Okinawa Prefecture, Japan. This is the first record of this species from the Daito Islands." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 22926.** Suzuki, M.; Tokuhara, K.; & Yamamoto, T. (2021): The first record of *Anax ephippiger* (Burmeister, 1839) in Osaka Prefecture, Japan. Tombo 63: 85-86. (in Japanese, with English summary) ["A female *A. ephippiger* is recorded in the Sakai District No. 7-3 Landfill Site, Sakai City, Osaka Prefecture, Japan. This is the first record [14-X-2019] of this species from Osaka Prefecture." (Authors)] Address: Suzuki, M. Email: gblies.zukky@gmail.com
- 22927.** Taguchi, M. (2021): Aberrant striped colored abdomen variant in a white-tailed skimmer *Orthetrum albistylum* Selys, 1848 (Anisoptera: Libellulidae) male in coastal Keihin, Yokohama. Tombo 63: 48-50. (in Japanese, with English summary) ["An aberrant male of *O. albistylum*, which lacks pruinescence on the distal half of dorsum on each of 3rd to 5th abdominal segments and intersegmental zones, thus likely seen as striped abdomen, was discovered in coastal Keihin, Yokohama City, Kanagawa Prefecture during a 2020 survey. In the same area, a "Kenwood-type", which has no pruinosity on the 6th abdominal segment, frequently appears more than the other areas. The striped-abdomen aberrant male had a totally broader black part than "Kenwood-type" on estimation. This area is an industrial zone, radiated with more ultraviolet rays than other areas. The pruinescence of this species is thought to protect the body from the harmful ultraviolet rays. From this area, the ratio of individuals with proportionally less pruinosity may change in the future." (Author)] Address: Taguchi, M., Yaei-Higashi High School, Sagami-hara, Kanagawa 229-0029, Japan. E-mail: taguchim@cameo.plala.or.jp
- 22928.** Taguchi, M.; Shimamura, M.; Hayakawa, H.; Ishikawa, H.; Kunishi, Y.; Higaki, H.; Yamada, Y.; Shibata, H.; Yoshida, Y. (2021): The sedentariness and mobility of mature adults of *Orthetrum melania* (Selys, 1883) (Anisoptera: Libellulidae) in the group of ponds for dragonflies in coastal Keihin, Yokohama, Japan. Tombo 63: 38-47. (in Japanese, with English summary) ["The sedentariness and mobility of adult *O. melania* was investigated with the mark-and-recapture



method, in coastal Keihin, Yokohama city, Japan. Among 49 mature males and 6 females of *O. melania* which were captured, marked and released at 7 out of 9 locations, only two males were recaptured at locations different from that of marking. The distances of these two locations from the location of marking were both 1.3 km. The percentage of males recaptured on the next day and later at the marking location was 36.7%. These results suggest that in this coastal area, mature male adults of this species show relatively high sedentariness to the locations, and that the movement of mature males from one pond to another does not occur so frequently. The usefulness of *O. melania* as an index species for ecological monitoring is here pointed out, because this species can utilize narrow spaces such as small ponds in human habitation as a larval habitat, and the relatively high sedentariness shown by mature males. We believe that *O. melania* has a potential to appeal the value of nature by giving many people a chance to meet and contact in urban biotopes." (Authors)] Address: Taguchi, M., Yaei-Higashi High school, Sagami-hara, Kanagawa 229-0029, Japan. E-mail: taguchim@cameo.plala.or.jp

**22929.** Takuma, Y.; Okude, G.; Futahashi, R. (2021): Report on a supernumerary molting in *Anisogomphus maacki* (Selys, 1872) in its final larval instar and *Ischnura senegalensis* (Rambur, 1842) in its penultimate larval instar. Tombo 63: 68-71. (in Japanese, with English summary) ["We report a case in which the final instar larva of *A. maacki* underwent a supernumerary molt to produce a giant final instar larva. To our knowledge, this is the first example of spontaneous supernumerary molting in final-instar larvae. Although generally, in insects, molting is induced by hormonal changes in final-instar larvae, we could not verify this case. We also report on a larva of *Ischnura senegalensis* (Rambur, 1842) that produced supernumerary molting in a penultimate-instar larvae.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22930.** Takuma, Y. (2021): First record of *Sympetrum vulgatum imitans* (Selys, 1886) from Fukuoka Prefecture, Kyushu, Japan). Tombo 63: 87-90. (in Japanese, with English summary) ["A photo of *S. vulgatum imitans*, photo in 2012, is the first record from Fukuoka Prefecture. As the species is similar to *Sympetrum striolatum* (Charpentier, 1840), the author at first misidentified it as the latter, but later noticed it was *Sympetrum vulgatum* from the markings of frons and abdomen, color of legs and structure of anal appendage. In addition, previous records of this species in Japan are reviewed." (Authors)] Address: Takuma, Y. Email: info@yagopedia.com

**22931.** Takuma, Y.; Futahashi, R. (2021): Report of a malformed egg of *Calopteryx japonica* (Selys, 1869) with an albino phenotype. Tombo 63: 55-57. (in Japanese, with English summary) ["The authors found a malformed egg of *Calopteryx japonica* (Selys, 1869) with abnormal compound eye formation and an albino phenotype. In addition, the mechanisms underlying pigment abnormalities are considered." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22932.** Tamada, A.; Futahashi, R. (2021): Updated northern limit record of *Mnais pruinosa* (Selys, 1853) from Aga-machi, Niigata Prefecture. Tombo 63: 83-84. (in Japanese, with

English summary) ["*M. pruinosa*, identified by DNA analysis, is recorded from Aga-machi, Niigata. It is the most northerly record for this species. Although no additional records have been reported from the vicinity so far, further investigations are needed." (Authors)] Address: Tamada, A. Email: t.dragonflew@gmail.com

**22933.** Tamada, A.; Okamura, Y.; Togashi, Y. (2021): First record of *Sympetrum speciosum* Oguma, 1915 breeding in Yamagata Prefecture. Tombo 63: 79-80. (in Japanese, with English summary) ["The occurrence of *S. speciosum* is observed in Yamagata Prefecture for the first time; 25-VII-2020. This is the second prefectural record after Nagahata (2011)." (Authors)] Address: Tamada, A. Email: t.dragonflew@gmail.com

**22934.** Tamada, A. (2021): First record of *Asiagomphus pryeri* (Selys, 1883) from Fukushima Prefecture). Tombo 63: 81-82. (in Japanese, with English summary) ["*A. pryeri* was for the first time recorded from Iwaki-shi, Fukushima Prefecture. The field survey in 2020 revealed that this species settles around this region." (Authors)] Address: Tamada, A. Email: t.dragonflew@gmail.com

## 2022

**22935.** Aoki, T. (2022): Differences in the larval prelabium between *Anotogaster klossi* Fraser, 1919 from Ishigakijima Is. and *A. sieboldii* (Selys, 1854) from Hyogo Prefecture). Tombo 64: 12-13. (in Japanese, with English summary) ["The prelabiums in larvae of *A. sieboldii* from Hyogo Prefecture and *A. klossi* from Ishigakijima Is. (Okinawa Pref.) were compared. In *A. sieboldii*, the lateral edge of the prementum is bulging, while in *A. klossi*, it is linearly narrowed. In *A. sieboldii*, the front margin of the median lobe is greatly bent, while in *A. klossi*, the degree of bending is smaller. In addition, *A. sieboldii* has two pairs of large and small protrusions at the central tip of the median lobe, while *A. klossi* has only one pair of large ones, that widely diverge laterad from the base." (Author)] Address: Aoki, T., Rokko Island High school, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: aoki@odonata.jp

**22936.** Fukaya, W.; Futahashi, R. (2022): A record of the intermediate form between orange- and hyaline-wing forms of *Mnais costalis* Selys, 1869 in Tochigi Prefecture, Japan. Tombo 64: 21-23. (in Japanese, with English summary) ["Males of *M. costalis* in Kanto district, Japan, show two morphological forms: an orange wing form and a hyaline wing form, and the morphological distinction between these two forms is clear. The first author collected an individual which has intermediate morphological characters between the two forms in Tochigi Prefecture, Japan. This specimen lacks the opaque area on the wings and pruinescence on the dorsal middle abdomen, but has pale yellowish-orange wings, intermediate in color between the two forms. This specimen was identified as *M. costalis* by the analysis of the ITS1 sequence of nuclear DNA.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22937.** Futahashi, R. (2022): Abnormally melanized individuals of the genus *Orthetrum*. Tombo 64: 27-32. (in Japanese, with English summary) [In males of *O. albistylum*, the abdomen is mostly covered with whitish wax at maturity. In this paper, I report on abnormally melanized males of *O. albistylum* where the whitish wax is almost absent even after

maturation. I also report on a female of *O. albistylum* with a significantly melanized abdomen, and individuals of other species of the genus *Orthetrum* with striped blackened abdominal segments." (Author)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22938.** Goertzen, D. (2022): Gewässerstrukturgüte- und Gewässergüteuntersuchungen in Fließgewässern im Gebiet der Stadt Braunschweig. Jahresbericht 2022. Auftraggeber: Stadtentwässerung Braunschweig GmbH, Taubenstraße 7, 38106 Braunschweig. Auftragnehmer: Institut für Geoökologie, Abt. Landschaftsökologie & Umweltsystemanalyse, Langer Kamp 19c, 38106 Braunschweig: 72 pp. (in German) ["A focus of the water structure quality and water quality studies according to the EC WFD in 2022 was on renatured sections of the Schunter. At the Harxbüttel floodplain and the Butterberg section, the structural quality mapping produced significantly improved results (quality classes 1 to 3, natural to moderately impaired), which were also reflected in the water quality assessment. The Schunter achieved good ecological potential in all sections examined, with the exception of the section in Querum that has not yet been renatured. Here it can be assumed that renaturation measures, like in the rest of the Schunterlauf, can bring about an improvement. Furthermore, the Oker was sampled according to the EC WFD procedure. Particularly in areas where the Oker can flow freely and without backing up from weirs, good ecological potential and a species community typical of rivers were identified. This applies to the outskirts of the city as well as to the city center. The assessments were somewhat worse at sample sites with backwater, but here too, with the exception of the flood ditches, a high level of biodiversity was demonstrated. In the smaller bodies of water, the low water levels were noticeable in what was once again a very dry and warm year. In some bodies of water (Ohegraben, Weddeler and Schapener Graben) this had a negative impact on the structural quality assessment of the bed. During the water quality studies according to DIN, an above-average number of samples could not be taken in the second half of the year due to many water bodies drying out. However, the saprobic values were still mostly in the range of quality classes II and II-III." (Author/Google translate) The study includes records of 14 odonate species including *Coenagrion mercuriale* and *Ophiogomphus cecilia*.] Address: [https://www.braunschweig.de/leben/umwelt/wasser/pdf\\_wasser/Jahresbericht-SEBS-2022.pdf](https://www.braunschweig.de/leben/umwelt/wasser/pdf_wasser/Jahresbericht-SEBS-2022.pdf)

**22939.** Kawasaki, S.; Yokoyama, T. (2022): *Aeshna subarctica* Walker, 1908 recorded for the first time in 48 years from Soya District, Hokkaido. Tombo 64: 41-42. (in Japanese, with English summary) [48 years after 1973, *A. subarctica* newly was recorded from Sarobetsu, Horonobe-cho, Soya District, Hokkaido, Japan, on 25-VI and 11-VIII 2022.] Address: Yokoyama, T. Email: sidemt@jcom.zaq.ne.jp

**22940.** Kawashima, I.; Futahashi, R. (2022): A record of the brown-winged male of *Mnais pruinosa* Selys, 1853 from Kanagawa Prefecture, Japan. Tombo 64: 24- (in Japanese, with English summary) ["A brown-winged male of *M. pruinosa* was collected in Kanagawa Prefecture. This male differs from the brown-winged males of south-western Kyushu in that the forewing tips are brown. The mitochondrial COI gene sequence of this individual does not differ from those of individuals from neighboring areas in Kanagawa Prefecture, suggesting that this individual was the result of a spontaneous mutation." (Authors)] Address: Futahashi, R., National

Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22941.** Kita, H. (2022): *Planaeschna milnei milnei* (Selys, 1883) female mating refusal, and male biting female behavior. Tombo 64: 33-36. (in Japanese, with English summary) ["When a female of *P. milnei milnei* was clasped by a male and became tandem, the female held onto a piece of rotten wood and refused to fly. Nevertheless, the male still tried to take off. The female, who did not accept flying, turned her abdomen and threatened the male. The male bit the base of the female hindwing, who still resisted to fly, but then the female could not hold back and released her legs from the rotten wood and they flew in a tandem. When female Odonata are not willing to copulate, they curve the abdomen ventrally or raise it dorsally to refuse copulation. However, in the observation of this paper, the female raised her abdomen and threatened the male, for refusal to copulate with the male. On the other hand, the biting behavior by the male forced the female to fly in tandem, probably in order to proceed with a normal copulation, but against the female's will.] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**22942.** Klausnitzer, B.; Christian, A.; Franke, R.; Gebert, J.; Hornig, U.; Liebig, W.-H.; Schultz, R.; Sobczyk, T.; Stöckel, D.; Voigtländer, K. (2022): 30 Jahre entomologische Arbeit in der Naturforschenden Gesellschaft der Oberlausitz. Berichte der Naturforschende Gesellschaft der Oberlausitz 30: 249-256. (in German) [The paper includes a few bibliographic notes on Odonata of the regional fauna (Sachsen, Germany).] Address: Klausnitzer, B., Lannerstr. 5, 01219 Dresden, Germany

**22943.** Meßlinger, U.; Achtziger, R.; Faltin, I.; Bachmann, M. (2022): Monitoring von Biberrevieren in Westmittelfranken 2022 (Lkr. Ansbach und Weißenburg-Gunzenhausen). Auftraggeber: Regierung von Mittelfranken, Bund Naturschutz in Bayern e. V.: 209 pp. (in German) [Verbatim/Google translate: "5.3 Dragonflies (Odonata): In 2022, 35 species of dragonflies were observed in the ten monitoring areas. Of these, five species are on the red lists of Bavaria and/or Germany and three further species are on the Bavarian and/or German warning list. A total of 44 species have been registered since 1999, 18 of which are valuable species (red lists, warning lists, regionally rare species). These include five highly endangered species: *Coenagrion hastulatum*, *C. ornatum*, *Leucorrhinia pectoralis*, *Sympetrum pedemontanum* and *S. flaveolum*. *Ophiogomphus cecilia*, *Leucorrhinia pectoralis* and *Coenagrion ornatum* are listed in Annex I of the Habitats Directive. 35 of the 44 species benefited from beaver activity in at least one sample area (colonization of new beaver waters or significant increase as a result of improved habitats). For 35 of the identified species, reproduction could be proven in waters newly created or significantly influenced by beavers (larvae, exuvia, hatching or still flightless adults, observation of egg laying) or there is suspicion of reproduction (mating wheels, tandems). Among the species with proof or suspicion of reproduction there are also nine valuable species. The number of species has increased compared to the first survey on nine sample areas and once remained constant (4-7 recording periods). The average number of species per sample area was 8.67 (three areas) in 1999, 13.14 (seven areas) in 2002, 16.25 (eight areas) in 2006, 18.80 in 2010, 18.50 in 2014, and 18.50 in 2018 at 19.20 and in 2022 at 21.40 (ten areas each). The number of species has increased significantly

compared to the first survey on all sample areas (3-6 recording periods, Spearman rank correlation:  $r_s = 0.40$ ,  $p = 0.003$ ,  $n = 55$ ). The activity level of the beaver has a significant influence: Calculated across all areas and study years, the areas with a strong beaver influence had, on average, 19.8 species, significantly more species than areas with a low beaver influence (Mann-Whitney W test:  $W = 507.0$ ,  $p = 0.030$ ). In 2002, one out of seven sample areas was classified as species-rich (at least 16 species). In 2006, five out of eight areas already achieved this value. In 2010, 2018 and 2022, eight out of ten and in 2014 seven out of ten sample areas were species-rich in this sense. High species richness correlates less with the size of the area, but rather with the range of water types and structures and thus in particular with the extent of beaver activity, in particular damming and digging activity as well as the clearing of bank trees. The number of species per area was 8.67 (three areas) in 1999, 13.14 (seven areas) in 2002, 16.25 (eight areas) in 2006, 18.80 in 2010, 18.50 in 2014, and 19 in 2018, 20 and 2022 at 21.4 (ten areas each). In relation to value-adding species, the average for the six study periods is 0.33 (1999), 1.57 (2002), 1.75 (2006), 1.90 (2010), 2.10 (2014), 2, 2 (2018) or 2.4 species (2022). In 2002, one out of seven sample areas was classified as "species-rich" (at least 16 species). In 2006, five out of eight areas already achieved this value. In 2014, seven out of ten sample areas were "species-rich", in 2010, 2018 and 2022 eight out of ten sample areas were. The largest number of species per sample area was achieved at Moosgraben (26-28 species in 2014, 2018 and 2022), at Heinersdorf (28 species in 2022), at Wannenbach (26 species in 2006 and 2022) and in Dietfurter Ried (25 species 2014 and 2022). Currently, for the first time, the Heinersdorf area was the most species-rich (28 species). High species richness correlates less with the size of the area, but rather with the range of water types and structures and thus in particular with the extent of beaver activity, in particular damming and digging activity as well as the clearing of bank trees. However, the 2022 Heinersdorf test area, which is particularly rich in species and with only low beaver activity, is an exception. The dragonfly fauna in the individual beaver areas is predominantly made up of generally common species that occur with a high degree of continuity. Of the valuable species, *Aeshna isoceles* was detected in three sample areas, *Lestes sponsa* in nine, *Ischnura pumilio* in seven and *Gomphus vulgatissimus* in six sample plots. Seven of the 17 valuable species were only recorded on 1-2 of the ten sample areas. There is evidence of the typical river resident *Cordulegaster boltonii* from four areas; *Calopteryx virgo* flies at least sporadically in all sample areas. The pioneer species *Ischnura pumilio* and *Orthetrum brunneum* were recorded on seven and eight sample plots, respectively." (Authors)] Address: Messlinger, U., Am Weiherholz 43, D-91604 Flachslanden, Germany. Email: u.messlinger@t-online.de

**22944.** Naraoka, H.; Yukita, Y. (2022): First record of *Symptetrum speciosum speciosum* Oguma from Aomori Prefecture. Tombo 64: 43-44. (in Japanese, with English summary) ["A female of *S. speciosum speciosum* was observed on 29 August, and a female was captured on 4 September, 2021 in Hashikami-cho, the southernmost area of Aomori Prefecture. This is a first record from this prefecture." (Authors)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan. Email: naraoka62@outlook.jp

**22945.** Oitaven, L.P.C.; Calado, S.S.; da Costa, H.N.; Glaucilane S. Cruz, G.S.; Monrós, J.S.; Mesquita, D.O.; Teixeira,

A.A.C.; Teixeira, V.W.; de Moura, G.J.B. (2022): Trophic ecology of *Gymnodactylus geckoides* Spix, 1825 (Squamata, Phyllodactylidae) from Caatinga, Northeastern Brazil. *Herpetozoa* 35: 187-197. (in English, with German summary) ["The diet of lizards is mainly composed of arthropods. It can be affected by biotic and abiotic factors, which influence the energy supply provided by the composition of the animal's diet. The richness and abundance of many arthropod species can be influenced by environmental seasonality, especially in the Caatinga ecoregion, due to the rainfall regimes. The present study aims to describe aspects of the seasonal and morphological variation in the lizard *Gymnodactylus geckoides* diet and their energy content. We collected 157 individuals (63 females, 68 males, and 26 juveniles) at the Catimbau National Park, Northeastern Brazil, of which 72 were analyzed for the dry season and 59 for the rainy season. Our data indicates Isoptera to be the most common prey in *G. geckoides*'s diet. Energy content, prey number was higher in the dry season, whereas prey volume and glycogen content increased in the rainy season. Proteins and lipids did not show marked differences. The present study represents the first effort to understand variations in *G. geckoide*'s trophic ecology, indicating that this specie presents a wide variation in their diet, especially when considering seasonal factors, revealing their needs and restrictions according to prey availability and environmental conditions." (Authors) In the rainy season, Odonata contribute with a few items to the diet of *G. geckoides*.] Address: de Moura, G.J.B., Laboratório de Estudos Herpetológicos e Paleoherpetológicos, Universidade Federal Rural de Pernambuco (UFRPE), Programa de Pósgraduação em Biociência Animal-UFRPE, 52171900 Recife, Pernambuco, Brazil. Email: geraldof.jbmoura@ufrpe.br

**22946.** Ota, S. (2022): A record of *Mnais costalis* in Tadami-machi, Fukushima Prefecture in October. Tombo 64: 38-40. (in Japanese, with English summary) ["An adult female of *M. costalis* was confirmed in Tadami-machi, Fukushima Prefecture on October 30, 2021. Since this species usually appears in spring, this record is out of season and peculiar. As one of the possible factors, the peculiar microscale meteorological conditions of the mountains in the heavy snowfall area where snow remains until late, may cause the unseasonable appearance of this species." (Author)] Address: Ota, S. Email: sho39ota@gmail.com

**22947.** Øvergaard, J.M. (2022): Stable isotope ratio to identify potential food chain transfer of  $^{137}\text{Cs}$  in fish with special focus on rudd (*Scardinius erythrophthalmus*). MSc. thesis, Norwegian University of Life Sciences, Ås. 66 pp. (in English, with Norwegian summary) ["The uptake of radionuclides such as radiocaesium ( $^{137}\text{Cs}$ ) in fish occurs mainly through diet. Generally, it is assumed that the transfer of  $^{137}\text{Cs}$  in predatory fish is higher than in non-predatory fish. In the present work food chain transfer of  $^{137}\text{Cs}$  in fish was studied in the Lake Glubokoye in Chernobyl Exclusion Zone (ChEZ) (Ukraine) by analysis stable carbon ( $\delta^{13}\text{C}$ ), stable nitrogen ( $\delta^{15}\text{N}$ ) and  $^{137}\text{Cs}$  in fish, benthic organisms, water plants and insects collected in and at shore of the contaminated lake. Results show that the assumed non-predatory fish rudd (*Scardinius erythrophthalmus*) had average of  $10.74 \text{ kBq kg}^{-1}$  of  $^{137}\text{Cs}$ , at least similar activity concentration of  $^{137}\text{Cs}$  as in species of fish more associated with predatory behavior such as pike and perch. Roach was measured to a overall lower activity concentration of  $^{137}\text{Cs}$  with average measured of  $2.79 \text{ kBq kg}^{-1}$  while pike, perch and rudd have all individuals with over  $10.0 \text{ kBq kg}^{-1}$  activity concentrations. The activity concentration of  $^{137}\text{Cs}$  in organisms at

Lake Glubokoye was highly variable. Five plants collected in October 2021 was in range from 0.83 to 48.9 Bq g<sup>-1</sup> dry weight. In the Benthic predator (Odonata) <sup>137</sup>Cs was measured to 8.42 Bq g<sup>-1</sup>. Snails collected showed a <sup>137</sup>Cs level of 20.89 Bq g<sup>-1</sup> in the body, and 1.66 Bq g<sup>-1</sup> in the shell. Several of the terrestrial insects had low biomass possible to detect <sup>137</sup>Cs. Samples possible to detect had activity concentration of <sup>137</sup>Cs up to 7.49 Bq g<sup>-1</sup>. The millipedes (Diplopoda) had an <sup>137</sup>Cs of 22.10 Bq g<sup>-1</sup>. <sup>137</sup>Cs was detected in all groups of feed organisms studied, except in the low biomass samples. The δ<sup>13</sup>C in rudd had an average of 28.93 ± 1.24 ‰ and was found to be significantly higher than for other fish species. It is a clear difference in δ<sup>13</sup>C signature of aquatic insects that had an average of 34.56‰ and terrestrial insects with an average of 26.43‰ being more similar to rudd. Results suggest that <sup>137</sup>Cs could be transferred from feeding of terrestrial-insects by rudd, as this seems to be a significant part of the diet to rudd. This is supported by the fact that analysis of intestine content contains different fractions of exoskeleton from invertebrates. The activity concentration of <sup>137</sup>Cs was significantly higher in rudd collected during June in 2017, with an average of 19.77 kBq kg<sup>-1</sup> <sup>137</sup>Cs, than the rudd collected during autumn in 2021. While the δ<sup>13</sup>C was found to be significantly lower in June of 2017, with an average of (-30.01‰), compared to autumn 2021. This indicate a move towards an aquatic food source as a source for explaining high <sup>137</sup>Cs. The δ<sup>15</sup>N was found to be significantly higher in June 2017 with a average of 7.12‰ compared to October 2021 (6.26 ‰), still significantly lower than for the predatory fish, but a move towards an isotope signature less different to the predatory fish could be observed. Predatory behavior in rudd could not be excluded, as gill covers were found in intestine samples. Results indicate that terrestrial insects can be a major diet source for rudd and that <sup>137</sup>Cs in terrestrial insects can be a main source of <sup>137</sup>Cs in rudd, but aquatic sources as predation of other fish can contribute to higher levels during times of the year when availability of terrestrial food sources are scarce. The findings highlight that information about the food chain is important to understand the dynamic transfer of radiocaesium. Absorption of radionuclides such as radiocaesium (<sup>137</sup>Cs) in fish is mainly through food intake. In general, it is assumed that the transfer of <sup>137</sup>Cs in predatory fish is higher than in non-predatory fish. In this work, transfer of <sup>137</sup>Cs in the food web to fish was studied in Lake Glubokoye inside the exclusion zone around Chernobyl by analyzing the stable carbon isotope (<sup>13</sup>C), stable nitrogen isotope (<sup>15</sup>N) and <sup>137</sup>Cs in fish, benthic animals, aquatic plants and aquatic insects collected in, or terrestrial insects collected on the shores of, the contaminated lake. The results indicate that the supposedly non-predatory fish sörv (*Scardinius Erythrophthalmus*) was at least as high as the activity concentration of <sup>137</sup>Cs (10.74 kBq kg<sup>-1</sup>) as predatory species, such as pike and perch. Mort was found to have a lower activity of <sup>137</sup>Cs, 2.79 kBq kg<sup>-1</sup> but, pike, perch and sea bream all had individuals with over 10.0 kBq kg<sup>-1</sup> activity concentration." (Author) Data on „Coenagrionidae“ and „Aeshnidae“ are given." (Author)] Address: [https://nmbu.brage-unit.no/nmbu-xmlui/handle/11250/3027214](https://nmbu.brage.unit.no/nmbu-xmlui/handle/11250/3027214)

**22948.** Qasim, A.M.; Jawad, L.A. (2022): Presence of the Amazon sailfin catfish, *Pterygoplichthys pardalis* (Castelnau, 1855) (Pisces: Loricariidae), in the Shatt al-Arab River, Basrah, Iraq. *Integrative Systematics: Stuttgart Contributions to Natural History* 5(1): 95-103. (in English, with German summary) ["This paper documents the first record of *P. pardalis*, in the natural waters of the Shatt al-Arab River, Basrah, Iraq, as a result of aquarium trade activities in the

country. The length-weight relationships and condition factors of 175 specimens of *P. pardalis*, collected in 2017 in the Shatt al-Arab, were calculated. The studied population of *P. pardalis* showed an allometric growth, where the regression line slope  $b = 2.548 \pm 0.038$  and the intercept  $a = 0.041 \pm 0.005$ . The average condition factor (K) was  $8.802 \pm 4.208$ . All 175 specimens had mature gonads and the sample was dominated by females, which had eggs as large as 3.7 mm diameter in the ovaries. Fecundity varied from 2,400 to 19,245 eggs per brood. 41 food items were recognised in the stomach contents, broadly categorised as follows: Algae, Crustacea, insect larvae [11.11% Odonata] and pupae, meiofauna, fish, fish eggs, and fish larvae. Suggestions for future studies are given, so as to correlate reproduction and diet with water level and seasonality." (Authors)] Address: Jawad, L.A., School of Environ. & Animal Sciences, Unitec Institute of Technology, 139 Carrington Road, Mt Albert, Auckland 1025, New Zealand. Email: laith\_jawad@hotmail.com

**22949.** Rico-Sánchez, A.; Rodríguez, J.; Sedeño Díaz, J.; López-López, E.; Sundermann, A. (2022): Aquatic macroinvertebrate assemblages in rivers influenced by mining activities. *Scientific Reports*, 12, 3209: (in English) ["Mining is one of the major pollution sources worldwide, causing huge disturbances to the environment. Industrial and artisanal mining activities are widespread in Mexico, a major global producer of various metals. This study aimed to assess the ecological impairments resulting from mining activities using aquatic macroinvertebrates assemblages (MA). A multiple co-inertia analysis was applied to determine the relationships between environmental factors, habitat quality, heavy metals, and aquatic macroinvertebrates in 15 study sites in two different seasons (dry and wet) along two rivers running across the Central Plateau of Mexico. The results revealed three contrasting environmental conditions associated with different MAs. High concentrations of heavy metals, nutrients, and salinity limit the presence of several families of seemingly sensitive macroinvertebrates. These factors were found to influence structural changes in MAs, showing that not only mining activities, but also agriculture and presence of villages in the basin, exert adverse effects on macroinvertebrate assemblages. Diversity indices showed that the lowest diversity matched both the most polluted and the most saline rivers. The rivers studied displayed high alkalinity and hardness levels, which can reduce the availability of metals and cause adverse effects on periphyton by inhibiting photosynthesis and damaging MAs. Aquatic biomonitoring in rivers, impacted by mining and other human activities, is critical for detecting the effect of metals and other pollutants to improve management and conservation strategies. This study supports the design of cost-effective and accurate water quality biomonitoring protocols in developing countries. ... Most of the Odonata [Coenagrionidae, Corduliidae, Gomphidae] ... were related to high Cr, As, Hg, and TP concentrations. ... Some Odonata (Coenagrionidae and Platystictidae) were also related to high concentrations of heavy metals. Studies by Corbi et al. and Michailova et al. suggest that some Odonata taxa are tolerant to heavy metals in water. Our results are consistent with those studies, as we found a high correlation between the presence of Odonata (Coenagrionidae and Platystictidae) and high Cd and Al levels." (Authors)] Address: López-López, Eugenia, Laboratorio de Evaluación de la Salud de los Ecosistemas Acuáticos, Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional, Prolongación de Carpio y Plan de Ayala S/N, Col. Santo Tomás, Miguel Hidalgo, Mexico City, C.P. 11340, Mexico

- 22950.** Saito, K.; Futahashi, R. (2022): The first record of *Anax ephippiger* (Burmeister, 1839) from Aichi Prefecture, Honshu, Japan. Tombo 64: 48-49. (in Japanese, with English summary) [A female of *A. ephippiger* was collected at Nakayamacno-misaki, Tahara-shi, Aichi Prefecture, Honshu, Japan at 2-XI-2019.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 22951.** Saito, K. & Futahashi, R. (2022): *Macromia daimoji* Okumura, 1949 collected in Fukusmma Prefecture after an interval of 40 years. Tombo 64: 45- (in Japanese, with English summary) ["Two males of *M. daimoji* were collected at Taira, Iwaki-shi, Fukushima Prerecture, Honshu, Japan at 12-VII-2021." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 22952.** Sakai, S.; Koike, F. (2022): The first record of *Paracercion melanotum* (Selys, 1876) from Nagano Prefecture, Japan. Tombo 64: 46-47. (in Japanese, with English summary) ["*P. melanotum* was photographed from Ina City, Nagano Prefecture, 21st, October 2021. This is the first record from Nagano Prefecture. In addition, their copulation and oviposition were seen, so the occurrence here should be carefully monitored." (Authors)] Address: Sakai, S. Email: don-guri-sh\_sky@inacatv.ne.jp
- 22953.** Schneeberg, K. (2022): Die entomologischen Sammlungen der POLLICHIA im Pfalzmuseum für Naturkunde - POLLICHIA-Museum Bad Dürkheim. Mitt. POLLICHIA 101: 237-254. (in German, with English summary) ["Since the last overview of the entomological collections almost 30 years ago, further collections containing important local faunistic voucher have been added. Insects make up the majority of the zoological collections in the Palatinate Museum. The article gives an overview of the insect collections curated in the Palatinate Museum and the „Haus der Artenvielfalt“. ... The collection contains 407 dragonfly specimens from various families (Coenagrionidae, Gomphidae, Libellulidae, Corduliidae, Aeshnidae, Cordulegastridae). The specimens were found in the Kaiserslautern area and the Palatinate by Kreiter, Ott and van Gysegham collected." (Author)] Address: Schneeberg, Katharina, Fachbereich Zoologie, Pfalz-museum für Naturkunde – POLLICHIA-Museum, Hermann-Schäfer-Str. 17, 67098 Bad Dürkheim, Germany. Email: k.schneeberg@pfalzmuseum.bv-pfalz.de
- 22954.** Swaegers, J.; Sánchez-Guillén, R.A.; Carbonell, J.A.; Stoks, R. (2022): Convergence of life history and physiology during range expansion toward the phenotype of the native sister species. *Science of The Total Environment* 816, 10 April 2022, 151530: (in English) ["Highlights: • How do species cope with new thermal regimes encountered during range expansion? • Plastic and evolutionary contributions to trait changes were tested in a damselfly. • Life history and physiology of range-expanding populations suggested to evolve. • Range-expanding populations converged toward a native sister species. • Role of evolution should be incorporated when predicting species' range expansions. Abstract: In our globally changing planet many species show range expansions whereby they encounter new thermal regimes that deviate from those of their source region. Pressing questions are to what extent and through which mechanisms, plasticity and/or evolution, species respond to the new thermal regimes and whether these trait changes are adaptive. Using a common-garden experiment, we tested for plastic and evolutionary trait changes in life history and a set of understudied biochemical/physiological traits during the range expansion of the damselfly *Ischnura elegans* from France into a warmer region in Spain. To assess the adaptiveness of the trait changes we used the phenotype of its native sister species in Spain, *I. graellsii*, as proxy for the locally adapted phenotype. While our design cannot fully exclude maternal effects, our results suggest that edge populations adapted to the local conditions in the newly invaded region through the evolution of a faster pace-of-life (faster development and growth rates), a smaller body size, a higher energy budget and increased expression levels of the heat shock gene *DnaJ*. Notably, based on convergence toward the phenotype of the native sister species and its thermal responses, and the fit with predictions of life history theory these potential evolutionary changes were likely adaptive. Nevertheless, the convergence toward the native sister species is incomplete for thermal plasticity in traits associated with anaerobic metabolism and melanization. Our results highlight that evolution might at least partly contribute in an adaptive way to the persistence of populations during range expansion into new thermal environments and should be incorporated when predicting and understanding species' range expansions." (Authors) *Ischnura elegans*, *I. graellsii*.] Address: Sánchez-Guillén, Rosa, Biología Evolutiva, Instituto de Ecología A.C. (INECOL) C.P. 91073 Xalapa, Veracruz, México. Email: rosa.sanchez@inecol.mx
- 22955.** Udono, K.; Onno, T. (2022): Three cases of defective or injured parts being regenerated in exuviae of *Odonata*. Tombo 64: 17-20. (in Japanese, with English summary) ["Three cases of defective or injured parts that occurred during the larval stage and regenerated in the exuviae are reported. In the first case, *Epiophlebia superstes*, the left fore-leg lacked basal parts, but in the final instar, coxa, trochanter, tibia, tarsus, and claw, though smaller, were regenerated. In the second case, *Sieboldius albardae*, the ventral side of abdomen was largely injured; afterwards the scar of one recovered as a blackish brown color. In the third case, the same species, a part of the lateral abdomen was largely defective; subsequently after ecdysis, the deformation was partly repaired." (Authors)] Address: Udono, K. Email: tohno@jk9.so-net.ne.jp
- 22956.** Vinko, D.; Bedjanic, M.; Kogovšek, P.; Tratnik, A.; Šalamun, A. (2022): Ostednja tema: Kaèji pastirji in njihova ogroženost, tudi v luèi podnebni sprememb [Main topic: Dragonflies and their threat, also in the light of climate change]. *Trdoživ* 11(1): 11-16. (in Slovenian) [Verbatim/Google translate: Dragonflies, this relatively small group of insects, rarely fail to fascinate anyone with their varied colors and flight skills. They are exceptional in many respects, and even at first glance they are so recognizable that they cannot be confused with other insects. At the same time, their appearance also indirectly communicates stories about the state of their, as well as our, living environments - it is only necessary to understand their message.] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, Slovenia. Email: damjan.vinko@gmail.com
- 22957.** Wakimoto, H.; Monyasu, T.; Futahashi, R. (2022): A record of the abnormal brown-winged male of *Mnais pruinosa* Selys, 1853 from Okayama Preiecture, Japan. Tombo 64: 25-26. (in Japanese, with English summary) ["An abnormal brown-winged male of *M. pruinosa* was collected in Soja-shi, Okayama Prefecture. This individual exhibits a brown color on the entire colored part or the wings, being

different from the brown winged males of south-western Kyushu. The mitochondrial COI sequence is consistent with the population of Okayama Prefecture, and is assumed to result from a spontaneous mutation in the population." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22958.** Yamamoto, T. (2022): Male-male abnormal coupling with likely copulating behavior in *Davidius moiwanus taruii* Asahina et Inoue. Tombo 64: 37- (in Japanese, with English summary) ["Two males of *Davidius moiwanus taruii* were observed to be connected, as if they had copulated. After that, they became in tandem, whereupon copulation was again attempted but in vain." (Author)] Address: Yamamoto, T. Email: t.yamamoto@gaia.eonet.ne.jp

**22959.** Yamauchi, T.; Ikeda, K. (2022): A first Japanese record of a male *Somatochlora exuberata exuberata* Bartenev, 1910 from Yamanashi Prefecture. Tombo 64: 14-16. (in Japanese, with English summary) [A male of *S. exuberata exuberata* was recorded from Hokuto-sm, Yamanashi Prefecture at 8-VIII-2021. Differences between *S. exuberata exuberata* Bartenev, 1910 and *S. exuberata japonica* Matsumura, 1911 are figured.] Address: Yamauchi, T. Email: Costalis1875@yahoo.co.jp

## 2023

**22960.** Akishinomiya, H.; Iijima, K.; Kiyoshi, T. (2023): Odonata fauna of Akasaka Imperial Gardens, Tokyo: Diversity sustained by continuous maintenance. Bull. Natl. Mus. Nat. Sci., Ser. A 49(4): 129-153. (in Japanese, with English summary) ["Faunal survey of dragonflies and damselflies in the Akasaka Imperial Garden, Tokyo, was conducted during 2012 to 2022, and recorded a total amount of 38 species including some species possibly occasionally came from outside (e.g. *Anotogaster sieboldii*). Previous study from 2002 to 2004 by Saitô et al., (2005) reported 24 Odonata species from the garden. In comparative with this record, additional 16 species are newly recorded by our survey but two species were not re-observed. Almost all the recorded species are lentic ones. It would be caused by the scarcity of lotic environment in the garden. A total of 12 threatened species ranked in the red list concerned with the biota of Tokyo (Natural Environment Division, Bureau of Environment, Tokyo Metropolitan Government, 2023) is found. This result could be one of rationales for the continued preservation of the Akasaka Imperial Garden, one of precious urban greens in the Tokyo metropolitan area." (Authors)] Address: Kiyoshi, T., Department of Zoology, National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba, Ibaraki 305-0005, Japan. E-mail: kiyoshi@kahaku.go.jp

**22961.** Alberts, C.H.E (2023): Assassin fly (Diptera: Asilidae). Systematics and predator ecology. PhD. thesis, Entomology and Nematology, University of California, Davis, USA: xix + 249 pp. (in English) ["... Chapter 2: More than 3,400 Asilidae specimens with their associated prey have been specimen-level databased, by examining 15 natural history collections in the USA. The orders of arthropods preyed upon are, in order of representation, Hymenoptera, Diptera, Coleoptera, Orthoptera, Blattodea, Odonata, Araneae, Neuroptera, Thysanoptera, Siphonaptera, and Trichoptera. .... Chapter 3: Assassin flies (Diptera: Asilidae) are a diverse family that plays an essential ecological role as top aerial and venomous predators. Little is known about the evolution of

their predatory habits. This study provides a novel phylogenetic hypothesis of Asilidae along with prey preference and ancestral state reconstruction in a maximum likelihood framework. This study is based on 176 assassin fly species, 35 Asiloidea outgroup species, prey preference data accumulated from literature and museum collections, and approximately 7,913 bp of nuclear DNA from five genes (18S and 28S rDNA, AATS, CAD, and EF-1alpha protein-encoding DNA) and mitochondrial DNA from one gene (COI). Of the 12 asilid subfamilies included in the analysis the monophyly of six was supported. We used ancestral state reconstruction and stochastic character mapping to test whether a polyphagous arthropod predator is the ancestral state for Asilidae. Assassin flies are polyphagous arthropod predators, with specialized arthropod prey preferences evolving 20 independently across the Asilidae phylogeny." (Author)] Address: <https://escholarship.org/uc/item/6996w9tb>

**22962.** Araújo, S.A.; Rodrigues, M.E. (2023): Registro de predação intraordem entre *Fredyagria dispar* Selys, 1876 e *Telebasis corallina* Selys, 1876 (Odonata: Coenagrionidae). Hetaerina 5(1): 36-39. (in Portuguese) ["Predator-prey interactions are fundamental structures of biological communities. Among invertebrates, Odonata are considered excellent predators, exhibiting unique predation behaviors and even records of cannibalism. The perception of these behaviors contributes to ecological understanding within communities. Therefore, the objective of this study was to report the first record of intraorder predation between *F. dispar* and the species *T. corallina*." (Authors/Google translate)] Address: Rodrigues, M.E., Depto de Ciências Exatas e Tecnologia, Universidade Estadual do Sudoeste da Bahia. Vitória da Conquista, Brasil. Email: merodrigues@uesc.br

**22963.** Bazarova, B.B.; Borzenko, S.V.; Tashlykova, N.A.; Afonina, E.Yu.; Matafonov, P.V.; Tsybekmitova, G.T.; Kuklin, A.P. (2023): Biodiversity of Hydrobionts in Soda, Chloride and Sulfate Lakes of Transbaikalia. Arid Ecosystems 13: 535-548. (in English) ["This article presents the results of a comprehensive hydrochemical and hydrobiological study of 13 different types of lakes in Transbaikalia conducted in July 2022. Based on factor analysis of hydrochemical and hydrobiological indicators, the lakes were divided into three groups: 1) brackish soda; 2) chloride and sulfate, as well as one salty soda lake, Shvartsivskoe; and 3) brine soda. It has been established that the number of species of different groups of aquatic organisms decreases as the salinity level increases, regardless of the chemical type of water. It has been shown that the dominant composition of primary producers in lakes of different types differs. Two new species of macroalgae for Transbaikalia have been identified (*Stigeoclonium flagelliferum* Kütz. and *Rhizoclonium riparium*: (Roth.) Harv.). In the flora of aquatic plants of Baikal Siberia, after more than a 100-year hiatus, *Ruppia maritima* L is present. The zooplankton of lakes is dominated by halotolerant species. The dominant structure of zoobenthos in brine and salt lakes is dominated by *Artemia* crustaceans and *Ephydriidae* flies. In deeper brackish lakes, *Chironomidae* mosquitoes are always the dominant species. Quantitative indicators of phytoplankton and zooplankton communities are characterized by an inverse relationship. With the massive development of cryptophyte algae in brine reservoirs, the abundance and biomass of zooplankton are minimal. No significant fluctuations in the biomass of zoobenthos and phytomass of aquatic plants were detected. In sulfate and chloride lakes, the trophic structure of heterotrophs is represented in zooplankton by a grazing chain, and in zoobenthos by detritivores." (Authors) The paper refers to a unnamed species of "Odonata".]

Address: Bazarova, B.B., Institute of Natural Resources, Ecology & Cryology, Siberian Branch, Russian Academy of Sciences, Chita, 672014 Russia. Email: balgit@mail.ru

**22964.** Beukema, J.J. (2023): After a cold spring and in cold regions adult dragonflies make a late appearance. *Brachytron* 24: 9-14. (in Dutch, with English summary) ["Regular counts of Odonata for 22 years along a pond in the dunes in the northwest of the Netherlands revealed a lot of variation in the date of the start of the adult flying season in three species: *Ischnura elegans*, *Enallagma cyathigerum* and *Lestes sponsa*. These dates were earlier as the foregoing months had been warmer: about 6 days per degree Celsius. In the study area, the season started almost three weeks later than in the entire Netherlands. This difference could be explained by spring temperatures as well." (Author)] Address: Beukema, J.J., Linieweg 19, Den Helder NL1783BA, The Netherlands. Email: jan.beukema@outlook.com

**22965.** Borda, D.R.; Cociuba, I.; Cruceru, N.; Papp, D.C.; Meleg, I.N. (2023): A cost-effective and straightforward approach for conducting short- and long-term biomonitoring of gold mine waters. *Water* 2023, 15, 2883. <https://doi.org/10.3390/w15162883>: 23 pp. (in English) ["Gold mining pollution has long-lasting effects on the environment, particularly through acid mine drainage (AMD) and heavy metal contamination. Monitoring and assessing the impact of this pollution is crucial, as well as evaluating the effectiveness of remediation efforts. In our study, conducted in the gold mining area of Zlatna (GMAZ), western Romania, we utilised on-site measurements of water temperature, pH, electrical conductivity, and dissolved oxygen, along with the quantification of culturable aerobic bacteria and microfungi using ready-to-use media plates. We also examined the taxonomic richness of water invertebrates (TRWI) and the environmental features of the sites. Our study found significant negative impacts on the water biota in mining areas, with microbial abundance proving to be a reliable indicator of AMD pollution. While water invertebrates [including "Odonata"] can also serve as indicators of mining effects, their abundance alone may not always accurately reflect pollution levels at every site. This multiple-factor analysis highlights the influences of water type, geological characteristics, air temperature, and precipitation on the structure of the aquatic biota. We observed a natural attenuation of mining pollution in the GMAZ in the last seven years. This study demonstrates that the quantification of microbiota, along with TRWI and basic physicochemical parameters, can offer a cost-effective alternative to expensive monitoring methods for assessing mining pollution." (Authors)] Address: Borda, Daniela, Romanian Academy Cluj-Napoca Branch, 5-7 Clinicilor Street, 400006 Cluj-Napoca, Romania

**22966.** Boyqobil kizi Norkobilova, Z.; Rakhmatullayev, A.Y.; Doniyor ogli Boyjigitov, O. (2023): Preliminary information about dragonflies fauna distributed in Kashkadarya region. *World of Scientific news in Science International Journal* 1(3): 5-14. (in English) [Uzbekistan, records from 2022. 12 species including *Calopteryx virgo*, *Anax imperator*, *Orthetrum brunneum*, *Ophiogomphus reductus*, and *Sympetrum pedemontanum* are listed. On specimen figured as *C. virgo* should be *Calopteryx samarcardica* Bartenef, 1912.] Address: Norkobilova Zarina Boyqobil kizi, Dept of Zoology Karshi State University Karshi, Uzbekistan. Email: zarinanorqobilova@gmail.com

**22967.** Brockhaus, T. (2023): Die Alpen-Smaragdlibelle *Somatochlora alpestris* (Selys, 1840) - Libelle des Jahres 2023:

Aktuelle Verbreitungssituation im Erzgebirge (Sachsen). *International Dragonfly Fund - Report* 183: 1-39. (in German, with English summary) ["The Alpine Emerald dragonfly *Somatochlora alpestris* (Selys, 1840) - Dragonfly of the year 2023: Current distribution in the Erzgebirge (Saxony). *S. alpestris* is a cold-adapted species that lives mainly in peat bogs in the high mountains of Central Europe. In 2023, the current population situation in the Erzgebirge region was reviewed in light of the impact of several hot and dry years on the habitats, management measures in some of the regional moors and, finally, the effect of climatic changes. The reason for the study was the declaration of the species as "Dragonfly of the Year 2023" in Germany. All records ever recorded in the Saxon Erzgebirge were summarised in three time series: (1) records up to 1990, (2) all records up to 2005, the year of publication of the book "Libellenfauna Sachsens" and (3) finally further records up to 2022. These records show a regional distribution that distinguishes five separate distribution areas in the Erzgebirge region: (1) the Westerzgebirge with the moors Großer and Kleiner Kranichsee and surrounding moors, (2) the Fichtelberg area with the Pfahlbergmoor and smaller moor areas on the Czech-German border, (3) the ridge region of the Central Erzgebirge with the moors around Kühnheide and Rübenu as well as the Kriegswiese near Satzung, (4) the moors near Deutscheinsiedel and (5) finally in the Osterzgebirge region the Georgenfelder Hochmoor and other moors in the surrounding area. All areas in which populations with evidence of reproduction were found are between 700 and 1000 metres above sea level. In 2023, 22 moors were checked for the presence of *S. alpestris*. Evidence was found in eight areas, in five of which exuviae were found. The abundance of exuviae and imagines found was very low. The main reason for the low number of individuals is seen in the climatic conditions of the hot and dry years between 2018 and 2022, as a result of which the habitats of the larvae were severely impaired. Many bog pools and pools were still dry in the (rainy) summer of 2023. Nevertheless, the species was found with at least one record in each of the five distribution areas in the Erzgebirge region. As species organised in metapopulations are generally able to recolonise lost habitats, it is to be hoped that the population will stabilise again under better environmental conditions." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf/Erzgebirge, Germany. Email: t.brockhaus@t-online.de

**22968.** Chandran, A.V.; Jose, S.K.; Rangnekar, P.; Chenthamarakshan, B. (2023): Description of the male *Macrogomphus wynaadicus* Fraser, 1924, from the Western Ghats, India (Odonata: Gomphidae). *Odonatologica* 52(3-4): 255-265. (in English) ["Description of the male *M. wynaadicus* Fraser, 1924, is given based on specimens collected from different localities of the Western Ghats, India. Photographs and illustrations detailing the taxonomic characters are provided." (Authors)] Address: Chandran, A.V., Aqua Research Lab, Department of Geology and Environmental Science, Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala, India-680125. Email: avivekchandran2@gmail.com

**22969.** Chang, J.; Gao, X.; Peng, W.; Yu, Z.; Chu, Z.; Gao, J.; Liu, M.; Ci, P.; Dong, S. (2023): A dragonfly-wing-like energy harvester with enhanced magneto-mechano-electric coupling. *Device* (2023), <https://doi.org/10.1016/j.device.2023.100021>: 13 pp. (in English) ["Energy harvesting is crucial for sustainable micropower sources, but conventional energy harvesters have limited power-generation capabilities. To address this, we introduce a novel dragonfly-wing-like energy harvester with four wing-like magneto-electric laminated cantilever



beams operating in two intercrossed anti symmetric bending modes. This design enhances magneto-mechano-electric coupling, enabling efficient harvesting of stray magnetic field and weak vibrations. Under a weak alternating current (AC) magnetic field (HAC = 3 Oe,  $f = 50$  Hz), our portable dragonfly-wing-like energy harvester (DWL-EH) achieves a record-high output power of 25.89 mW<sub>avg</sub> and also effectively harvests low-level vibration energy with the highest output power density by far. Remarkably, even under an HAC of 1 Oe, the DWL-EH generates sufficient power to illuminate hundreds of light-emitting diodes (LEDs). Furthermore, the harvested energy powers a multi-sensor Internet of Things system for real-time environmental monitoring. This work highlights the effectiveness of incorporating natural inspirations into piezoelectric and magnetoelectric energy harvesters through bionic movement pattern emulation." (Authors)] Address: Dong, S., Institute for Advanced Study, Shenzhen Univ., Shenzhen 518060, China. Email: sxdong@szu.edu.cn

**22970.** Clausnitzer, V.; Lozano, F. (2023): IUCN SSC Dragonfly Specialist Group. 2022 Report. In: Nassar, J.M.; García, L.; Mendoza, L.; Andrade, N.D.; Bezeng, S.; Birkhoff, J.; Bohm, M.; Canteiro, C.; Geschke, J.; Henriques, S.; Ivande, S.; Mileham, K.; Ramos, M.; Rodríguez, A.; Rodríguez, J.P.; Street, B. & Yerena, E. (Eds.). 2022 Report of the IUCN Species Survival Commission and Secretariat. International Union for Conservation of Nature: 6 pp. (in English) [[https://www.iucn.org/sites/default/files/2024-03/2022-iucn-ssc-dragonfly-sg-report\\_publication.pdf](https://www.iucn.org/sites/default/files/2024-03/2022-iucn-ssc-dragonfly-sg-report_publication.pdf)] Address: Clausnitzer, Viola, Heinzlstr. 3, 02826 Görlitz, Germany. E-mail: violacl@t-online.de

**22971.** Crowley, L.M.; Price, B.W.; Allan, E.L.; Eagles, M. (2023): The genome sequence of the Common Darter, *Sympetrum striolatum* (Charpentier, 1840) [version 1; peer review: 2 approved, 1 approved with reservations]. Wellcome Open Research 2023, 8:389: 10 pp. (in English) ["We present a genome assembly from an individual female *S. striolatum* ... The genome sequence is 1349.6 megabases in span. Most of the assembly is scaffolded into 12 chromosomal pseudomolecules, including the X sex chromosome. The mitochondrial genome has also been assembled and is 16.16 kilobases in length." (Authors)] Address: Crowley, L.M., University of Oxford, Oxford, England, UK

**22972.** de Armas, L.F. (2023): Depredación por arañas (Araneae: Araneidae) de *Aeshna interrupta* en Canadá y *Gynacantha nervosa* (Odonata: Aeshnidae) en Cuba. *Revista ibérica de aracnología* 43: 97-99. (in Spanish, with English summary) ["Predation by spiders (Araneae: Araneidae) of *A. interrupta* in Canada and *G. nervosa* in Cuba: Predation in Canada of *A. interrupta* by the orb-weaver spider *Aculepeira packardii* (Thorell, 1875) and also of *G. nervosa* Cuba by the spider *Eriophora ravilla* (C. L. Koch, 1844) (Araneidae), are recorded for the first time. The former observation was at Glenmore Reservoir, Calgary, Alberta Province; the latter happened near Ariguanabo River, San Antonio de los Baños, Artemisa Province." (Author)] Address: unknown

**22973.** De Knijf, G.; Eysermans, D. (2023): New records of *Leucorrhinia albifrons* from Belgium. *Brachytron* 24: 28-30. (in Dutch, with English summary) ["On 14 and 16 June 2023 at two different localities in Ploegsteert (Hainaut) a male of *Leucorrhinia albifrons* was observed. These are the second and third observation of this species for Belgium and the first ones for the Walloon Region. There are no indications of the presence of a local population, hence we consider them as dispersal individuals." (Authors)] Address: Knijf, G. de, Research

Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**22974.** De Koning, M.; van der Voort, W. (2023): Ovipositing of the Vagrant Emperor (*Anax ephippiger*) in the Dutch coastal zone. *Brachytron* 24: 15-18. (in Dutch, with English summary) ["On 1-X-2023, an ovipositing female *A. ephippiger* was observed in the Kapittelduinen near Hook of Holland, the Netherlands. This species is known for its long-distance migrations. Relatively many observations in fall in the Netherlands and Belgium originate from the coastal region. This is the fourth year that ovipositing of the Vagrant Emperor was reported in the Netherlands and the third year that this has been observed in the Kapittelduinen area." (Authors)] Address: De Konig, M.: Email: mathijs.de.konig@gmail.com

**22975.** De los Ríos-Escalante, P.R.; Wilson, R.; Norambuena, J.-A.; Esse, C.; Baaloudj, A. (2023): Null model for explain benthic macroinvertebrates communities in Salado River, (23°S, Antofagasta Region, Chile). *Idesia* 41(3): 115-121. (in English, with Spanish summary) ["The invertebrate fauna in Northern Chilean inland waters has poorly studied due the difficult access, and there are only studies on crustacea species based in scarce expeditions. The aim of the present study is do a first community study on aquatic invertebrate communities reported in Salado River, a sub-saline river in north of Chile, that is a tributary of Loa River the most long river in Chile (23°S, Antofagasta region), based on size overlap null models. The results revealed the presence of Diptera larvae (*Simulium* sp., *Gigantodax* sp., and *Ortochladinae*), coleoptera larvae (*Elmidae*), Odonata larvae [nor further details presented], Aranae, and amphipod *Hyalella kochi*. The results revealed that there is a size overlap, this means that the reported species would share their ecological niches. It is the first description of niche overlap for invertebrate Chilean rivers, and the exposed results are similar for descriptions for decapods in marine environments." (Authors)] Address: De los Ríos-Escalante, P.R., Univ. Católica de Temuco, Fac. de Recursos Naturales, Depto de Ciencias Biológicas y Químicas, Casilla. Temuco, Chile

**22976.** Dietrich, W. (2023): Beobachtung von Insekten in der Kammregion des Mittleren Erzgebirges zwischen Jöhstadt und Kühnhaide. *Mitteilungen Sächsischer Entomologen - Online* 2023-5: 14 pp. (in German) [The paper includes records of *Calopteryx splendens*, *C. virgo*, *Libellula quadrimaculata*, *Platycnemis pennipes* and *Sympetrum danae*.] Address: Weigel, A., Am Schloßgarten 6, 07381 Wernburg, Germany

**22977.** Ferreira, E.D.F.; Dias de Oliveira, T.M.; Vilela, D.S.; Jacques, G.; de Souza, M.M. (2023): Predação de *Progomphus complicatus* Selys, 1854 (Odonata) por *Oxyopsis* sp. (Mantodea). *Haeterina* 5(2): 24-26. (in Portuguese) ["Odonata play an important role in the flow of energy in terrestrial and freshwater ecosystems, acting both as predators and prey. However, there is little information available in the literature about predation of Odonata by praying mantises, (Insecta: Mantodea). The objective of this work was to report the predation of *Progomphus complicatus* Selys, 1854 by a praying mantis of the genus *Oxyopsis*. More studies are needed to better understand the trophic relationship of the mentioned species and determine whether this interaction is frequent or accidental." (Authors/Google translate)] Address: Ferreira, E.D.F. Inst. Federal de Educação e Tecnologia do Sul de Minas, Campus Inconfidentes, Inconfidentes, Minas Gerais, Brasil. Email: eike.ferreira@alunos.ifsuldeminas.edu.br



**22978.** Gál, B.; Weiperth, A.; Farkas, J.; Schmera, D. (2023): Road crossings change functional diversity and trait composition of stream-dwelling macroinvertebrate assemblages. *Scientific Reports* volume 13, Article number: 20698: 15 pp. (in English) ["Functional diversity is regarded as a key concept in understanding the link between ecosystem function and biodiversity, and is therefore widely investigated in relation to human-induced impacts. However, information on how the intersection of roads and streams (hereafter road crossings, representing a widespread habitat transformation in relation to human development), influences the functional diversity of stream-dwelling macroinvertebrates is still missing. The general aim of our study was to provide a comprehensible picture on the impacts of road crossing structures on multiple facets of the functional diversity of stream-dwelling macroinvertebrates. In addition, we also investigated changes in trait structure. Our research showed that road crossing structures had negative impacts on functional richness and dispersion; i.e., functional diversification. However, we found no significant impact on functional divergence and evenness components. We found a decrease in functional redundancy at road crossing structures. This indicates a reduced ability of the community to recover from disturbances. Finally, we found that road crossings drive stream habitat and hydrological changes in parallel with modification of the trait composition of stream-dwelling macroinvertebrate assemblages. All these results suggest that road crossings cause notable changes in the functional diversity of stream-dwelling macroinvertebrate assemblages." (Authors)] Address: Gál, Blanka, Balaton Limnological Research Inst., Klebelsberg K. u. 3, 8237 Tihany, Hungary. Email: gal.blanka@blki.hu

**22979.** Goldner, J.T.; Holland, J.D. (2023): Wing morphology of a damselfly exhibits local variation in response to forest fragmentation. *Oecologia* 202: 369-380. (in English) ["Environmental differences can lead to morphologically different subpopulations. The scale of the mosaic of morphologies should help shed light on the nature of the mechanisms at work. Previous work has shown that jewelwing damselflies have different wing sizes in different types of habitat. Our aim was to (1) describe the relationship between damselfly wing lengths and a gradient of forest fragmentation and (2) determine the spatial scale at which these morphological differences occur. We hypothesized that local adaptation would lead to differences in wing morphology over short distances. We herein test one of the several predictions that would need to be met to support this hypothesis: that wing morphology would show spatial autocorrelation at relatively short distances. We further predicted that the wing morphology would correlate to forest fragmentation. We collected jewelwing damselflies from across Indiana, USA, in habitats across a gradient of forest fragmentation. We examined the link between forest edge density and wing length using three biologically relevant landscape sizes. We then examined the distance to which wing length variation was autocorrelated using Moran's I. We found positive linear or unimodal relationships between wing length and edge density, in both males and females, at all three landscape scales. Spatial autocorrelation in wing length indicated that variation in wing length was autocorrelated at short distances, out to 1–5 km. Our findings uphold one of the predictions stemming from the hypothesis that adaptations to local environments — habitat fragmentation here — can occur at relatively fine spatial scales." (Authors)] Address: Holland, J.D., Dept of Entomology, Purdue Univ., 901 W. State Street, West Lafayette, IN, 47907, USA

**22980.** Göricke, P.; Schnitter, P. (2023): Zum 70. Geburtstag von Dietmar Spitzenberg. *Entomologische Nachrichten*

und Berichte 67(3): 257-260. (in German) [D. Spitzenberg contributed several classical studies to the regional odonate fauna of Sachsen-Anhalt, Germany.] Address: Göricke, P., Fasanengasse 6, 39179 Ebendorf, Germany. Email: peter-goericke@web.de

**22981.** Hasebe, Y.; Nagano, Y.; Yokoi, T. (2023): Rapid bluing and slow browning: reversible body color change according to ambient temperature in damselfly *Indolestes peregrinus* (Ris, 1916). *Entomological Science* 26(1), e1253: 7 pp. (in English) ["Variation in body color occurs in many animals, and its function differs by species. Some species use multiple colors to create different effects. Most dragonflies change their body color unilaterally with maturation, whereas in a few species these changes are reversible. Both sexes of the damselfly *I. peregrinus* show temperature-dependent reversible body color changes, with a brown color when the ambient temperature decreases and a blue color when the temperature increases. To elucidate the temperature range at which this color change occurs and the exact elapsed time for the color change, laboratory experiments were conducted to determine whether the time required for body color change was related to ambient temperature and whether sex differences affected this duration. The body color and time required for the change were recorded under four temperature conditions. Bluing was completed in a few minutes, whereas browning took several hours. Moreover, sexual differences were observed, whereby males showed a more rapid transformation to blue than that of females. Our results suggest that the rapid bluing has some importance in this species, especially in males." (Authors)] Address: Yokoi, T., Lab. of Conservation Ecology, Graduate school of Science and Technology, University of Tsukuba, 1-1-1 Tennoudai, Tsukuba 305-8572, Japan. Email: yokoi.tomoyuki.gp@u.tsukuba.ac.jp

**22982.** Hoppenbrouwers, P. (2023): First observation of *Coenagrion scitulum* in the province Gelderland (the Netherlands) in 2020. *Brachytron* 24: 19-22. (in Dutch, with English summary) ["*C. scitulum* was first observed in the province Gelderland on 7-VI- 2020 at the Hatertse and Overasseltse Vennen, Nijmegen. The following years this species was found at several places around this city." (Author)] Address: Hoppenbrouwers, P. Email: peter.hoppenbrouwers@plant.nl

**22983.** Jorissen, S.; Janssens, L.; Verheyen, J.; Stoks, R. (2023): Synergistic survival-related effects of larval exposure to an aquatic pollutant and food stress get stronger during and especially after metamorphosis and shape fitness of terrestrial adults? *Environmental Pollution* 326, 121471: (in English) ["To improve the ecological risk assessment of aquatic pollutants it is needed to study their effects not only in the aquatic larval stage, but also in the terrestrial adult stage of the many animals with a complex life cycle. This remains understudied, especially with regard to interactive effects between aquatic pollutants and natural abiotic stressors. We studied effects of exposure to the pesticide DNP (2,4-Dinitrophenol) and how these were modulated by limited food availability in the aquatic larvae, and the possible delayed effects in the terrestrial adults of the damselfly *Lestes viridis*. Our results revealed that DNP and low food each had large negative effects on the life history, behaviour and to a lesser extent on the physiology of not only the larvae, but also the adults. Food limitation magnified the negative effects of DNP as seen by a strong decline in larval survival, metamorphosis success and adult lifespan. Notably, the synergism between the aquatic pollutant and food limitation for survival-related traits was stronger in the non-exposed adults than in the exposed larvae, likely because metamorphosis

is stressful itself. Our results highlight that identifying effects of aquatic pollutants and synergisms with natural abiotic stressors, not only in the aquatic larval but also in the terrestrial adult stage, is crucial to fully assess the ecological impact of aquatic pollutants and to reveal the impact on the receiving terrestrial ecosystem through a changed aquatic-terrestrial subsidy." (Authors)] Address: Jorissen, Sarah, Evolutionary Stress Ecology & Ecotoxicology, University of Leuven, Charles Deberiotstraat 32, B-3000, Leuven, Belgium. Email: sarah.jorissen@kuleuven.be

**22984.** Kaufmann, P.; Gros, P.; Wittmann, H.; Pflugbeil, G.; Pils, P.; Nowotny, G.; Kwitt, S.; Pöhacker, J.; Rücker, T.; Kyek, M.; Zuna-Kratky, T.; Bergmann, F.; Seifert, T.; Kraus, C.; Lindner, R. (2023): Der Bioblitz Salzburg 2021 auf Observation.org – eine Citizen Science Bestandserfassung der urbanen Biodiversität Salzburgs. Mitteilungen aus dem Haus der Natur Salzburg 28: 5-20. (in German, with English summary) ["While Citizen Science is generally increasing in relevance as a source of data in the field of biodiversity research, playful incentives such as cross-city competitions and the associated PR can be an additional motivation for participants. In the city competition between Salzburg and Münster, a total of almost 60,000 nature observations were recorded on Observation.org in the two cities in 2021. The city of Salzburg and the surrounding municipalities accounted for almost 20,000 observations of 2,500 species. This corresponds to about a quarter of the biodiversity documented so far in the city of Salzburg. About 80% of the species recorded in the course of the Bioblitz and half of the observations are documented photographically. Almost two thirds of the photos could be validated and verified by experts. The smartphone as a mapping tool not only facilitates data collection, but opens up a new dimension of verifiability of the data. Among the species reported in Salzburg are many endangered species and even first records for this federal state. The spread of neobiota and climatically induced range changes can also be tracked in real time using the data from Observation.org. By integrating the validated data from Observation.org into the biodiversity database at the Haus der Natur and subsequently into the internal GIS system of the Salzburg Nature Conservation Department, the observations represent a valuable addition to species conservation and the documentation of Salzburg's flora and fauna." (Authors) Odonata/Verbatim/Google transl. "Even if the dragonflies represent a relatively species-poor group of insects in Salzburg with 41 identified species and 295 observations, some particularly rare and attractive species were discovered here. A small sensation is the occurrence of *Leucorrhinia albifrons*, which is threatened with extinction throughout Austria and strictly protected throughout the EU, and which Henrik Klar discovered at the Liefering bathing lake. This species was discovered at four new locations in Salzburg in 2020 and may be showing slight dispersal tendencies in the foothills of the Alps (Gfrerer et al. 2021). *Leucorrhinia pectoralis*, which is also protected by the EU and is threatened with extinction in Austria, was also found at the Schmederer Weiher in Aigen. Both *Leucorrhinia* species have never been documented in the city of Salzburg. Other highlights are *Libellula fulva*, *Aeshna isocetes* and *Gomphus pulchellus*, which seems to be spreading more and more in our federal state after it was first recorded in Salzburg in 2005 (Gros 2006). In the case of dragonflies, all evidence of rarer species is documented by mostly high-quality photos, and the determinations are confirmed by specialists throughout." (Authors)] Address: Kaufmann, P., Haus der Natur – Museum für Natur und Technik, Museumsplatz 5, A-5020 Salzburg, Austria. Email: peter.kaufmann@hausdernatur.at

**22985.** Manger, R.; van der Maar, M. (2023): First observation of *Coenagrion scitulum* for Drenthe and its distribution north of the river Rhine. *Brachytron* 24: 23-27. (in Dutch, with English summary) ["From 2020 onwards, *C. scitulum* has been observed north of the Rhine river in the Netherlands. Most of the sites are located on sandy soils, such as forests, heathlands and dunes. Many observations of the species originate from a dune region of Zuid-Holland. Every year more observations were made, and further north. The first *Coenagrion scitulum*, a male, was observed in the province of Drenthe in August 2023. This is the northernmost sighting of the species in the Netherlands. The next years will reveal how fast and how far the species will expand northward." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**22986.** Moreno Pallares, M.I. (2023): Evaluación de las condiciones bióticas y abióticas sobre la variación espacial y temporal de las náyades de *Miathyria marcella* (Odonata: Libellulidae) en ciénagas del departamento del Atlántico. Tesis, Universidad Nacional de Colombia, Facultad de Ciencias, Departamento de Biología, Bogotá, Colombia: XVIII, 118 pp. (in Spanish, with English summary) [Evaluation of the biotic and abiotic conditions on the spatial and temporal variation of the naiads of *M. marcella* in swamps of the department of Atlántico: "Physicochemical variables and the composition of macroinvertebrates were evaluated as determinants in the spatial and temporal variation of *M. marcella* larvae in six wetlands in the department of Atlántico. Monthly measurements were made at 29 sampling points during a year. Standardized techniques for collecting data on water physicochemical variables and macroinvertebrates were used. A total of 2586 individual *M. marcella* larvae were collected; abundance was greater in wetlands influenced by the Magdalena River, followed by wetlands influenced by local runoff, and lowest in wetlands with the influence of the Caribbean Sea. Abundances of *M. marcella* larvae exhibited similar variations at different months during the sampling period in all wetlands excepting Mallorquin. Among sampling points, significant differences were found between Larga-Luisa and Luwuaco. A total of 12925 individual aquatic macroinvertebrates was found; the most abundant orders were Neotaenio-glossa (26%), Odonata (15%), Calanoida (10%), and Diptera (8%). In situ physicochemical proxies of water quality were EC, DO, pH, NH<sub>4</sub>, alkalinity, transparency, and temperature. Mean pH and temperature oscillated in narrow ranges within wetlands, whereas ammonium concentrations and conductivity exhibited a wide variation. A Principal Component Analysis indicated that the abundance of *M. marcella* is related to alkalinity. A high positive correlation was found between *M. marcella* and the orders Odonata ( $R^2 = 0.84$ , p-value = 0.05), Coleoptera ( $R^2 = 0.52$ , p-value ≤ 0.05), Basommatophora ( $R^2 = 0.60$ , p-value = 0.05) and Hemiptera ( $R^2 = 0.50$ , p-value ≤ 0.05). In conclusion, the results suggest that the distribution of *M. marcella* abundance responds to the wetland hydric influence types, macroinvertebrates, and mainly to the conductivity, alkalinity, and transparency." (Author)] Address: <https://repositorio.unal.edu.co/bitstream/handle/unal/84566/55304635.2023.pdf?sequence=4&isAllowed=y>

**22987.** Nagano, K.; Hiraiwa, M.K.; Ishiwaka, N.; Seko, Y.; Hashimoto, K.; Uchida, T.; Sánchez-Bayo, F.; Hayasaka, D. (2023): Global warming intensifies the interference competition by a poleward-expanding invader on a native dragonfly species. *R. Soc. Open Sci.* 10: 230449. <https://doi.org/10.1098/rsos.230449>: 10 pp. (in English) ["Rapid climate warming has boosted biological invasions and the distribution or expansion polewards of many species: this can cause

serious impacts on local ecosystems within the invaded areas. Subsequently, native species may be exposed to threats of both interspecific competition with invaders and temperature rises. However, effects of warming on interspecific interactions, especially competition between invader and native species remains unclear. To better understand the combined threats of biological invasions and warming, the effect of temperature on competitive interactions between two dragonfly species, the expanding *Trithemis aurora* from Southeast Asia and the Japanese native *Orthetrum albistylum speciosum* were assessed based on their foraging capacity. Although the stand-alone effect of temperature on foraging intake of the native dragonfly was not apparent, its intake significantly decreased with increasing temperatures when the invader *T. aurora* was present. Such reductions in foraging might lead to displacement of the native species through competition for food resources. This suggests that impacts of invader species against native species are expected to be more severe when interspecific competition is exacerbated by temperature rises." (Authors)] Address: Hayasaka, D., Fac. of Agriculture, Kindai University, Nakamachi 3327-204, Nara, Nara 631-8505, Japan. Email: hayasaka@nara.kindai.ac.jp

**22988.** Narangarvuu, D.; Enkhdul, T.; Erdenetsetseg, E.; Enkhrii-Ujin, E.; Irmuunzaya, K.; Batbayar, G.; Oyundelger, K.; Sau-Wai, R.; Pfeiffer, M. (2023): Mining and urbanization affect river chemical water quality and macroinvertebrate communities in the upper Selenga River Basin, Mongolia. *Environmental Monitoring and Assessment* 195:1500: 18 pp. (in English) ["Mongolia is a country with a quickly growing economy mainly based on 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, Gatsuurt, and Yeröö. PCA of catchment water quality distinguished three groups of pollutants prevalent at the sites: (1) nutrients, (2) saline components (Cl<sup>-</sup>, Na<sup>+</sup>, Mg<sup>2+</sup>, SO<sub>4</sub><sup>2-</sup>, Ca<sup>2+</sup>) 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 32 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 [*Gomphus*, *Lestes*, *Stylurus*] were found to be significantly ( $p < 0.05$ ) positively correlated with high concentrations of Mo ( $R = 0.39$ ), U ( $R = 0.34$ ), and Zn ( $R = 0.34$ ). ... Odonata tolerated high concentrations of Al, as reported from Mexico (Rico-Sánchez et al., 2022)." (Authors)] Address: Narangarvuu, D., Div. Ecol., National Univ. of Mongolia, Ulaanbaatar, Mongolia. Email: garvuu@num.edu.mn

**22989.** Nel, A.; Garrouste, R.; Kaya, M.Y.; Licht, A.; Legal, S.; Coster P. (2023): The second oldest representative of

the genus *Aeshna* (Odonata: Aeshnidae) found in the lowermost Oligocene of Luberon (France) and revealed by UV light. *Historical Biology* 36(2): 261-265. (in English) ["*Aeshna caseneuveensis* sp. nov., the second oldest representative of the genus *Aeshna*, is described and figured from the lowermost Oligocene of Luberon in southeastern France. The oldest described species in this genus is from the uppermost Eocene of Colorado in USA. Their occurrence in very distant areas in an interval of time of less of five millions years strongly suggests that the genus is older, possibly appearing during the middle Eocene, as it is still unknown in the early Eocene odonate faunas. The specimen could be studied thanks to a technique of photograph under UV light newly developed by one of us (RG). " (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22990.** Nicolai, B.; Grimm, H. (2023): Observations on a mass invasion of *Anax ephippiger* (Burmeister, 1839) (Odonata, Aeshnidae) on Fuerteventura (Canary Islands, Spain). *Libellula* 42(3/4): 139-149. (in English, with German summary) ["On the Canary Island of Fuerteventura, a mass influx of hundreds of thousands of *A. ephippiger* was observed between 11 and 15 February 2023. The influx was associated with a strong south-east wind situation ("Calima"). After 16 February 2023 the majority had already disappeared. It is assumed that most of the dragonflies had moved on and we were observing the beginning of an Atlantic crossing." (Authors)] Address: Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. Email: nicolaibeaa@gmx.de

**22991.** Nooijen, T.; van Grunsven, R.H.A. (2023): The reappearance of *Leucorrhinia caudalis* in the Netherlands and its effect on *Leucorrhinia pectoralis*. *Brachytron* 24: 3-8. (in Dutch, with English summary) ["*L. caudalis* re-established itself in the Netherlands after being locally extinct for almost 30 years. Since the populations of *L. caudalis* started to increase, populations of *L. pectoralis* seemed to become more restricted to more densely vegetated parts of the water bodies where both co-occur. On transects where *L. pectoralis* was present, and *L. caudalis* established, the number of *L. pectoralis* declined. It was unclear whether this was because of competition in the larval stage or changes in the behaviour of adult *L. pectoralis*. If there is competition, a reduced number of *L. pectoralis* in areas with high numbers of *L. caudalis* can be expected. If competition is primarily in the larval stage, and not solely in the adult stage, it was expected that the larvae, and therefore the exuviae in time of emergence, of *L. pectoralis* would mostly be present in densely vegetated areas while *L. caudalis* would mostly be present in open areas. Therefore this study compared the trends of *L. pectoralis* from before and after the reappearance of *L. caudalis*. Here, a significant decrease in *L. pectoralis* was found in the presence of *L. caudalis*. Furthermore, plant structure was determined and exuviae were collected in areas where they co-occur. We found that *L. pectoralis* exuviae are more abundant in densely vegetated areas and *L. caudalis* in more open water. Therefore the shift is not merely a displacement of territorial adults but also a reduction in larval habitat." (Authors)] Address: Nooijen, T., Email: tomas.nooijen@ru.nl

**22992.** Parimala, B. (2023): Assessment of status, diversity and threats of odonates in Kaggaladu Bird Sanctuary, Sira Taluk, Tumkur district, Karnataka, India. Manohar Shinde, Girish K.S., Sharathchandra R.G., Devraj S., Nagaraja S., Dwarkanath V. (eds.), *Traits and Innovation in Health, Nutrition, Food, and Crop Security*, cISBN:978-93-

94958-94-4 Publisher: Archers and Elevators, Bangalore, Karnataka, India: 122-128. (in English) ["The present attempt is to analyze the role of aquatic insects in particular of Odonates diversity contribute to sustaining the condition of the Kaggaladu wetland. The study was conducted from November 2019 to October 2019 during which, a total of 33 species of Odonates belonging to 6 families have been recorded. Among them, the Anisoptera were predominant with 24 species, followed by the Zygoptera with 9 species. Libellulidae were widely distributed and dominated with high percentage composition followed by the Coenagrionidae i.e., 84%, (n=18) and 67% (n=6) respectively. The status based on the frequency of occurrence revealed that 40% were common, 21% were occasional, 18% were very common, 15% were rare and 6% were very rare. The study highlights the importance of odonates and threats in their habitat due to different anthropogenic activities. Also, it provides the baseline data of the odonate diversity of Tumkur District of Karnataka state in order to conduct biological and conservation research." (Authors)] Address: Parimala, B., Department of Zoology University College of Science, Tumkur University, Tumkur, India. Email: parimala.bb@gmail.com

**22993.** Piame, Z.O.; Akodogbo, H.H.; Gouissi, F.M.; Gouton, R.R.T.; Adje, A.S.D.D.; Abahi, K.S.; Gnohossou, M.P.; Piscart, C. (2023): Impacts of cotton production on the diversity and distribution of benthic macroinvertebrates in the Alibori and Sota rivers in northern Bénin. *International Journal of Biosciences* 22(1): 77-94. (in English) ["This study carried out on two streams of the Alibori river and three streams of the Sota river in the cotton basin of northern Bénin aims to highlight the impact of cotton production on benthic macroinvertebrate communities. On each stream, three stations (clean; moderately polluted and heavily polluted) were determined. In each station eight MIB samples were collected. In situ parameters were measured while others were assayed in the laboratory. A Canonical Correspondence Analysis (CCA) was used to match the physico-chemical data with the MIB families. Diversity indices were used to determine the effects of pesticides on MIBs. The physicochemical variables revealed a significant dominance of temperature, conductivity, total ammonia and total phosphate values under the effect of agricultural pesticides. The macrofauna collected consisted of 95.15% insects, 2.23% worms, 2.03% molluscs, 0.42% hydracarans and 0.17% Crustaceans before the use of pesticides. After the use of pesticides, this macrofauna is made up of 69.70% of insects, 26.4% of worms, 2.44% of mollusks, 1.03% of crustaceans, and 0.39% of hydracarians. A high abundance of insects and hydracarians and a low abundance of molluscs, worms and crustaceans were noted before the use of pesticides than after the use of pesticides in the Beninese cotton basin. This situation is corroborated by the low abundance and taxonomic richness as well as the low values of the Shannon index and the high values of the Hilsenhoff index at the stations after the use of pesticides, especially the stations under strong agricultural disturbances." (Authors) Taxa (Gomphidae, Lestidae, Libellulidae) are treated at family level.] Address: Piame, Z.O., Univ. of Parakou (UP), Faculty of Agronomy (FA), Laboratory of Ecology, Health and Animal Production (LESPA), PO Box 123 Parakou, Bénin. Email: zoulkpiame@gmail.com

**22994.** Pietrelli, L.; Biondi, M.; Menegoni, P. (2023): Impact of hay mowing on the Stonechat *Saxicola torquatus* nestling. *Rivista Italiana di Ornitologia - Research in Ornithology*, 93 (2): 11-14. (in English) ["The impact of hay mowing on nestling Stonechats *Saxicola torquatus* was described and quantified through the feeding activity of adults. Three breeding

pairs (6 broods) were monitored. Occurrence of invertebrate taxa in the diet of nestling Stonechats was reported. The feeding frequency differs immediately after hay mowing (reduction up to 73%) to go back up after a few days even hunting different prey. The reduction of the feeding frequency does not appear to have affected reproductive success for the breeding pairs at least when the hay mowing takes place in limited and protected areas. The diet composition change with increasing nestling age, spiders and ants increase during the first days." (Authors) The diet includes (unspecified) Odonata.] Address: Pietrelli, L., GAROL, (Gruppo Attività Ricerche Ornitologiche del Litorale), Via del Castello 17, 00119 Roma, Italia. Email: lpietrelli@gmail.com

**22995.** Rachmatiyah, R.; Lupiyaningdyah, P. (2023): Dragonfly (Odonata) specimens collection of Bogor Botanical Garden: Creation and identification process. *Manilkara | Journal of Bioscience* 2(1): 9-17. (in Indonesian, with English summary) ["Odonata specimens that have been collected for 76 years (1929-2005) by the Bogor Botanical Gardens (BBG) and kept at the Zoologicum Bogoriense Museum (ZBM) are interesting to study because quite a number of these specimens have not been identified at the species taxon level. The research objective was to record and identify dragonfly species that once lived and were found flying in the BBG area and have become ZBM specimen collections. The research method used is by sorting, grouping, and identifying specimen collections. The identification results of dragonfly specimen collection showed that there were 1,357 specimens consisting of 7 families and 25 species. The most collected family was Libellulidae. The most collected species was *Agriocnemis femina* (311 specimens), followed by *Crocothemis servilia* (245 specimens), and *Brachythemis contaminata* (217 specimens). The year 1995 was the year with the highest number of specimens collected at 1,137 specimens. Garuda Park Pond, Building 9 Pond, Palace Pond, and inside the botanical garden area were the locations with the most dragonfly encounters." (Authors)] Address: Rachmatiyah, Rina, Pusat Riset Konservasi Tumbuhan dan Kebun Raya Bogor, BRIN, Indonesia

**22996.** Rocha, T.S.; Calvão, L.B.; Juen, L.; Oliveira-Junior, J.M. (2023): Effect of environmental integrity on the functional composition of the Odonata (Insecta) community in streams in the eastern Amazon. *Front. Ecol. Evol.* 11, doi: 10.3389/fevo.2023.1166057: 14 pp. (in English) ["Anthropic activities affect the dynamics of aquatic communities and can influence the reproductive behavior of many species. In addition, functional diversity is expected to be influenced by the environment. In this context, we evaluated how the biological functional characteristics of the Odonata adult community respond to impacts caused by human action on streams in the eastern Amazon, using bionomic characteristics as response variables. Concomitantly, we analyzed which characteristics are responsible for the presence of species in the environment. We sampled adults of Odonata in 98 preserved and altered streams in the eastern Amazon. We used as functional characteristics: oviposition, thermoregulation and body size, and as morphological characteristics: width of the thorax, width of the wing at the base, length of the abdomen and length of the thorax. We recorded 80 species, distributed in 16 functional groups and three categories: present in all environments, present only in preserved environments, and present only in altered environments. There was variation in the functional characteristics studied between the environments (PerMANOVA;  $F = 15,655$ ;  $P < 0.01$ ), with a significant difference in the composition of attributes between the environments studied. Although PCoA

did not find a strong relationship between the functional attributes and the level of integrity, the individuals found in altered areas are heliothermic, exophytic oviposition, with a wider wing width at the base and larger size. Individuals with smaller body size and endophytic and epiphytic oviposition, and thermal and endothermic conformators are found in preserved areas. Our study provides evidence that functional attributes are determining factors for the occurrence of species in the environment. The high quality of environment has a significant effect on the composition of functional groups. Exophytic and heliothermic species are favored by altered environments, while in preserved environments, the species that are best adapted are those that present epiphytic and endophytic oviposition and ectothermic thermoregulation (thermal conformers). As for morphology, altered environments favor medium to large individuals, with greater thorax length and abdomen size, preserved environments may favor the smaller and/or specialized species." (Authors)] Address: Rocha, Tainã, Programa de Pós-Graduação em Ecologia, Inst. Ciências Biológicas, Univ. Federal do Pará, Belém, Brazil. Email: tainasilva.tr@gmail.com

**22997.** Schneider, B.; Wildermuth, H. (2023): Der Zwergtaucher (*Tachybaptus ruficollis*) (Pallas, 1764) als Libellenjäger (Odonata). *Mercuriale* 23: 21-35. (in German, with English summary) ["The Little Grebe (*Tachybaptus ruficollis*) as dragonfly hunter (Odonata) – The Little Grebe is the smallest of the five European grebes and feeds on aquatic insects and other invertebrates as well as fish and amphibians, which it catches by diving. The hunting behaviour of juvenile and adult little grebes at two ponds in north-eastern Switzerland was analyzed in detail using film recordings with four to twelve times slow motion. A hunting tactic was discovered that was previously unknown: stalking egg-laying *Anax* spp. under water and grabbing the prey with the beak when suddenly and precisely emerging from below. The prey strike lasted only 0.04 s and was successful in 50-65% of cases. The dragonflies often reacted in time and were able to pull out of the firing line and escape within 0.02 s by flying backward and tilting sideways. The film recordings also made it possible to determine the range of prey at the two bodies of water. In addition to zygopteran and anisopteran larvae, juvenile Little Grebes also preyed on imagines of *Enallagma cyathigerum* and *Erythromma viridulum*. Adult birds mainly hunted dragonflies (*Anax* spp.) as larvae and imagines, as well as egg-laying females of *E. cyathigerum* under water, various aquatic insects, newts, small marsh frogs and tadpoles." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. Email: hansruedi@wildermuth.ch

**22998.** Scholl, G. (2023): The dragonfly in Cheyenne: Art and culture. *Whispering Wind* 50(3): 7-9. (in English) ["The use of dragonfly symbols in Cheyenne art and culture has been well documented. George Bird Grinnell in his classic study of the Cheyenne people makes mention of the importance of the dragonfly. He wrote that the dragonfly typifies, "swiftness and activity, and gave the wearer ability to move about swiftly and to escape bullets and arrows." He noted that the dragonfly was painted on war shields and on the bodies of warriors as preparation before battle." (Author)] Address: unknown

**22999.** Seehausen, M. (2023): Gemeinsame Vorkommen der an Libellen parasitierenden Gnitze *Forcipomyia paludis* und der Binsenschneide *Cladium mariscus* in Schleswig-Holstein (Odonata; Diptera: Ceratopogonidae). *Libellula* 42(3/4): 129-138. (in German, with English summary) ["Co-occurrence of the biting midge *Forcipomyia paludis* and the Great fen-sedge *Cladium mariscus* in Schleswig-Holstein, Germany –

Twelve localities where *Forcipomyia paludis* and *Cladium mariscus* co-occur are presented. In June 2023, altogether 216 midges on 132 Odonata individuals of eleven species were recorded. All records are listed in detail. The maximum number of biting midges per dragonfly individual was nine, for a female of *Libellula fulva*. A map with the current distribution of *F. paludis* in Germany is provided. No midges had been recorded at five waters with former occurrence of *C. mariscus*." (Author)] Address: Seehausen, M., Zoologisches Museum der CAU zu Kiel, Hegewischstr. 3, 24105 Kiel, Germany. Email: mseehausen@zoolmuseum.uni-kiel.de

**23000.** Shahroni, A.M.; Rahma, N. (2023): First locality record of Javan endemic damselfly *Drepanosticta gazella* Lef-tinck, 1929 (Odonata: Zygoptera: Platystictidae) in east Java, Indonesia. *Zoo Indonesia* 32(1): 59-63. (in English, with Indonesian summary) ["*D. gazella* has been reported only to spread on Java Island, ... in the western and central parts. An accidental encounter with a male *D. gazella* occurred in the tropical rainforest of the highlands of Mount Penanggungan, Mojokerto, East Java, on vegetation near a small stream. This record represents the easternmost area within the distribution range of this endemic species. In addition, further exploration in East Java at several important locations needs to be carried out in order to determine the expansion of its distribution." (Authors)] Address: Shahroni, A.M., Dept Biology, Fac. of Natural & Science, Brawijaya Univ., Malang 65145, East Java, Indonesia. Email: amsyahroni11@gmail.com

**23001.** Silva dos Anjos, C.; Pereira de Gouvêa, T.; Vilela, D.S.; Souza, M.M. (2023): Odonata (Insecta) richness in Atlantic Forests from Minas Gerais state, Brazil. *EntomoBrasilis* 16:e1056. DOI: 10.12741/ebrazilis.v16.e1056: 8 pp. (in English) ["Inventories provide important information about species, both from a biogeographic perspective and in terms of their conservation status. Among insects, dragonflies are extensively surveyed in Brazil; however, significant knowledge gaps still exist regarding the distribution of these organisms in the country, particularly in threatened biomes such as the Atlantic Forest. In this study, we present data on an Odonata community collected in the Serra do Papagaio State Park between 2015 and 2016. We recorded 64 species, including six new records for the state of Minas Gerais [*Erythrodiplax acantha*, *Fredyagrion siqueirai*, *Oxyagrion sulinum*, *Peristicta guarellae*, *Lestes tricolor*, *Rhionaeschna decessus*], along with ten species with problematic conservation status, either due to a lack of distribution data or some degree of extinction risk. Our results highlight the importance of inventories in expanding our knowledge of species distribution and providing data that can aid in the assessment of their conservation status." (Authors)] Address: Silva dos Anjos, C., Instituto Federal de Educação, Ciência e Tecnologia, do Sul de Minas Gerais, Campus Inconfidentes, MG, Brazil

**23002.** Sirois-Delisle, C. (2023): Understanding how odonates respond to global change; a cross-continental analysis. PhD thesis, Department of Biology, University of Ottawa, Ottawa, Ontario, Canada: 236 pp. (in English, with French summary) ["Global change profoundly alters biological communities and increases species extinction rates. Recent reports show that odonate species (dragonflies and damselflies) are declining globally, however, odonates can also respond strongly to climate and land use change through shifts in range and phenology - i.e., the timing of life history events. Understanding how and when species respond to rapid environmental change is critical to address conservation risks in a timely way. I assembled a dataset of ~2 million odonate records between 1901 and 2021 and investigated

a series of research questions about odonate persistence within historically occupied regions, how species respond across continents, and mechanisms leading to these responses. I discovered that non-target effects of pesticides interacted with temperature increases, leading to higher rates of odonate declines across the United States. Species with greater capacities in shifting their range northward may be more robust to impacts of global change (Chapter 2). Converging across Europe and North America, stronger range limit shifts were associated with stronger shifts in emergence phenology towards earlier spring dates, even though land use histories are highly divergent among regions. It is temperature variability and range geography, determinants of habitat conditions to which species are exposed, rather than ecological traits, that facilitated or hindered range shifts (Chapter 3). Temperature variability interacted with pesticide applications to hinder persistence or establishment in new areas that were otherwise climatically suitable, providing further evidence of impacts of extreme weather to insect declines. Tests of methods commonly used to predict species' distributions under future climate change (Species Distribution Models) revealed that species most likely to decline were also less likely to be well modeled, in terms of their temporal transferability (Chapter 4). This work deepens knowledge of spatial and temporal interspecific variation in species distributions as humans continue to reshape the Earth's ecosystems and climatic processes. This thesis can help improve species-specific conservation planning for species that decline in the face of anthropogenic activities." (Author)] Address: <https://ruor.uottawa.ca/handle/10393/45236>

**23003.** Strand, J. (2023): Trollsländor i Halmstads kommun. Tips på lokaler och strategier för att upptäcka luftens juveler i Halmstads kommun. John Strand, Hushållningssällskapet Halland: 80 pp. (in Swedish) [Sweden. Tips on premises and strategies for discovering the jewels of the air in Halmstad municipality] Address: <https://www.trollslandeforeningen.se/wp-content/uploads/2023/08/Trollslandor-i-Halmstads-kommun.pdf>

**23004.** van Grunsven, R. (2023): Waar blijven de witpunttoeverlibellen? [Where is *Orthetrum albistylum*?]. *Vlinders* 38(3): 4-5. (in Dutch) ["There are three species of *Orthetrum* dragonflies in the Netherlands: the very common *O. cancellatum* and the rare *O. coerulescens* and *O. brunneum*. *O. albistylum* is not known from the Netherlands, but has been expected for some time. Is this species not yet available or is it being overlooked? A large number of dragonfly species have appeared in the Netherlands in recent years: *Coenagrion scitulum*, *Aeshna affinis*, *Sympetrum meridionale*, and *Crocothemis erythraea* to name just a few. But not yet *O. albistylum*. A male was already seen in 2016 in Hageven in Belgium, one kilometer south of the Dutch border, but we are still waiting for the first one on this side. Distribution: *O. albistylum*: occurs in a large part of Europe: in Western and Central Europe in a band across France (except the north-west) via southern Germany and northern Italy to the east. In eastern Europe it occurs from Lithuania in the north to Greece in the south, further east the distribution extends to Japan. In Belgium, the first *O. albistylum* was seen in 2016, in the Famenne, and in the same year also in the Hageven. In any case, it had a population at Étalle until 2022 (De Knijf, 2019), but it is unclear whether it is still there. After 2016, no more observations have been made in Flanders. The distribution of *O. albistylum* in Europe is different from the heat-loving species that have established themselves in the Netherlands. It is a more continental species. In Eastern Europe it occurs further north, such as in almost all of Poland,

but it is absent from most of Germany and northwestern France. These are areas with milder winters and less hot summers than further east. The mild winters do not seem to be the problem, the winters are also mild in southern France and the lowlands of the Balkans and it does occur there. The crux is probably the hot summers. Since summers are becoming increasingly warmer here, the chance that a white-tipped sand dragonfly will appear in the Netherlands is only increasing. Be careful. The places where you can expect this species are shallow sunny lakes with many aquatic plants. This is not a special habitat and urban ponds, for example, may already be suitable. So it can show up in all kinds of places. Many common shore dragonflies often fly in suitable places. How do you recognize a *O. albistylum* so quickly? The females and young males are striking: because they have white parts on the thorax and along the side of the abdomen, they make a much more contrasty impression than the yellow and black common shore dragonfly. The white appendages are also very noticeable. Discolored males are a bit more difficult to recognize. The blue is lighter in color, almost whitish and they are slimmer than a normal shore dragonfly. In addition, they have light A male white-tipped sandfly with a blue snout, light stripes on the thorax and white appendages. stripes on the thorax and a pale blue snout. The appendages usually have some white, but not always. *O. cancellatum* never has white appendages. It is certainly not inconceivable that an *O. albistylum* occasionally flies around the Netherlands, especially in a summer with a lot of southeasterly wind. If you see a strikingly colorful or pale blue *Orthetrum* dragonfly, take a second look, it could easily be the first whitetip for the Netherlands! Literature: De Knijf, G. (2019). First evidence of reproduction of the White-tipped Sandfinch (*Orthetrum albistylum*) in Belgium. *Brachytron* 20(2). The southern bank dragonfly only established itself again in the Netherlands in 1995. There are some older observations, but before that the last sighting was in 1902. For almost a century we only had the common and stream bank dragonfly in the Netherlands. There are five other species of shore dragonflies in Europe, which sometimes look quite similar to our species, but they are all Mediterranean species from, for example, southern Spain or the Greek islands, which are not expected in the Netherlands." (Author/Google translate)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: [roy.vangrunsvan@vlinderstichting.nl](mailto:roy.vangrunsvan@vlinderstichting.nl)

**23005.** Werku, B.C.; Bulto, T.W. (2023): Assessment of macro-invertebrates' colonization in the context of impacts of exotic and native broadleaf litter species in Ethiopia. *Sustainable Water Resources Management* 9(154): 16 pp. (in English) ["The distribution of macro-invertebrates in freshwater habitats is influenced by invasive and native plant litter. The objective of this investigation was to determine whether stream water quality and macro-invertebrates' communities were affected by the leaf litter from alien and native broadleaf plants. The litter input was collected and manipulated in the Gulufa River's upper, middle, and lower tributaries. In the stream corridors, two exotic litter species (*Eucalyptus grandis* and *E. globulus*) and two native broadleaf litter species (*Croton macrostachyus* and *Ficus sure*) were chosen. The sampling methods were classified as upper, middle, and lower approaches. A total of 84 independent litter bag samples were used in the experiments. Of these, 42 of the litter bags were filled with the exotic litter species, and the other 42 litter bags were filled with native broadleaf litter species, respectively. The quality of the water was analyzed in the laboratory and in the field. The macro-invertebrate colonization was assessed using the exotic and native broadleaf litter species. The

leaf litter types used in the laboratory and field tests were as follows: *C. macrostachyus*, *E. grandis*, *F. sure*, and *E. globulas*. A total of 2297 macro-invertebrates from 48 families were quantified. The percentage composition of Diptera was high with colonization of the leaf pouches with exotic litter species (*E. grandis* and *E. globulas*) with a relative frequency of 29 and 42%. The percentage composition of all the orders associated with the leaf litter species that contained certain species of *Ficus sure* was found to be higher in frequency (Coleoptera: 74%, Odonata: 64%, Hemiptera: 59%, Ephemeroptera: 54%, and Trichoptera: 44%, respectively), with the exception of Diptera (11%). These findings suggest that the monocultures of the exotic plant species have an impact on aquatic communities. Furthermore, macro-invertebrate assemblages were higher in the substrates composed of native broadleaf litter species than in the substrates composed of exotic leaf litter species. However, the impact can be mitigated if the original vegetation of the native riparian corridors is preserved as soon as possible." (Authors) Taxa - including Odonata - are treated at family level.] Address: Werku, B.C., Dept of Natural Resource Management, Wollega Univ., Nekemte, Ethiopia

## 2024

**23006.** Akindele, E.O.; Adedapo, A.M.; Akinpelu, O.T.; Fagbohun, I.R.; Kowobari, E.D.; Oladeji, T.O.; Adeniyi, A.V.; Aliu, O.O. (2024): Freshwater macroinvertebrates along the Nigeria-Cameroon border enhance the conservation value of the lower Guinea forest biodiversity hotspot. *Journal of Environmental Management* 355, 120532: (in English) ["Highlights: • Freshwater biodiversity receives less conservation attention, especially in Tropical Africa. • Information on freshwater biodiversity is provided on some of Africa's natural sites. • Community conservation index (>20) marks out sites of very high conservation value. • Riparian forests favour a preponderance of collector-gatherers. • More freshwater ecological studies are needed in Africa's protected and unexplored areas. Abstract: In Nigeria and tropical Africa, the bias towards the protection of natural sites on account of terrestrial biodiversity or their resultant ecosystem services has led to a considerably low number of freshwater conservation studies in the region. To close this gap, six lotic freshwater systems in three different natural sites (Obudu Mountains, Agbokim Waterfalls, and Cross River National Park) along the Cameroon border of Nigeria were evaluated for the biodiversity of macroinvertebrates and some aspects of water quality in December 2021 and March 2022. Among other macroinvertebrate-related indices, the community conservation index (CCI), which considers the presence of threatened, rare, and notable species, was used for the conservation evaluation of the freshwater systems. The Ephemeroptera-Plecoptera-Trichoptera (EPT) species were notably rich at the sites, with over 12 species each at the Afundu Stream, Kwa River, Cataract Stream, and Agbokim River. All of the sites had a very high conservation value, according to the CCI, which was greater than 20. Some Obudu sites (Grotto and Becheve streams), despite having fewer EPT taxa, had higher CCI than the Kwa or Agbokim River. This was due to the presence of the endangered damselflies (*Africocypha centripunctata* and *Allocnemis vicki*) at the Obudu sites and a rare mayfly species in Nigeria (*Tricorythus tinctus*), which was reported at Agbokim and Kwa Rivers. The presence of a notable damselfly genus (*Pentaplebia*) at the Afundu stream of the Obudu Mountains also raises some hope that the critically endangered *Pentaplebia gamblesi*, whose adult was last seen in 1973, could still be alive at the site. Canonical Correspondence Analysis revealed that the proportion

of scrapers had a strong association with high BOD and EC in Agbokim River, while the Becheve and Grotto streams which had high vegetal cover was positively associated with shredders. Also, increasing DO in Afundu Stream, Kwa River and Cataract Stream was positively associated with EPT richness. This study revealed that more freshwater ecological studies need to be conducted at isolated natural sites and protected areas in Africa. Findings from such studies have implications for preserving freshwater ecosystems of high conservation value from the various threats that characterize the Anthropocene." (Authors) Address: Akindele, E.O., Dept of Zoology, Obafemi Awolowo University, Ile-Ife, Nigeria. Email: eoakindele@oauife.edu.ng

**23007.** Alcaraz-Hernández, D.; Sánchez-Hernández, J.; Muñoz-Mas, R.; Martínez-Capel, F. (2024): Drivers of macroinvertebrate communities in Mediterranean rivers: A mesohabitat approach. *Sustainability* 2024, 16(7), 3075; <https://doi.org/10.3390/su16073075>: 14 pp, Suppl- (in English) ["We investigated the relationship between benthic macroinvertebrate community attributes (richness, abundance, biodiversity, and climate-specific and resistance forms) and the physical characteristics of distinct mesohabitats (hydromorphological unit types) discretized into fast (e.g., riffles or rapids) and slow (e.g., pools or glides) flow types in four Mediterranean rivers of Spain. Key attributes of hydromorphological units, including length, width, depth, shade, substrate composition, embeddedness, abundance of aquatic vegetation, and density of woody debris, were considered. Through a comprehensive suite of multivariate analyses, we unraveled taxonomic and habitat distinctions among rivers and hydromorphological unit types, with a notable influence of spatial proximity (greater similarity within the same river basin). In slow hydromorphological units, aquatic vegetation, depth, and abundance of coarse substrate emerged as pivotal factors shaping macroinvertebrate assemblages, whereas in fast-flowing units, vegetation, substrate embeddedness, and density of woody debris were the most important. Contrary to the remaining community attributes, the studied resistance forms (absent, eggs, cocoons, and cells against desiccation and diapause) exhibited uniformity across rivers despite observed variations in macroinvertebrate communities, underscoring regional functional analogies in biological and ecological mechanisms within the investigated Mediterranean river basins. This study contributes valuable insights for anticipating the repercussions of ongoing climate change, particularly in regions where fast-flowing hydromorphological units are more susceptible to depletion during drought periods." (Authors) Taxa - including Odonata - are treated at family level: Libellulidae, Calopterygidae, Cordulegasteridae, Gomphidae, Aeshnidae, Coenagrionidae] Address: Alcaraz-Hernández, D., GRECO, Institute of Aquatic Ecology, University of Girona, 17003 Girona, Catalonia, Spain

**23008.** Alhinai, R.A.; Schenkel, T. (2024): Design and development of bio-inspired fixed-wing flying robots. Published: 03 April 2024 by MDPI in The 1st International Online Conference on Biomimetics session Biomimetics of Materials and Structures: (in English) ["Introduction: Low-Reynolds-number aerodynamics is important to a number of natural and man-made flyers. Currently, this is a topic under active study in the aerospace engineering community, motivated by interest in micro air vehicles (MAVs), and has been increasing rapidly. Our research suggests that it is more practical to employ bio-mimetic technology to utilize insect forms such as the dragonfly for specific functional parts of conventional robots only or to comprehensively refine existing engineering instead of directly imitating entire complex functions



of living creatures. Methods: Computational fluid dynamics (CFD) will be utilised to investigate the aerodynamic forces over corrugated and tandem wings. Once the results are verified and validated, finite element analysis (FEA) will then be used to study the effects of structural loading on the wings. Topology optimisation algorithms will then be used to design lightweight and load-bearable structural elements. The next phase of the project will involve building and flight-testing (indoor/outdoor) various prototypes of flying robots with an emphasis on material selection and construction techniques. Results: This is an ongoing research project that was recently initiated. We are currently working on the CFD part by conducting studies on Reynolds number (Re) effects and angle of attack (AoA) to gain a better understanding of the benefits of tandem and corrugated wings in terms of flight stability and drag reduction. We are aiming to include the results from the FEA and topology optimisation studies in the upcoming conference. Conclusion: Our research suggests that the majority of the work carried out on the design and development of flying robots focuses on the direct imitation of entire functions of living creatures. In this paper, we presented a more practical approach by employing biomimetics to utilise the dragonfly wing form and comprehensively refine the design of fixed-wing flying robots." (Authors) <https://sciforum.net/paper/view/17056>] Address: Alhinai, R.A., Dept of Engineering and Mathematics, Sheffield Hallam Univ., S1 1WP, UK

**23009.** Alves, V.; de Noronha, M.L.; Soares, A.B.; Nessimian, J. (2024): Dieta de *Ramphocelus bresilia* (Linnaeus, 1766) na Área de Proteção Ambiental de Guapi-Mirim, estado do Rio de Janeiro, Brasil. *Boletim Do Museu Paraense Emílio Goeldi. Ciências Naturais* 19(1): 12 pp. (in Portuguese, with English summary) ["The Brazilian Tanager, *R. bresilia* is an endemic bird of the Brazilian Atlantic Forest with a distribution restricted to eastern Brazil. Between 2010 and 2015, its diet was studied in the Guapi-Mirim Environmental Protection Area, being the most important mangrove remaining in Guanabara Bay, Rio de Janeiro. The birds were captured with mist nets and their feces were collected and stored in flasks with 70% alcohol, resulting in 51 samples from 40 individuals. In 62.7% of the samples there were plant and animal items, in 21.6% only plant items, and in 13.7% only animal items. In 2% of the samples there was no identifiable material. Seeds of three species were identified: *Schinus terebinthifolius* Raddi (n = 9), *Tapirira guianensis* Aubl. (n = 2) and *Tilesia baccata* (L.) Pruski (n = 1); only the genus was identified of six other seeds, the most frequent being *Miconia Ruiz & Pav.* (n = 10) e *Alchornea Sw.* (n = 6). Among the animal items, arthropods were found, mainly insects of the orders Coleoptera (n = 24), Hymenoptera (n = 10), and Odonata (n = 7). A possibly new record was the presence, in a sample, of a vertebra and two bone fragments from a nestling, a probable opportunistic predation." (Authors)] Address: Alves, Vania, Univ. Federal do Rio de Janeiro. Instituto de Biologia. Departamento de Zoologia. Centro de Ciências da Saúde – Cidade Universitária. Ilha do Fundão. Rio de Janeiro, RJ, Brasil. CEP 21944-970. Email: [aves.alves@gmail.com](mailto:aves.alves@gmail.com)

**23010.** Anbalagan, V.; Ishwarya, M. (2024): Species composition and diversity of Odonata fauna in Cauvery River of Mettur dam, Salem district, Tamil Nadu, India. *Entomon* 49(1): 87-92. (in English) ["Odonata diversity study was carried out from September 2020 to October 2022 in the Mettur Dam, Salem District. Among the total 40 different species ... A migratory species, *Pantala flavescens*, was the most dominant in numbers throughout the year. Maximum number of individuals was found during September 2020 to September 2021. Odonata diversity was higher in the first season

of 2021 than in next second season. Both dragonflies and damselflies mainly used wetlands of the dam ecosystem and agricultural fields rather than shrubland." (Authors)] Address: Anbalagan, V., PG and Research Department of Zoology, Vivekanandha College of Arts and Sciences for women (Autonomous), Tiruchengode 637 205, Tamil Nadu, India. Email: [anbueri@gmail.com](mailto:anbueri@gmail.com)

**23011.** Azar, D.; Nel, A. (2024): The youngest and first Gondwanan representative of the anisopteran family Aktassiidae from the Upper Cretaceous of Lebanon (Odonata, Petalurida). *Cretaceous Research* 154, 105744: (in English) ["*Lebanoaktassia curiosa* gen. et sp. nov., the youngest and first Gondwanan representative of the anisopteran family Aktassiidae is characterized, illustrated, described. Its taxonomic position is discussed. This fossil is the third case (over four) of strange dragonflies found altogether with the two endemic odonatan families Libanocorduliidae and Libanogomphidae, in the same assemblage from the Cenomanian of Hjoula, Lebanon. This very particular odonatan fauna advocates taxa that have developed very original morphological characters, possibly in relation to an endemism on an island insular system during the Early Cretaceous." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@mnhn.fr](mailto:anel@mnhn.fr)

**23012.** Badu, I.K.; Combey, R.; Abraham, J. (2024): Response of Odonata assemblages to disturbance in urban freshwater habitats. *African Journal of Ecology* 62(2), e13258: 15 pp. (in English, with French summary) ["Urbanisation continues to increase at an alarming rate and its effects on the natural environment are very profound now more than ever. Moreover, studies on terrestrial urban landscapes seems to be more than that on urban freshwater habitats. Furthermore, studies have shown that the Odonata are effective indicators of the effects of urbanisation on freshwater habitats. However, not much is known about their responses to urbanisation in sub-Saharan Africa, especially given the unique set of conditions that characterise the area. Therefore, this study was conducted to investigate differences in Odonata responses, measured as the proportion of habitat generalists, to three levels of habitat disturbance in the Cape Coast Metropolis of Ghana. Results showed that *Phaon camerunensis* was a potential indicator of habitat disturbance. Also, differences in habitat disturbance significantly affected Odonata composition. The most important variables that influenced Odonata responses were the individual and interaction effects of altitude and preservation of riparian vegetation. Therefore, conservation strategies that are targeted at reducing the impacts of urbanisation on Odonata must focus on these variables." (Authors)] Address: Badu, I.K., Global Change Research Institute, School of Geosciences, University of Edinburgh, Edinburgh, UK. Email: [isaakbadu@gmail.com](mailto:isaakbadu@gmail.com)

**23013.** Baitchorov, V.M.; Moroz, M.D.; Hihiniak, U.G.; Giginnyak, I.U. (2024): Macrozoobenthos of the rivers of the republican landscape reserve «Sorochansky Lakes» (Belarus). *Biological Resources* 1/2024: 22-29. (in Russian, with English summary) ["The conducted research allowed to identify 108 lower defined taxa (LDT) belonging to 3 types of invertebrates in the rivers of the Republican landscape reserve «Sorochansky Lakes»: Mollusca – 36, Annelida – 7 and Arthropoda – 65. A total of 88 taxonomic elements were identified before the species, 72 of which were new to the «Sorochansky Lakes» Reserve. The number of the lowest determined macrozoobenthos taxa in the channels of the studied rivers varied from 23 to 43, with average values of 31 LDT. Macrozoobenthos abundance ranged from 58 to



312 specimens, with an average value of 181 specimens. A new species for the fauna of Belarus was identified – *Ephemerella notata* Eaton, 1887. The alien species *Dreissena polymorpha* (Pallas, 1771) (Mollusca) and the poorly studied species *Gomphus flavipes* should also be noted. Among the collected hydrobionts in the rivers of the Republican landscape reserve «Sorochansky Lakes», 21 species are under protection and included in the Red Lists of a number of European countries. Thus, the fauna of the studied animals in the watercourses of the Republican Reserve «Sorochansky Lakes» is relatively rich and is represented by rare and protected by animal species rare and protected not only in Belarus, but also in Europe." (Authors)] Address: Baitchorov, V.M., Scientific and Practical Centre of the National Academy of Sciences of Belarus for Bioresources, Minsk, Belarus. Email: vbaitch@gmail.com

**23014.** Banaybanay, D.P.; Amparado, O.A.; Morilla, L.J.G.; Estaño, L.A. (2024): Species diversity of Odonata in the urban ecosystem of Iligan City, Philippines. *Biodiversitas* 25: 890-899. (in English) ["Urbanization impacts ecosystem function and services, resulting in changes in ecological processes, increasing human population, and biodiversity loss. This threat may influence Odonata species' abundance, diversity, and distribution in freshwater habitats. The survey of Odonata in the urban ecosystem in Iligan City was carried out from December 2022 to March 2023 to determine the species diversity, abundance, endemism, distribution, and their correlation to various environmental parameters in freshwater habitat in this area. Field sampling was conducted in six identified barangays: Barangay Tubod, Bagong Silang, Del Carmen, Villa Verde, Poblacion, and Ubaldo Laya. The study recorded 569 individuals consisting of two major odonate families, Libellulidae, comprising nine species: *Acisoma panorpoides*, *Brachydiplax chalybea*, *Crocothemis servilia*, *Diplacodes trivialis*, *Neurothemis terminata*, *N. ramburii*, *Orthetrum sabina*, *Rhodothemis rufa* and *Trithemis aurora*; and Coenagrionidae with four species: *Agriocnemis femina*, *Ceriagrion lieftincki*, *Ischnura senegalensis* and *Pseudagrion pilidorsum*. Among the recorded species, *I. senegalensis* (34.80%) was found to be the most abundant species, followed by *A. femina* (32.51%) and *O. sabina* (10.54%), which are encountered in all sampling sites. Meanwhile, the low diversity and low endemism (7.69%) were recorded in all sampling areas, with *C. lieftincki* as the only Philippine endemic recorded in Iligan City Wet Park and Barangay Bagong Silang. Canonical correspondence analysis reveals that environmental factors such as air temperature, water temperature, water pH, water turbidity, and relative humidity are crucial parameters in determining the assemblage of Odonata. Overall, urban ecosystems in Iligan City are dominated by oriental species, signifying that the areas are heavily disturbed. Therefore, urgent management of urban ecosystems is required to enhance the city's ecological health, sustainability, and insect biodiversity." (Authors)] Address: Banaybanay, D.P., Dept of Biological Sciences, College of Sciences and Mathematics, Mindanao State University - Iligan Institute of Technology. Tibanga, Iligan City 9200, Philippines

**23015.** Banuelos, G. (2024): *Nubenocephalus secundus* infection in five species of damselflies (Odonata: Coenagrionidae) in East Texas. Master of Science (Biology), May 2024, Sam Houston State University, Huntsville, Texas: X + 35 pp. (in English) ["Damselfly parasites are diverse and highly susceptible to ectoparasites and endoparasites. Damselflies are commonly parasitized by gregarines (Apicomplexa: Eugregarinida) which inhabit the gut of its host. Gregarines are ubiquitous protozoan parasites that infect aquatic and

terrestrial invertebrates all over the world except for Antarctica. More than 1,600 gregarine species have been described, however, only a small percentage of invertebrates have been surveyed for apicomplexan parasites, thus the biodiversity of gregarines is underestimated. Gregarines are highly thought to be host specific, with some studies suggesting a one-host-to-one gregarine species ratio. However, a survey of damselflies in the genus *Argia* found *N. secundus* infecting at least seven species. It has additionally been reported from *Ischnura ramburii* and an unidentified species of *Nubenocephalus* was reported from *I. hastata* and *I. posita*. The objective of this project was to survey adults of *Argia sedula*, *A. translata*, *A. tibialis*, *Enallagma civile*, and *I. posita* and measure if the *Nubenocephalus* infecting each of these species is *N. secundus*. All host species were collected among three sites in Walker County, TX: Harmon Creek and the pond at the Pineywoods Environmental Research Lab and Cook Pond. Adult damselfly populations were dissected and examined for gregarine infection from May 2022 through August 2023. Using a combined approach of observing for morphological characteristics, a multivariate analysis of variance (MANOVA) on gregarine trophozoites and a centroid clustering on sporonts, we observed that the *Nubenocephalus* species infecting *A. sedula* and *A. translata* is *N. secundus*. However, the gregarine infecting the other three damselfly species was not *N. secundus* but another gregarine species. Additional data collection, including the collection of oocysts, is necessary to determine which species of gregarine is infecting *A. tibialis*, *E. civile*, and *I. posita*." (Author)] Address: <https://shsu-ir.tdl.org/server/api/core/bitstreams/826235f7-7e6b-42ff-93f6-ac3e00fcef97/content>

**23016.** Baranyak, A. (2024): Do heat waves drive natural selection in damselflies? BSc thesis, Biology, Fulbright College of Arts and Sciences, The University of Arkansas: 18 pp. (in English) ["Climate change has led to changes in both mean temperatures and temperature extremes over the recent years. These changes have had differential effects on animals throughout the world. Ectotherms depend on their external environment for thermal regulation, making them especially susceptible to temperature extremes. It is not yet clear whether there is a relationship between physical traits in ectotherms, and survivorship throughout a heat wave. That is, whether or not temperature extremes driven survival selection. In this study, a heat wave was simulated artificially using thermally regulated mesocosms at different temperatures (18°C, 22°C, 26°C, 30°C) with a population of *Enallagma vesperum*, a type of aquatic ectotherm. Physical traits of body length, head width, lamellae area, and lamellae remaining were examined before and after the heat wave, and analyzed to determine whether temperature imposed selection was present in the surviving damselflies. Results indicated that the mean values for each trait, except lamellae remaining, following the simulated heat wave were statistically different, though this relationship was not linear, and the amount of variance accounted for by temperature was relatively low. Survivorship peaked at an intermediate temperature of 22°C, and decreased as the temperature increased or decreased from there. This survivorship curve is consistent with other research on ectotherms, however, further research is needed to determine whether natural selection arises through a relationship between morphological traits and survivorship following a heat wave." (Author)] Address: <https://scholarworks.uark.edu/biscuht/99/>

**23017.** Basel, A.M.; Simaika, J.P.; Samways, M.J.; Midgley, G.F.; Latombe, G.; MacFadyen, S.; Hui, C. (2024): Drivers of compositional turnover in narrow-ranged and widespread

dragonflies and damselflies in Africa. *Insect Conservation and Diversity*: 11 pp. (in English) ["We aim to explore what processes dominate community assembly of Anisoptera and Zygoptera by differentiating the environmental and geographical drivers behind compositional turnover of narrow-ranged versus widespread species. In this way, we further aim to describe patterns of species incidence and compositional turnover to expand upon the body of knowledge related to understanding biodiversity patterns and processes. We explored species turnover of dragonflies and damselflies separately, using zeta diversity to measure compositional turnover among multiple assemblages. Narrow-ranged and widespread species within each suborder showed similar drivers. Specifically, both narrow-ranged and widespread dragonflies show rapid turnover with small shifts in annual mean temperature, temperature seasonality and annual precipitation, whereas for damselflies, the major driver for turnover is distance between sites followed by climatic variables. Our results therefore show that odonate turnover is largely driven by climate, although the limited dispersal capabilities of damselflies also influences community assembly. Climate change could cause major changes in composition of odonates, presenting a challenge for conservation planning in Africa as species assemblages that were previously conserved may no longer be protected if their ranges shift outside protected areas. For damselflies, adaptation is a major concern, and with their limited dispersal capabilities and climate sensitivity, they may not be able to migrate effectively in response to changing climate conditions. The underlying assembly processes do not differ considerably for narrow-ranged and widespread species within each suborder, suggesting that conservation planning tailored to each suborder may be sufficient in Africa." (Authors)] Address: Basel, Ashleigh, International Centre for Tropical Agriculture (CIAT), Cali 763537, Colombia. Email: ashbasel501@gmail.com

**23018.** Bauer, S.; Tielens, E.K.; Haest, B. (2024): Monitoring aerial insect biodiversity: a radar perspective. *Phil. Trans. R. Soc. B* 379: 20230113. <https://doi.org/10.1098/rstb.2023.0113>: 12 pp. (in English) ["In the current biodiversity crisis, populations of many species have alarmingly declined, and insects are no exception to this general trend. Biodiversity monitoring has become an essential asset to detect biodiversity change but remains patchy and challenging for organisms that are small, inconspicuous or make (nocturnal) long-distance movements. Radars are powerful remote-sensing tools that can provide detailed information on intensity, timing, altitude and spatial scale of aerial movements and might therefore be particularly suited for monitoring aerial insects and their movements. Importantly, they can contribute to several essential biodiversity variables (EBVs) within a harmonized observation system. We review existing research using small-scale biological and weather surveillance radars for insect monitoring and outline how the derived measures and quantities can contribute to the EBVs 'species population', 'species traits', 'community composition' and 'ecosystem function'. Furthermore, we synthesize how ongoing and future methodological, analytical and technological advancements will greatly expand the use of radar for insect biodiversity monitoring and beyond. Owing to their long-term and regional-to-large-scale deployment, radar-based approaches can be a powerful asset in the biodiversity monitoring toolbox whose potential has yet to be fully tapped." (Authors) The paper includes references to Odonata.] Address: Bauer, Silke, Swiss Federal Institute for Forest, Snow and Landscape Research, 8903 Birmensdorf, Switzerland. Email: silke.s.bauer@gmail.com

**23019.** Bergey, E.A. (2024): The impacts of non-native watercress in Oklahoma spring ecosystems. *Aquatic Ecology* 58: 411-427. (in English) ["Watercress (*Nasturtium officinale*) has spread widely from Europe and commonly occurs in Oklahoma (USA) springs. Watercress is usually an emergent plant and affects water flow patterns and may provide habitat for biota. Although watercress is not considered an invasive species, its impacts in springs have not been reported. With a goal to describe possible impacts of watercress in springs, 14 karst-associated springs (12 with watercress) were surveyed for sediment characteristics, macroinvertebrates, and diatoms in July 2021. The effects of watercress were evident. Sediment particle size was unaffected by the presence of watercress but sediment organic matter was higher under watercress beds than outside of beds. Although there was no difference in total benthic macroinvertebrate density or richness, higher organic matter was associated with slightly higher abundances of detritivorous and predatory macroinvertebrates (SIMPER). Submerged portions of watercress had significantly much lower diatom density than other spring substrates, with diatom composition similar to other plants but different from that of rocks. Self-shading or possible allelopathy may cause the low diatom density. The significantly lower macroinvertebrate density within watercress mats relative to that of other plants may result from a reduced food source because of the plant's low diatom density. Only predatory damselflies were more common in watercress than in other plants, which had more abundant grazers. Although watercress can increase heterogeneity in sediments and is sometimes valued as an edible plant, watercress supports low algal and macroinvertebrate densities, such that extensive growth of watercress can have an overall negative impact on spring ecosystems." (Author)] Address: Bergey, Elizabeth, Oklahoma Biological Survey & School of Biological Sciences, University of Oklahoma, Norman, OK, USA. Email: lbergey@ou.edu

**23020.** Berliani, N.; Kardiman, R.; Vauzia, Satria, R. (2024): Species diversity of Odonata as a bioindicator of water pollution in the Batang Harau watershed, Tanah Datar District, West Sumatra. *IOP Conference Series: Earth and Environmental Science*, Volume 1346, 012026. The 2nd International Conference and The 11th Congress of The Entomological Society of Indonesia 29/09/2023 - 01/10/2023 Padang, Indonesia: 9 pp. (in English) ["The Batang Harau River was located in Nagari Paninjauan, X Koto District, Tanah Datar Regency, West Sumatra. The local community uses this river as a water source to carry out various daily activities, such as the irrigation of rice fields; household activities, and household waste disposal. The research aimed to analyze the comparison of dragonfly species diversity as a bioindicator for pollution in several habitat types (natural, rice fields, and settlements). The observations were made by exploring and walking along the river in the morning (9 am – 12 am) and evening (3 pm - 5 pm). The Visual Encounter Survey (VES) method was modified using a 20 m x 10 m plot, and all dragonflies found in this area were collected using an insect net. The data obtained were analyzed using the Shannon-Wiener diversity index, the Margalef species richness index, and Simpson's dominance index. A total of 280 individuals, 12 species from 7 families, were collected in this study site. Most Odonata species were found in natural areas, followed by rice fields and settlements. ... Conclusion: Based on the research conducted, the following conclusions were drawn. The diversity and abundance of dragonfly species are correlated with water pollution levels, dissolved oxygen levels, and habitat types. *Orthetrum sabina* is more commonly found in areas with higher pollution and *Euphaea*

variegata in cleaner waters. So, can be concluded that certain Odonata species are identified as indicator species for pollution levels, dissolved oxygen levels, and different habitat types. The presence or absence of dragonfly species provides an overview of the health of the aquatic ecosystem in the Batang Harau watershed" (Authors)] Address: Satria, R., Dept of Biology, Faculty of Mathematics & Natural Sciences, Universitas Negeri Padang, West Sumatra, 25131, Indonesia. Email: rijalsatria@fmipa.unp.ac.id

**23021.** Bernal, A.; Conesa, M.; Barco, J.C.; Waldhauser, M.; Teruel Montejano, S. (2024): Nuevo registro ibérico de *Onychogomphus cazuma* Barona, Cardo y Díaz, 2020 (Odonata, Gomphidae). Boletín de la Asociación española de Entomología 47(3-4): 183-186. (in Spanish) [Adult male of the species *Onychogomphus cazuma* photographed in the area on 11/06/2023.] Address: Bernal, A., C/ Juan Ramón Jiménez 28, 11160 Barbate, Cádiz, Spain. Email: arturo.libelula@gmail.com

**23022.** Bernal Sánchez, A.; Conesa García, M.A.; Cano Villegas, F. (2024): Reproducción de *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae) en la península ibérica y descripción de un posible corredor migratorio desde la costa occidental africana. - Reproduction of *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae) in the Iberian Peninsula and description of a possible dispersal pathway from the western African coast. Boln. Asoc. esp. Ent. 48(1-2): 69-81. (in Spanish, with English summary) ["A swarm of *P. flavescens* observed in a section of the Barbate River in Cádiz is described. In addition, the reproduction of the species is confirmed in the La Breña and Marismas del Barbate Natural Park. These are the first records of migratory and reproductive behaviour of the species since its presence was first detected in the Iberian Peninsula (Bernal Sánchez & Conesa García, 2021). A possible migratory path of this swarm is also proposed, as well as its dispersion in the Iberian Peninsula." (Authors)] Address: Bernal Sánchez, A., Asociación odonológica de Andalucía. Email: arturo.libelula@gmail.com

**23023.** Brito, J.S.; Cottenie, K.; Brasil, L.S.; Bastos, R.C.; Santos Ferreira, V.R.; Cruz, G.M.; Melo Lima, D.V.; Soares Vieira, L.J.; Michelan, T.S.; Juen, L. (2024): Main drivers of dragonflies and damselflies (Insecta; Odonata) metacommunities in streams inside protected areas in the Brazilian Amazon. Environmental Monitoring and Assessment 196, 281: 16 pp. (in English) ["The evaluation of environmental and spatial influence in freshwater systems is crucial for the conservation of aquatic diversity. So, we evaluated communities of Odonata in streams inside and outside sustainable use areas in the Brazilian western Amazon. We predicted that these streams would differ regarding habitat integrity and species  $\alpha$  and  $\beta$  diversity. We also predict that environmental and spatial variables will be important for both suborders, but with more substantial effects on Zygoptera species, considering their nature of forest-specialist. The study was conducted in 35 streams, 19 inside and 16 outside sustainable use areas. The streams outside presented high species richness, abundance, and number of exclusive forest-specialist species from Zygoptera and higher scores of habitat integrity. In contrast, one sustainable use area presented the lowest values of these metrics. Besides, we found that environmental and spatial variables were significantly associated to Zygoptera species composition, but not with Anisoptera, which can be explained by their cosmopolitan nature. Our results indicated that an interplay between environmental and spatial processes determines the structure of the metacommunities of Zygoptera. The less effective dispersal

rates and narrow ecological tolerance of Zygoptera species make them more influenced by local conditions and dispersal limitation, and more sensible to habitat modifications. We highlight the importance of improving the local management of the sustainable use areas by environmental agencies, mainly on areas that are losing their capacity to maintain the aquatic fauna, and implementation of social policies toward traditional people." (Authors)] Address: Brito, J.S., Programa de Pós-Graduação Em Ecologia, Universidade Federal Do Pará, Belém, Pará, Brazil

**23024.** Brito, J.S.; Silva, E.C.; Santos Ferreira, V.R.; Bastos, R.C.; Cruz, G.M.; Sampaio Monteles, J.; Lima, A.; Raseira, M.; Bregão, G.L.; Oliveira-Junior, J.M.B.; Dias-Silva, K.; Michelan, T.S.; Casatti, L.; Juen, L. (2024): The importance of national parks in maintaining the habitat integrity and diversity of Odonata species in Amazonian streams. Journal of Insect Conservation 28: 315-330. (in English) ["Protected areas are hugely important for preserving freshwater systems, given their importance for the human well-being and aquatic diversity. Our main objective in the present study was to investigate the diversity of adult Odonata species in streams inside a national park, and in streams located outside this protected area, under different human interventions. We analyzed assemblages of Odonata from 28 streams (inside = 17 and outside = 11) in Itaituba municipality, in Pará state, Brazil. Our results indicated that only habitat integrity and Zygoptera species composition significantly differed between both categories. The lack of more significant results may indicate some degree of buffer influence of the area of the national park since the streams inside and outside its area are a very short distance. Therefore, this closeness may be enough to allow the dispersal of Anisoptera species, considered effective dispersers, and some tolerant species of Zygoptera. However, only the Zygoptera suborder presented species specialists in streams inside and outside the national park, and even though this may be explained through their physiological aspects, another explanation may be that the presence of the national park mitigates the negative influence of human activities. Implications for insect conservation: We highlight the importance of full-protected areas in preserving the diversity of Odonata species, through the maintenance of habitat integrity and physical structure. However, there is a need for more studies conducted inside protected areas to address their effectiveness for the preservation of aquatic systems." (Authors)] Address: Brito, J.S., Programa de Pós-graduação em Ecologia, Universidade Federal do Pará, Belém, Pará, Brazil. Email: jotabio13@gmail.com

**23025.** Brooks, S. (2024): An investigation of dragonfly larval development time using newly-created garden ponds. J. Br. Dragonfly Society 40(1): 25-29. (in English) ["Final stage larval exuviae of 57 *Pyrrhosoma nymphula* and 11 *Libellula depressa* were recorded during spring 2023 at six garden ponds from different addresses in St Albans, Hertfordshire. As all the ponds had been newly created since November 2021, it was possible to demonstrate that both species had completed larval development within one-year, rather than the two-years often quoted in the literature. This suggests an accelerated developmental rate in response to climate warming." (Author)] Address: Brooks, S., 35 Salisbury Avenue, St Albans, Hertfordshire AL1 4UB, UK

**23026.** Buczynski, P.; Sobus, T. (2024): Dragonflies Odonata in the diet of the European Bee-eater *Merops apiaster* - an analysis based on photographic materials. Ptaki Podkarpacia 16: 13-28. (in Polish, with English summary) ["The paper analyses the species composition of Odonata that

constitute the Bee-eater's food, based on photos taken by nature photographers and obtained through an Internet inquiry. 219 photographs from 17 sites showing 179 victims were obtained: 16 of the sites are in southern Poland (mainly the Sandomierz Basin) and one in north-eastern Poland. In 16 sites, photographs were taken near slopes with Bee-eater colonies, and in the birds foraging area in the 17<sup>th</sup> one. The material revealed 28 species of dragonflies. The five most numerous species, accounting for a total of 42.4% of the prey, were *Orthetrum cancellatum*, *Somatochlora flavomaculata*, *Stylurus flavipes*, *Onychogomphus forcipatus* and *Ophiogomphus cecilia*. *Isoaeschna isoceles* (7) and *O. forcipatus*, *S. flavomaculata* and *Orthetrum cancellatum* (6 each) were found in the largest number of sites. The number of prey items and their species diversity varied greatly at the individual sites. A significant relationship was found between the distance of a given site from a river and the proportion of rheobionts and rheophiles in the prey, but not in the case of species associated with lentic waters and the distance from these habitats. The composition of the food was very variable over time, the only species present almost throughout the season being *O. cancellatum*. Although dragonflies of very different sizes were available, Bee-eaters preferred at least medium-sized ones, and in fact consumed mainly large and very large ones. However, seasonal variation in the number of victims was small and statistically insignificant. The sex ratio ( $\delta:\text{♀}$ ) was 1.29:1 overall, but was highly variable between sites. The data confirms that the Bee-eater is an opportunist hunter in whose food dragonflies play an important role. Differences in body size mean that anisopterans are usually caught, but the smaller proportion of zygopterans may also be partly due to their microhabitat preferences and behaviour, which makes them less accessible to Bee-eaters hunting in flight. The data also highlight the value of cooperation between specialists in various fields of biology. For odonatologists, they increase knowledge of dragonfly faunistics in the regions where the photographs were taken, they provide further data on legally protected rheobionts *S. flavipes*, *O. cecilia* and rare migrants *Pantala flavescens*, *Anax ephippiger*, and have enabled the flying season dates of 6 species in Poland to be adjusted." (Authors)] Address: Sobus, T., Rakszawa 149C, 37-111 Rakszawa, Poland. Email: t.sobusi@wp.pl

**23027.** Cannings, R.A.; Klymko, J.; Catling, P.M.; Savard, M.; Lemelin, G.; Jones, C.D.; Cannings, S.G.; Savard, R.-J. (2024): The dragonflies and damselflies (Insecta: Odonata) of Canada: species list, geographical distribution, status, and conservation ranks. *Zootaxa* 5410(1): 1-48. (in English, with French summary) ["As of August 2023, 220 species in 57 genera and 10 families of damselflies and dragonflies (Insecta: Odonata) are recorded for Canada. Since the publication of the first edition in 2005, 14 species have been added to the list; one, *Neurocordulia obsoleta* has been removed because of a misidentification and another, *Sympetrum occidentale*, has been to synonymy. Conservation ranks are given for species in all 13 provinces and territories. English and French names for all listed species are included. Literature sources are discussed and presented, as is information on species status and the addition and exclusion of species. Sections on taxonomy and variation, subspecies, presumed hybrids, the introduction of exotic species, notable range extensions and observations, and conservation and protection are also provided." (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia V8W 9W2 Canada. Email: rcannings@royalbcmuseum.bc.ca

**23028.** Chovanec, A. (2024): An example of successfully merging dragonfly conservation with tourism: Odonata at a large artificial swimming pond in Styria (Austria). *J. Br. Dragonfly Society* 40(1): 4-24. (in English) ["In 2023, the odonate fauna of the man-made Gruber-Pond in Pollau (Styria Province, Austria) was investigated. Records of preliminary studies in 2021 and 2022 were also included in the results. The investigation of this 'swimming biotope' of 4.000 m<sup>2</sup> revealed a total of 22 odonate species, with 18 of them certainly, probably, or possibly breeding. Five of the breeding species are listed in the Red List of endangered Odonata for Styria. Most remarkable is the record of a large population of the 'endangered' *Coenagrion scitulum*. The pond is characterised by an open water zone (approximately 2/3 of the total area) and a zone densely vegetated by reed and floating-leaved macrophytes (1/3 of the total area). Littoral zones are open (1/3 of the shoreline), sparsely vegetated (1/3 of the shoreline), and densely vegetated (1/3 of the shoreline). The resulting structural heterogeneity is reflected by the occurrence of odonate species in a wide variety of ecological guilds." (Author)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

**23029.** Clarke, D.J. (2024): Accelerating range expansions of *Libellula depressa* Linnaeus (Broad-bodied Chaser) and *Calopteryx splendens* (Harris) (Banded Demoiselle) in Cumbria, 2000 - 2023. *J. Br. Dragonfly Society* 40(1): 45-56. (in English) ["*L. depressa* and *C. splendens* in Cumbria are currently near the north-western edges of their British ranges. Both have shown accelerating increases in range in the past quarter of a century, especially in the last decade. *L. depressa* has arrived as an incoming colonist, while *C. splendens* has a history of limited presence pre-2000, stretching back to at least 1937. The two species are ecologically very different and have shown different patterns of colonisation. It is presumed that climate change is the underlying factor in both their responses." (Author)] Address: Clarke, D.J., Bumfoot, Cumwhitton, Brampton, Cumbria CA8 9EX, UK

**23030.** Cooper, S.D.; Wiseman, S.W.; DiFiore, B.D.; Klose, K. (2024): Trout and invertebrate assemblages in stream pools through wildfire and drought. *Freshwater Biology* 69(2): 300-320. (in English) ["Climate change is increasing the frequency, severity, and extent of wildfires and drought in many parts of the world, with numerous repercussions for the physical, chemical, and biological characteristics of streams. However, information on how these perturbations affect top predators and their impacts on lower trophic levels in streams is limited. The top aquatic predator in southern California streams is native *Oncorhynchus mykiss*, the endangered southern California steelhead trout. To examine relationships among the distribution of trout, environmental factors, and stream invertebrate resources and assemblages, we sampled pools in 25 stream reaches that differed in the presence (nine reaches) or absence (16 reaches) of trout over 12 years, including eight reaches where trout were extirpated during the study period by drought or post-fire flood disturbances. Trout were present in deep pools with high water and habitat quality. Invertebrate communities in trout pools were dominated by a variety of medium-sized collector-gatherer and shredder invertebrate taxa with non-seasonal life cycles, whereas tadpoles and large, predatory invertebrates (Odonata, Coleoptera, Hemiptera [OCH]), often with atmospheric breather traits, were more abundant in troutless than trout pools. Structural equation modelling of the algal-based food web indicated a trophic cascade from trout to predatory invertebrates to collector-gatherer taxa and weaker direct negative

trout effects on grazers; however, both grazers and collector-gatherers also were positively related to macroalgal biomass. Structural equation modelling also suggested that bottom-up interactions and abiotic factors drove the detritus-based food web, with shredder abundance being positively related to leaf litter (coarse particulate organic matter) levels, which, in turn, were positively related to canopy cover and negatively related to flow. These results emphasise the context dependency of trout effects on prey communities and of the relative importance of top-down versus bottom-up interactions on food webs, contingent on environmental conditions (flow, light, nutrients, disturbances) and the abundances and traits of component taxa. Invertebrate assemblage structure changed from a trout to a troutless configuration within a year or two after trout were lost owing to post-fire scouring flows or drought. Increases in OCH abundance after trout were lost were much more variable after drought than after fire. The reappearance of trout in one stream resulted in quick, severe reductions in OCH abundance. These results indicate that climate-change induced disturbances can result in the extirpation of a top predator, with cascading repercussions for stream communities and food webs. This study also emphasises the importance of preserving or restoring refuge habitats, such as deep, shaded, perennial, cool stream pools with high habitat and water quality, to prevent the extirpation of sensitive species and preserve native biodiversity during a time of climate change." (Authors)] Address: Scott D. Cooper, S.D., Dept of Ecology, Evolution, and Marine Biology, University of California, Santa Barbara, Santa Barbara, CA 93106, USA. Email: sdcooper@ucsb.edu

**23031.** Corcoran, S. (2024): Survey of Northern damselfly (*Coenagrion hastulatum*) management sites and new ponds. <https://british-dragonflies.org.uk/wp-content/uploads/2024/01/Survey-of-Northern-damselfly-Ponds-Stephen-Corcoran-2023final-1.pdf>: 27 pp. (in English) ["All 12 ponds where management work was undertaken and the 11 new ponds that were built in 2022 and 2023 were surveyed in the summer of 2023. At six of the new ponds *C. hastulatum* adults were seen, with breeding recording at five of these. Ten Odonata species were recorded at one of the new ponds, an excellent outcome given the pond is less than 18 months old. Creating more new ponds will provide habitat for new populations of Northern damselfly as well as many other wetland species, and this should be the focus of any new project. Three of the new ponds had virtually dried up with another one only half full of water. Management works has improved most of the 12 sites. Further management of ponds is recommended and advice on future pond design is detailed below." (Author)] Address: [https://british-dragonflies.org.uk/wp-content/uploads/2024/01/Survey-of-Northern-damselfly-Ponds-Stephen-Corcoran-2023\\_final-1.pdf](https://british-dragonflies.org.uk/wp-content/uploads/2024/01/Survey-of-Northern-damselfly-Ponds-Stephen-Corcoran-2023_final-1.pdf)

**23032.** Croisille, Y.; Bailleux, G.; Doré, F.; Escolar, Q.; Jourdain, B.; Kalfayan, M.; Krieg-Jacquier, R.; Masloski, F.; Melin, M.; Malvina, I. (2024): Premières observations de *Sympetrum vulgatum ibericum* Ocharan, 1985 (Odonata: Libellulidae) dans les Pyrénées-Atlantiques. *Martinia* 38(2): 20-26. (in French) [First records of *S. vulgatum ibericum* in Pyrénées-Atlantiques, France. Records are mapped and morphology of the taxon is documented and discussed.] Address: Croisille, Yoann, 27 route de Picharou, 24430 Courzac, France. Email: yoann.croisille24@gmail.com

**23033.** Dalvi, A.; Koli, Y.; Thakur, R. (2024): *Macromia kannharaiensis*, a new species of dragonfly (Insecta: Odonata: Macromiidae) from Maharashtra, India. *Zootaxa* 5447(2): 239-252. (in English) ["We describe a new species of dragonfly

*Macromia kannharaiensis* sp. nov., based on a male and a female specimens collected from Dodamarg taluka, Sindhudurg district, Maharashtra. The new species belongs to the calliope-group (species group initially discussed by Laidlaw 1922), and it can be distinguished by its congeners on the bases of specific colour pattern on postclypeus, markings on S2 and S8, shape and structure of caudal appendages and accessory genitalia. ... Figure 6: Caudal appendages of *Macromia* spp. in dorsal and lateral views: (a-b) *M. calliope*; (c-d) *M. callisto*; (e-f) *M. chiaphumensis*; (g-h) *M. corycia*; (i-j) *M. erato*; (k-l) *M. flavocolorata*. Figure 7: Caudal appendages of *Macromia* spp. in dorsal and lateral views: (a-b) *M. gerstaeckeri*; (c-d) *M. ida*; (e-f) *M. kannharaiensis*; (g-h) *M. polyhymnia*; (i-j) *M. septima*; (k-l) *M. urania*." (Authors)] Address: Dalvi, A., Br. Nath Pai Junior College, Kudal, Sindhudurg, Maharashtra 416520, India. Email: asdamv25@gmail.com

**23034.** Datto-Liberato, F.H.; Vinicus M. Lopez, V.M.; Quinaia, T.; Farias do Valle Junior, R.; Samways, M.J.; Juen, L.; Valera, C.; Guillermo-Ferreira, R. (2024): Total environment sentinels: Dragonflies as ambivalent/amphibiotic bioindicators of damage to soil and freshwater. *Science of The Total Environment* 934, 15 July 2024, 173110: 11 pp. (in English) ["Highlights: • Environmental Law currently ignores measures of soil quality and degradation. • Amphibiotic bioindicators may be used as tools to assess impacts on water and soil. • A nexus exists between pasture degradation, riparian integrity, and Odonata biodiversity. • Inland water assessments should consider that rivers and streams interact with adjacent land and their biodiversity. Abstract: Discerning the impact of anthropogenic impacts requires the implementation of bioindicators that quantify the susceptibilities and vulnerabilities of natural terrestrial and aquatic ecosystems to perturbation and transformation. Although legal regulations in Brazil recognize the value of bioindicators in monitoring water quality, the depreciation of soil conditions has yet to receive adequate attention. Thus, our study aimed to evaluate the potential of odonates (dragonflies and damselflies) as amphibiotic bioindicators to reflect the correlation between the degradation of aquatic and terrestrial habitats in pasture-dominated landscapes. We assessed the relationship between the biotic indices of Odonata and the conservation status of preserved riparian landscapes adjacent to anthropogenically altered pastures in 40 streams in the Brazilian savannah. Our results support the hypothesis that Odonata species composition may be a surrogate indicator for soil and water integrity, making them promising sentinels for detecting environmental degradation and guiding conservation strategies in human-altered landscapes. Importantly, while the Zygoptera/Anisoptera species ratio is a useful bioindicator tool in Brazilian forest, it is less effective in the open savannah here, and so an alternative index is required. Importantly, while the Zygoptera/Anisoptera species ratio is a useful bioindicator tool in Brazilian forest, it is less effective in the open savannah here, and so an alternative index is required. On the other hand, our results showed the Dragonfly Biotic Index to be a suitable tool for assessing freshwater habitats in Brazilian savannah. We also identified certain bioindicator species at both ends of the environment intactness spectrum." (Authors)] Address: Guillermo-Ferreira, R., Lestes Lab, Centre of Entomology & Experimental Biology, Federal Univ. of Triângulo Mineiro (UFTRM), Uberaba, MG, Brazil. Email: rhainer.ferreira@uftm.edu.br

**23035.** Davidson, A.T.; Stunkle, C.R.; Armstrong, J.T.; Hamman, E.A.; McCoy, M.W.; Vonesh, J.R. (2024): Warming and top-down control of stage-structured prey: linking theory to patterns in natural systems. *Ecology* 105:e4213:

16 pp. (in English) ["Warming has broad and often nonlinear impacts on organismal physiology and traits, allowing it to impact species interactions like predation through a variety of pathways that may be difficult to predict. Predictions are commonly based on short-term experiments and models, and these studies often yield conflicting results depending on the environmental context, spatiotemporal scale, and the predator and prey species considered. Thus, the accuracy of predicted changes in interaction strength, and their importance to the broader ecosystems they take place in, remain unclear. Here, we attempted to link one such set of predictions generated using theory, modeling, and controlled experiments to patterns in the natural abundance of prey across a broad thermal gradient. To do so, we first predicted how warming will impact a stage-structured predator-prey interaction in riverine rock pools between *Pantala* spp. dragonfly nymph predators and *Aedes atropalpus* mosquito larval prey. We then described temperature variation across a set of hundreds of riverine rock pools ( $n = 775$ ) and leveraged this natural gradient to look for evidence for or against our model's predictions. Our model's predictions suggested that warming should weaken predator control of mosquito larval prey by accelerating their development and shrinking the window of time that aquatic dragonfly nymphs could consume them in. This was consistent with data collected in rock pool ecosystems, where the negative effects of dragonfly nymph predators on mosquito larval abundance were weaker in warmer pools. Our findings provide additional evidence to substantiate our model-derived predictions, while emphasizing the importance of assessing similar predictions using natural gradients of temperature whenever possible. .... As in Davidson et al. (2021a), we considered predation of *Ae. atropalpus* mosquito larvae, but while Davidson et al. (2021a) focused on dragonfly nymphs of the species *Pachydiplax longipennis* and *Erythemis simplicicollis*, we instead focused on the most common genus in the system: *Pantala* spp. (A. T. Davidson, personal observations)."] Address: Vonesh, J.R., Center for Environmental Studies, Virginia Commonwealth University, Richmond, Virginia, USA

**23036.** Deans, A.R.; Porturas, L. (2024): Diversity and complexity of arthropod references in haiku. *PLoS ONE* 19(4): e0298865. <https://doi.org/10.1371/journal.pone.0298865>: 20 pp. (in English) ["Haiku are short poems, each composed of about 10 words, that typically describe moments in nature. People have written haiku since at least the 17th century, and the medium continues to be popular with poets, amateurs, educators, and students. Collectively, these poems represent an opportunity to understand which aspects of nature —e.g., which taxa and biological traits— resonate with humans and whether there are temporal trends in their representation or the emotions associated with these moments. We tested this potential using a mix of linguistic and biological methods, in analyses of nearly 4,000 haiku that reference arthropods. We documented the taxa and the life history traits represented in these poems and how they changed over time. We also analyzed the poems for emotion and tone. Our results reveal a mix of predictable trends and compelling surprises, each of which stand to potentially inform engagement strategies. At least 99 families of arthropods, in 28 orders, are represented in these haiku. The eight most commonly referenced taxa, from highest to lowest number of references, include: Lepidoptera, Hymenoptera, Diptera, Coleoptera, Araneae, Orthoptera, Hemiptera, and Odonata. Several common, conspicuous orders were never referenced, including Trichoptera, Plecoptera, and Megaloptera. The most commonly referenced traits relate to ecology (especially habitat, phenology, time of day), behavior (especially

sound production), phenotype (especially color), and locomotion (especially flight). The least common traits in haiku relate to arthropod reproduction and physiology. Our analyses revealed few obvious temporal trends in the representations of taxa, biological traits, or emotion and tone. The broader implications of these results and possible future directions are discussed.] Address: Deans, A.R., Frost Entomological Museum, The Pennsylvania State University, University Park, Pennsylvania, USA. Email: adeans@psu.edu

**23037.** de Araújo-Hoffmann, F.P.; Hoffmann, D.; Pelissari da Silva, A.; Correia da Rocha-Filho, L. (2024): Potential role of damselflies in the pollination of *Callitriche rimosa* Fasset. *Austral Ecology* 49(5), e13529: (in English) ["While most flowering plant species rely on animal pollinators, approximately 10% of angiosperms utilize wind or water for pollination. Moreover, certain species can have mixed pollination system —ambophily— wherein both biotic and abiotic agents contribute to pollen transport. Upon frequent observation of Coenagrionidae perching on *C. rimosa* (Plantaginaceae), an aquatic herb with small flowers protruding above the water's surface, we hypothesized their potential contribution to the pollination of this primarily abiotically pollinated plant. Observations were conducted along the shores of a pond in southern Brazil. Damselflies were seen carrying pollen grains on their legs from *C. rimosa* leaves, where pollen falls from the anthers and remains exposed. Given damselflies' activity levels during summer, incidental contact with *C. rimosa* reproductive structures facilitates cross-pollination. This interaction may facilitate both plants and insects, considering damselflies' dependence on freshwater bodies and use of *C. rimosa* leaves for perching. Accessory pollen presentation on leaves may convert occasional visitors into pollinators, expanding the pollination niche of *C. rimosa*. Recognizing lesser-known pollinators like damselflies is crucial for understanding plant reproduction in diverse ecosystems." (Authors)] Address: de Araújo-Hoffmann, Francielle Paulina, Universidade Estadual do Rio Grande do Sul – UERGS, Unidade Hortênsias, R. Assis Brasil 842, Centro, São Francisco de Paula, Rio Grande do Sul 95400-000, Brazil. Email: franciaraalp@yahoo.com.br

**23038.** Dias de Oliveira, T.M.; Fôlha Ferreira, E.D.; Pereira de Gouvêa, T.; Vilela, S.D.; de Castro Jacques, G.; Magalhães de Souza, M. (2024): Odonatofauna in a Brazilian Cerrado area, featuring the rediscovery of two species. *Revista Chilena De Entomología* 50(2): 171-192. (in English, with Portuguese summary) ["The Cerrado harbors rich biodiversity and yet faces various anthropogenic pressures, an alarming situation that justifies fauna inventory studies, particularly insects, often overlooked in such endeavors. Additionally, many locations within the Cerrado lack information about the odonatofauna, including Conservation Units (CUs), considered the main tools for biodiversity conservation in Brazil. The objective of our study is to report the Odonata community occurring in the Minas Gerais portion of the Parque Nacional Grande Sertão Veredas (PNGSV), the conservation status of species, taxonomic information for some taxa, and compare the Odonata community along wet and dry seasons. The study was conducted from September 2022 to April 2023, with a total of 576 hours of sampling. We collected 601 specimens from 83 species, highlighting two new species (one recently described and other to be described elsewhere), eight new records for the state, and the rediscovery of the species *Progomphus geijskesi* Needham, 1944, collected for the first time in Brazil since 1918, and *Argia botacudo* Calvert, 1909, previously known only from the type material. The significant richness sampled, new

taxa, new records, and the presence of species at some risk of extinction reinforce the Cerrado's relevance as a global hotspot. It also underscores the importance of CUs as a tool to ensure the protection of Odonata communities in Brazil and highlights the need to strengthen public policies to guarantee investments and foster future financial resources for the protection of Brazilian biota, especially for conducting more inventory studies in the Cerrado.] Address: Dias de Oliveira, T.M., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas - Campus Inconfidentes, Inconfidentes, Minas Gerais, Brazil.

**23039.** Dietzel, A.; Moretti, M.; Cook, L. (2024): Shrinkage-based Bayesian variable selection for species distribution modelling in complex environments: An application to urban biodiversity. *Ecological Informatics* 81, 102561: 9 pp. (in English) ["Highlights: • Big ecological data can improve species distribution modelling. • Covariate selection in sparse, high-dimensional problems is challenging. • We apply cross-validated Bayesian variable selection with shrinkage priors. • We show importance of aquatic habitat and vegetation types for urban biodiversity. • We disentangle diverse habitat needs of species with different life history strategies. Abstract: Robust, quantitative understanding of the diverse ecological needs of species is needed to inform effective biodiversity conservation, now and in the future, but is lacking for most species. The advent of "big data" in ecology presents unprecedented opportunities to fill this gap and to disentangle the diverse drivers of biodiversity. Variable and model selection in sparse (small sample sizes for most species), high-dimensional (large pool of candidate predictors) problems is, however, non-trivial. Here, we employ cross-validated Bayesian projection predictive variable selection and shrinkage priors to identify, from a list of 70 ecological and biophysical candidate predictor variables, the minimal subset that best predicts the habitat preferences and distributions of 103 species of amphibians, birds, butterflies, dragonflies, and grasshoppers using the city of Zurich, Switzerland, as a case study. We contrast the predictive performance and ecological inference of models fit with the full set of predictors using shrinkage priors (exhaustive models) to models fit with a limited number of predictors obtained by compiling predictors from the full list of predictors using weakly informative priors (selective models). We show that exhaustive models excel in predictive performance, albeit at the cost of greater model complexity compared to the selective models. Results from the selective models reveal the importance of access to aquatic habitat for a wide range of taxa, relative to other drivers such as urbanisation, vegetation and environmental hazards. These results are complemented by more nuanced insights from the exhaustive models into the importance of specific types of aquatic habitat (ponds, lakes, streams) and vegetation (herb, shrub, canopy cover) for the distribution of urban biodiversity, as well as the different spatial scales at which drivers are of predictive relevance. Our findings demonstrate the potential of shrinkage-based Bayesian variable selection to leverage big ecological data for species distribution modelling, and contribute to the development of concrete guidelines for urban planning and infrastructure design that account for biodiversity conservation." (Authors)] Address: Dietzel, A., Swiss Federal Inst. Aquatic Science & Tech. (EAWAG), Switzerland. Email: andreas.dietzel@eawag.ch

**23040.** Duchet, C.; Grabicová, K.; Kolar, V.; Lepšová, O.; Švecová, H.; Csercsa, A.; Zdvihalová, B.; Randák, T.; Boukal, D.S. (2024): Combined effects of climate warming and pharmaceuticals on a tri-trophic freshwater food web. *Water Research* 250, 121053: (in English) ["Multiple anthropogenic

stressors influence the functioning of lakes and ponds, but their combined effects are often little understood. We conducted two mesocosm experiments to evaluate the effects of warming (+4 °C above ambient temperature) and environmentally relevant concentrations of a mixture of commonly used pharmaceuticals (cardiovascular, psychoactive, antihistamines, antibiotics) on tri-trophic food webs representative of communities in ponds and other small standing waters. Communities were constituted of phyto- and zooplankton and macroinvertebrates (molluscs and insects) including benthic detritivores, grazers, omnivorous scrapers, omnivorous piercers, water column predators, benthic predators, and phytophilous predators. We quantified the main and interactive effects of warming and pharmaceuticals on each trophic level in the pelagic community and attributed them to the direct effects of both stressors and the indirect effects arising through biotic interactions. Warming and pharmaceuticals had stronger effects in the summer experiment, altering zooplankton community composition and causing delayed or accelerated emergence of top insect predators (odonates). In the summer experiment, both stressors and top predators reduced the biomass of filter-feeding zooplankton (cladocerans), while warming and pharmaceuticals had opposite effects on phytoplankton. In the winter experiment, the effects were much weaker and were limited to a positive effect of warming on phytoplankton biomass. Overall, we show that pharmaceuticals can exacerbate the effects of climate warming in freshwater ecosystems, especially during the warm season. Our results demonstrate the utility of community-level studies across seasons for risk assessment of multiple emerging stressors in freshwater ecosystems." (Authors)] Address: Duchet, Claire, Dept Ecosystem Biol., Fac. Sci., Univ. South Bohemia, Branišovská 1760, 37005 České Budějovice, Czech Republic. Email: cduchet@prf.jcu.cz

**23041.** Eraghi, S.H.; Toofani, A.; Guilani, R.J.A.; Ramezanzpour, S.; Bijma, N.N.; Sedaghat, A.; Yasamandaryaei, A.; Gorb, S.; Rajab, H. (2024): Mechanical intelligence in insect wings: The role of the basal complex in wing shape-morphing. Published: 03 April 2024 by MDPI in The 1st International Online Conference on Biomimetics session Biomimetics of Materials and Structures: (in English) ["The flight muscles of birds and bats actively control wing deformations, while insect wings rely mainly on passive mechanisms determined by their adaptive wing structures. This study delves into the unique design of insect wings, specifically focusing on the 3D component known as the basal complex situated in the wing's proximal region. Our research, employing a comprehensive array of multidisciplinary methods, including modern imaging techniques, mechanical testing, finite element analysis, parametric modelling, conceptual design, and 3D printing, rigorously tests the hypothesis that the basal complex plays a pivotal role in determining the quality and quantity of wing deformations during flight. The results support this hypothesis, revealing that variations in the basal complex's material and structural design elements among dragonfly and damselfly species lead to significant differences in symmetric or asymmetric deformation patterns observed in insect wings in flight. Our systematic investigation of geometric parameters in a set of numerical models further indicates adaptations for achieving maximum camber under loading. Inspired by the basal complex, we introduce a shape-morphing mechanism applicable to wind turbine blades, simplifying actuation and control systems. This research not only contributes to understanding the biomechanics of complex insect wings but also offers valuable insights for engineering shape-morphing systems with enhanced mechanical intelligence and simplified control requirements." (Authors)]



<https://sciforum.net/paper/view/17061>] Address: Gorb, S., Functional Morphology and Biomechanics, Institute of Zoology, Kiel University, Kiel, Germany

**23042.** Eshghi, S.; Rajabi, H.; Shafaghi, S.; Nabati, F.; Nazarian, S.; Darvizeh, A.; Gorb, S.N. (2024): Allometric scaling reveals evolutionary constraint on Odonata wing cellularity via critical crack length. *Advanced Science* 2024, 2400844: 8 pp. (in English) ["Scaling in insect wings is a complex phenomenon that seems pivotal in maintaining wing functionality. In this study, the relationship between wing size and the size, location, and shape of wing cells in Odonata is investigated, aiming to address the question of how these factors are interconnected. To this end, Wing Gram, the recently developed computer-vision-based software, is used to extract the geometric features of wing cells of 389 dragonflies and damselfly wings from 197 species and 16 families. It has been found that the cell length of the wings does not depend on the wing size. Despite the wide variation in wing length (8.42 to 56.5 mm) and cell length (0.1 to 8.5 mm), over 80% of the cells had a length ranging from 0.5 to 1.5 mm, which was previously identified as the critical crack length of the membrane of locust wings. An isometric scaling of cells is also observed with maximum size in each wing, which increased as the size increased. Smaller cells tended to be more circular than larger cells. The results have implications for bio-mimetics, inspiring new materials and designs for artificial wings with potential applications in aerospace engineering and robotics." (Authors)] Address: Eshghi, S., Dept Functional Morphology & Biomechanics Zool. Inst. Kiel Univ. 24118 Kiel, Germany

**23043.** Fan, G., Liu, P.; Nel, A.; Jarzembowski, E.A.; Yao, C.; Zheng, D. (2024): Discovery in Burmese amber of the youngest-known aktassiid dragonfly (Odonata: Anisoptera). *Zootaxa* 5424(4): 497-500. (in English) ["The first aktassiid dragonfly is described from mid-Cretaceous Burmese amber. It belongs to the family Aktassiidae Pritykina, 1968 on account of its large size, dense wing cell cover, weakly zigzagged Rps1, and broad areas between IR2 and RP2 and between IR1 and RP2. Distally, it has a very broad area between RP1 and IR1, distinguishing it from Aktassia Pritykina, 1968, but it is not named pending the discovery of more material. The new dragonfly is the youngest-known representative of Aktassiidae, which was previously recorded from the Middle-Upper Jurassic to Lower Cretaceous as adpression fossils." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@mnhn.fr](mailto:anel@mnhn.fr)

**23044.** Farias, A.B.S.; Ventura, I.M.C.; Vilela, D.S.; Santos, J.C. (2024): Description of the female of *Leptagrion itabaiana* Vilela, Lencioni & Santos, 2021 (Odonata: Coenagrionidae) from Serra of Itabaiana National Park, Northeastern Brazil. *Zootaxa* 5442(2): 273-280. (in English, with Portuguese summary) ["The unknown female, *L. itabaiana* was described, illustrated, and diagnosed based on two specimens collected in the Serra of Itabaiana National Park (female, Brazil, Sergipe, Areia Branca, Serra of Itabaiana National Park, -10.7484, -37.3390, 221 m, 24.v.2023, A. B. S. Farias leg., UFS). *L. itabaiana* female can be separated from their congeners by the following characteristic combinations: shape of the prothoracic hind lobe, body size, and ovipositor valves size." (Authors)] Address: Farias, A.B., Programa de Pós-Graduação em Ecologia e Conservação, Universidade Federal de Sergipe, Sao Cristovao, Sergipe, Brazil. Email: [antoniobrunofarias@gmail.com](mailto:antoniobrunofarias@gmail.com)

**23045.** Farias, A.B.S.; Santos-Neto, A.M.; Viana, G.M.; Ventura, I.M.C.; Santos, S.A.; Régis-Silva, C.C.; Vilela, D.S.;

Santos, J.C.C. (2024): Checklist of Odonata species from Serra of Itabaiana National Park, and an update and new records for the state of Sergipe, Brazil. *Biota Neotropica* 24(2): e20231609: 12 pp. (in English, with Portuguese summary) ["Understanding species diversity and distribution cannot be overstated in the development of effective management and biological conservation strategies. Our goal was to address the knowledge gap regarding dragonfly diversity in the northeastern Atlantic Forest, specifically in the Serra of Itabaiana National Park in the state of Sergipe, Brazil. During our study, we recorded 40 species and 969 Odonata individuals across six families and 25 genera. This study contributes 27 new occurrence records of Odonata species in Sergipe, Brazil, highlighting the significance of preserving and protecting the habitats of this region. Our findings provide valuable information on the distribution of dragonfly species in the state of Sergipe and the Northeast region." (Authors)] Address: Farias, A.B., Programa de Pós-Graduação em Ecologia e Conservação, Univ. Federal de Sergipe, Sao Cristovao, Sergipe, Brazil. Email: [antoniobrunofarias@gmail.com](mailto:antoniobrunofarias@gmail.com)

**23046.** Farias, A.B.S.; Santiago Pereira, M.M.; Ribero Barao, K.; Viela, D.S.; Santos, J.C. (2024): Description of the female of *Heteragrion lencionii* Vilela, Farias & Santos, 2021 (Odonata: Heteragrionidae), from Northeastern Brazil, with some ecological notes. *Zootaxa* 5453(2): 263-270. (in English, with Portuguese summary) ["Group A of the genus *Heteragrion* Selys, 1862 comprises 34 species, of which 19 have complete descriptions of females. The aim of this study was to describe the female *H. lencionii* based on three specimens collected at the Federal Institute of Sergipe (Brazil, Sergipe, São Cristóvão, -10.9198, -37.1862, 30 m asl, A.B.S. Farias leg., UFS), including mating specimens. Here, we provide a detailed diagnosis and illustrations of the female, and compare it with its closest congeners. *H. lencionii* female is distinguished from others by the shape of the intersternite, shape of the posterior lobe of the prothorax, and coloration of the head. The distribution extensions are relevant because the species has not been recorded from the type locality since its original description." (Authors)] Address: Santos, J.C., Depto de Ecologia, Universidade Federal de Sergipe, São Cristóvão, Sergipe, Brazil. Email: [jcsantosbio@gmail.com](mailto:jcsantosbio@gmail.com)

**23047.** Ferreira, E.D.F.; Dias de Oliveira, T.M.; de Souza, M.M.; Lencioni, F.A.A.; Vilela, D.S. (2024): The F-0 larva of *Angelagrion nathaliae* Lencioni, 2008 from Southern Minas Gerais state, Brazil (Odonata: Coenagrionidae). *Zootaxa* 5433(3): 419-428. (in English, with Portuguese summary) ["In this study, we described the last instar larva of *A. nathaliae*, the first one described for this genus, collected in Inconfidentes and Uberlândia municipalities, Minas Gerais state, Brazil. We compared the diagnostic characters of *A. nathaliae* with some species of *Telebasis* Selys, 1865. Despite some similarities with *Telebasis* larvae, the larva of *A. nathaliae* can be distinguished from the family by a combination of characters of the mouthparts and gills." (Authors)] Address: Ferreira, E.D.F. Instituto Federal de Educação e Tecnologia do Sul de Minas, Campus Inconfidentes, Inconfidentes, Minas Gerais, Brasil. Email: [eike.ferreira@alunos.ifsuldeminas.edu.br](mailto:eike.ferreira@alunos.ifsuldeminas.edu.br)

**23048.** Ferreira, E.H. (2024): Odonata (Insecta) na Reserva de Desenvolvimento Sustentável do Uatumã, Amazonas, Brasil: taxonomia e inventário. Dissertação (Mestrado - Programa de Pós-Graduação em Entomologia) - Coordenação do Programa de Pós-Graduação, INPA: 112 pp. (in Portuguese) ["In this work, we present the faunal survey of Odonata species occurring in the Uatumã Sustainable Development Reserve (RDS), as well as a dichotomous key to



identify the genera occurring in this location. RDS is a Conservation Unit (UC) located in the state of Amazonas, Brazil. Knowledge about the existing biodiversity in the study is important for the preservation and conservation of the place, which is home to an exuberant biodiversity of Brazilian fauna and flora. Our objective was to contribute information about the distribution of Odonata to the Amazon biome. For this, we collected in the months of August and November 2022 and September 2023 throughout the three poles that make up the RDS, totaling 32 sampling points. The collection methods were through active search with the aid of an entomological net and passive collection with the aid of flight interception traps, of the Malaise type. Seven families, 33 genera and 60 species were catalogued, one of these represents a new record for Brazil: *Oligoclada garrisoni* and five for the state of Amazonas: *Micrathyria occipita*; *Micrathyria dunklei*; *Metaleptobasis diceras*; *Phoenicagrion flavescens* and *Protoneura paucinervis*. We created a dichotomous key to identify adults collected in the RDS, organized into Suborder, Family and Genus. We reinforce the need for new studies in unexplored areas in the Amazon in order to guarantee the integrity and biodiversity of the biome." (Author)] Address: <https://repositorio.inpa.gov.br/handle/1/40418>

**23049.** Ferreira, E.H.; Vilela, D.S.; Hamada, N. (2024): The F-0 exuvia of *Protoneura paucinervis* Selys, 1886 (Zygoptera: Protoneurinae): description and diagnosis. *Zootaxa* 5437(2): 285-293. (in English, with Portuguese summary) ["The F-0 exuvia of *P. paucinervis* is described, illustrated, and diagnosed by comparison with the hitherto known *Protoneura* Selys in Sagra, 1857 larvae. The larvae of *P. paucinervis* can be distinguished from its congeners by the following combination of characters: palpal lobe squared bearing three strong teeth, 5 palpal setae, and nodus of lateral gills at 0.77 of its length." (Authors)] Address: Ferreira, Eloiza, Instituto Nacional de Pesquisas da Amazônia; Coordenação de Biodiversidade; Av. André Araújo; 2.936; 69067-375 Manaus; Amazonas; Brazil

**23050.** Fukuoka, T.; Tamuru, R.; Yamasaki, S.; Ohba, S.-y. (2024): Frozen crickets are a useful prey for rearing the diving beetle *Cybister sugillatus* (Coleoptera: Dytiscidae) larvae: a growth comparison with raised on field-collected prey. *Jpn. J. Environ. Entomol. Zool.* 35(1): 1-7. (in Japanese, with English summary) ["Populations of many of the diving beetles (Coleoptera: Dytiscidae) in Japan are declining. Effective captive breeding techniques are needed to elucidate the ecology of these species and for ex situ conservation. For the stable rearing and breeding, it is important to provide appropriate prey for larval growth that can also be supplied continuously. In this study, we reared *Cybister sugillatus* larvae using three prey treatments: field-collected prey (Odonata nymphs and mixed Odonata nymph tadpole treatments) and frozen crickets. We compared larval survival rates, larval periods, and body sizes of emerged adults among treatments. *Cybister sugillatus* larvae reared on frozen crickets showed no difference in survival rates compared to field-collected prey. Furthermore, no differences were observed in the total body length and wet weight of the emerged adults. Differences in the larval period were observed in the second instar, which were thought to be due to the effects of prey size and feeding frequency. Therefore, frozen crickets can be a useful alternative food for rearing and breeding *C. sugillatus*." (Authors)] Address: Fukuoka, T, Dept of Environmental Solution Technology, Graduate School of Science & Technology, Ryukoku University, 1-5 Yokotani, Seta Oe, Otsu. Shiga 520-2194. Japan

**23051.** Fuller, G.; Wirdateti; Nekaris, K.A.I. (2024): Evaluating the use of chemical weapons for capturing prey by a venomous mammal, the Greater Slow Loris (*Nycticebus coucang*). *Animals* 2024, 14, 1438. <https://doi.org/10.3390/ani14101438>: 13 pp. (in English) ["Simple Summary: Having venom is a rare trait among mammals and even rarer among primates. Slow and pygmy lorises are the only venomous primates, and they possess a unique "two-step" venom system. When threatened, they release a secretion from a gland on their forearm and lick it, activating the venom by mixing it with their saliva. There are several hypotheses for why slow and pygmy lorises evolved this unique trait. Venom can be used to capture prey, to defend against predators or parasites, or for competition with other slow or pygmy lorises. We tested the hypothesis that venom is used to capture prey by experimentally offering various arthropod prey items to 22 wild-caught greater slow lorises living in a rescue center. We observed how their behavior was affected by prey characteristics including size, potential for escape, and toxicity. The few venom-related behaviors we observed only occurred in a defensive context, suggesting that the greater slow lorises do not use their venom as a means of subduing prey. These negative results are consistent with the growing body of evidence that pygmy and slow lorises primarily use venom in competition with members of their own species. Abstract: Few mammals are venomous, including one group of primates—slow (*Nycticebus* spp.) and pygmy (*Xanthonycticebus* spp.) lorises. Hypotheses for the evolutionary function of venom in these primates include defense from predators or ectoparasites, communication or competition with conspecifics, and the capture of prey. We tested the prey capture hypothesis in 75 trials with 22 wild-caught greater slow lorises (*N. coucang*) housed in a rescue center in Java, Indonesia. We experimentally offered the slow lorises arthropod prey items varying in size, escape potential, and toxicity and recorded venom-related and predatory behaviors using live and video observations. The slow lorises visually targeted arthropod prey, approached it quickly and efficiently, and captured it with a manual grasping motion. They rarely performed venom-related behaviors and seemed to do so in a defensive context. The slow lorises exhibited little variation in pre-capture behavior as a function of prey size or escape potential. In response to noxious prey, the slow lorises performed tongue-flicking and other investigative behaviors that indicate they are using chemosensory input to assess prey characteristics. These data suggest it is unlikely that slow lorises use chemical weapons to subdue arthropod prey and may support, instead, a defensive function for slow loris venom." (Authors) The loris didn't try to catch Odonata.] Address: Fuller, Grace, Nocturnal Primate Research Group, School of Social Sciences and Law, Oxford Brookes University, Oxford OX3 0BP, UK. Email: [gfuller@dzs.org](mailto:gfuller@dzs.org)

**23052.** García-Girón, J.; Múrria, C.-; Arnedo, M.A.; Bonada, N.; Cañedo-Argüelles, M.; Derka, T.; Fernández-Calero, J.M.; Li, Z.; Tierno de Figueroa, J.M.; Xie, Z.; Heino, J. (2024): A time-calibrated 'Tree of Life' of aquatic insects for knitting historical patterns of evolution and measuring extant phylogenetic biodiversity across the world. *Earth-Science Reviews* 252(5):104767: (in English) ["Highlights: • Mapping the evolutionary pathway of aquatic insects has proven to be a complex task. • We present the largest time-calibrated phylogeny for key groups of aquatic insects. • Important events in Earth's geological history shaped aquatic insect macroevolution. • Phylogenetic variation is dependent on the geographical and environmental context. • This 'Tree of Life' contains a great deal of useful information for biogeosciences. Abstract: The extent to which the sequence and

timing of important events on Earth have influenced biological evolution through geological time is a matter of ongoing debate. In this context, the phylogenetic history of aquatic insects remains largely elusive, and our understanding of their chronology is fragmentary and incomplete at best. Here, after gathering a comprehensive data matrix of 3125 targeted rRNA and protein-coding gene sequences from nine independent gene portions, we built a well-supported time-calibrated phylogenetic tree comprising almost 1200 genera that represent a large proportion of extant families of Odonata, Ephemeroptera, Plecoptera, and Trichoptera. We reviewed the main evolutionary and historical scenarios for each aquatic insect lineage as revealed by our best-scoring molecular tree topology, major ancient radiations, calibrated divergence estimates, and important events in geological history related to the spatial arrangement of land masses, continental drift, and mass extinctions. Molecular dating using the birth-death model of speciation, with a lognormal-relaxed model of sequence evolution informed by transcriptomic constraints, suggested that (i) Odonata first radiated approximately 220 million years (Ma) ago and most extant lineages thrived independently after the Triassic–Jurassic (Tr–J) extinction event; (ii) mayflies underwent bursts of diversification during the Cretaceous; (iii) ancestral divergence separating the stonefly suborders Arctoperlaria and Antartoperlaria was consistent with geographical isolation after vicariant fragmentation and tectonic splitting of the supercontinent Pangaea around 170Ma ago; and (iv) the most recent common ancestors of caddisflies extended back to the time of Pangaea, supporting the earliest offshoot of the ‘retreat-making’ Annulipalpia and a sister relationship between the predatory free-living Rhyacophilidae and Hydrobiosidae. Our ‘Tree of Life’ of aquatic insects also resolved shallow phylogenetic relationships related to key evolutionary innovations, such as the convergent evolution of exophytic oviposition in dragonflies or the Jurassic origins of the burrowing lifestyle in mayflies. In this study, we also illustrate how our time-calibrated phylogeny can help to integrate phylogenetic aspects in biogeographical and ecological research across the world. To do so, we used three empirical datasets of stream insects from subarctic Finland, northeastern Spain, and southeastern Tibet as exemplary cases. These examples of application tested ecogeographical mechanisms related to (i) the responses of size structural resemblances to phylogenetic constraints, and patterns of (ii) phylogenetic relatedness and (iii) phylogenetic uniqueness along elevational and flow-intermittence gradients, respectively. We emphasise how specific details capturing different aspects of phylogenetic variation are dependent on the geological, geographical, and environmental contexts in different drainage basins. We finally highlight potential venues for future research, including evaluations of geographical patterns of phylogenetic diversity in space and time, evolution of ecological characters in relation to palaeoclimatic variation, and development of complementary algorithms for conservation prioritisation of evolutionarily valuable bioregions for aquatic insects. Overall, we hope that this work will stimulate multidisciplinary research efforts among different areas of the biogeosciences towards safeguarding the phylogenetic heritage of extant aquatic insects across the world.” (Authors) Odonata are treated in Chapter 4.1.] Address: García-Girón, J., Geography Research Unit, Univ. of Oulu, P.O. Box 3000, FI-90014 Oulu, Finland. Email: Jorge.Garcia-Giron@oulu.fi

**23053.** Garrison, M.; Tennessen, K.T. (2024): Nymph Cove: Identification to Genus: Petaluridae. *Argia* 36(1): 19-21. (in English) [Larvae of *Tachopteryx thoreyi* and *Tanypteryx hageni* are figured and discussed.] Address: Tennessen, K., 125

N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktensesen@centurytel.net

**23054.** GdO (2024): Tagungsband. 41. Jahrestagung der GdO in Bonn 2024. 15.-17.3.2024 im GSI (Gustav-Stresemann-Institut) in Bonn: 37 pp. (in German) [Table of contents: Brockhaus, Thomas - Situation of *Somatochlora alpestris* in the Erzgebirge 9; Buczyński, Pawel et al - Buffer zone does matter: GIS in analyzes of the environmental drivers of the occurrence of dragonflies 10; Conze, Klaus-Jürgen - Danger and its causes for dragonflies in Germany - current status 11; Dedolf, Tamara - Dragonfly fauna in degraded moors in southern Brandenburg - assessment of development (1977-2023) and protective measures 12; Entling, Martin H. - Effects of Bti-based mosquito control on dragonflies (and spiders) .. 13; Fahrenholz, Arne - Investigation of the dispersal behavior of *Orthetrum coerulescens* in a ditch system near Stenwede, NRW 14; Fiebrich, Manuel - The dragonfly fauna of the Wollmatinger Ried (Lake Constance) 15; Gieser, Julia T. et al. - Protection of dragonfly communities on urban watercourses 16; Gorb, Stanislav - Dragonflies as objects of bionics - patents of nature 17; Großer, Marie et al. - Road bridges as barriers: How do river dragonflies behave? (Example Delme, Lower Saxony) ... 18; Günther, Andre et al. - News about *Erythromma lindenii* in East Germany - a working status 19; Hartung, Matthias - Odonatological report in Bad Belzig 20; Hunger, Holger et al. - Significant declines in the population of *Ophiogomphus cecilia* in Baden-Württemberg 21; Kokott, Julian et al. - Frightening and fascinating - dragonflies from the perspective of young people 22; Kunz, Bernd - Quo vadis, Gomphidae? 23; Martens, Andreas et al. - The moulting of the chewing stomach of the dragonfly larvae 24; Mauersberger, Rüdiger - The question again and again: Does *Calopteryx splendens* sometimes reproduce in lakes? 25; Mauser, Ken et al. - Effects of water pollution on the wing symmetry of the horseshoe azure (*Coenagrion puella*) 26; Ott, Jürgen et al. - Moor dragonflies in the Palatinate – in constant decline 27; Packmor, Jana et al. - Evaluation of a peat moss paludiculture as a habitat for dragonflies - 6 years of monitoring in the Hankhauser Moor 28; Rautenberg, Tobias et al. - Dragonflies in the western Ruhr area - developments in the last decades 29; Schleichauf, Hanna C. et al. - Interactive effects of extreme water level fluctuations and mosquito control with Bti on dragonflies. 30; Schiedewitz, Susen - On the influence of natural year-round grazing on the edges of meadow ditches on the dragonfly communities of an area 31; Schmitz, Michael - Entry of *Anax junius* into western Europe in autumn 2023 32; Tarkowski, Adam - Peat pools - a rescue wheel for aquatic fauna based on the example of dragonflies 33; T. Wirsing - Recording dragonflies and grasshoppers with the FaunaMAppEr and the question of data interfaces 34; W. Zessin, Wolfgang - The youngest about the oldest dragonflies 35; entry list Map of the places from which the participants come Note sheets (Google Translate)] Address: [https://www.libellula.org/wp-content/uploads/2024/03/2024\\_GdO-Bonn\\_Abstractband\\_20240305\\_ohne-Teilnehmer\\_liste.pdf](https://www.libellula.org/wp-content/uploads/2024/03/2024_GdO-Bonn_Abstractband_20240305_ohne-Teilnehmer_liste.pdf)

**23055.** Germ, M.; Tertinek, Z.; Zelnik, I. (2024): Diversity of macrophytes and macroinvertebrates in different types of standing waters in the Drava field. *Water* 2024, 16(8), 1130; <https://doi.org/10.3390/w16081130>: 19 pp. (in English) [“The diversity of macrophytes and macroinvertebrates in small standing waters of different origins and characteristics was investigated. This survey covered 19 ponds in the Drava field in northeastern Slovenia. The influence of the macrophytes on the macroinvertebrates was investigated and the main environmental factors that had the most significant influence

on the composition of the two communities were identified. Sixty-seven taxa of macrophytes and seventy-three families of macroinvertebrates were identified. We found that a diverse macrophyte community has a positive effect on the macroinvertebrate community [including "Coenagrionidae" and "Odonata"]. In contrast, the dominance of a single macrophyte species has a strong negative influence on the richness of the macroinvertebrate community. The taxonomic richness and abundance of the macroinvertebrate community in the natural ponds was statistically significantly higher than that in artificial ponds. The significant differences in the environmental characteristics between the natural and artificial ponds, such as the macrophyte cover, conductivity, and riparian zone width, may account for these differences. Our study suggests that a greater diversity of macrophyte and macroinvertebrate communities in natural ponds is enabled by abundant but diverse macrophyte cover, low phosphorus content, and wide riparian zones, which require appropriate management of ponds and their catchments." (Authors)] Address: Zelnik, I., Dept of Biology, Biotechnical Faculty, University of Ljubljana, Jamnikarjeva 101, 1000 Ljubljana, Slovenia. Email: igor.zelnik@bf.uni-lj.si

**23056.** Girgente, H.E.; McIntyre, N.E. (2024): Evaluation of speculated reproductive habitat for *Somatochlora calverti* (Corduliidae), a rare and range-restricted dragonfly. *Journal of Odonatology* 27: 85-92. (in English) ["Globally, freshwater ecosystems and the organisms that depend on them are at risk. Odonates have a history of being used as bioindicators of freshwater habitat quality due to their wide range in environmental sensitivities across species and because they are relatively accessible. However, the nymphal stage is severely understudied compared to the adult stage, which inhibits conservation efforts. *S. calverti* is a rare species of dragonfly in the family Corduliidae; members of the genus *Somatochlora* are notoriously difficult to find and collect in the field as nymphs and adults. *S. calverti* is known primarily from the Florida panhandle but has been documented in Alabama, Georgia, and South Carolina. The nymph of this species is speculated to use seepage streams analogous to sympatric congeners; however, the nymph has never been collected in the field and, therefore, its specific microhabitat is unknown. We conducted a review from a suite of informational sources to generate a holistic consensus on what is defined to be suitable reproductive habitat for *S. calverti*. Sources identified eight major environmental characteristics that are likely to harbor *S. calverti*: shallow seepage streams, including steephead ravines, with undercut banks and mats of *Sphagnum* moss adjacent to intact sandhill forest. These ecosystems are being lost and degraded by anthropogenic activity, which has considerable impacts on the persistence of habitat specialists, including *S. calverti*, and managers' ability to conserve them." (Authors)] Address: Girgente, Hannah E., Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131 USA

**23057.** Goodman, A.M.; Beatty, C.D.; Büsse, S.; Ubukata, H.; Miyazaki, T.; Blair, M.E.; Ware, J.L. (2024): Paleoeological niche modeling of *Epiophlebia* (Epiophlebioptera: Epiophlebiidae) reveals continuous distribution during the Last Glacial Maximum. *International Journal of Odonatology* 27: 50-76. (in English) ["Disjunct biogeographic patterns of similar species remain enigmatic within evolutionary biology. Disparate distributions typically reflect species responses to major historical events including past climate change, tectonics, dispersal, and local extinction. Paleo-ecological niche modeling (PaleoENM) has proven useful in inferring the causes of disjunct distributions within charismatic and well-

studied taxa including mammals, plants, and birds, but remains under-explored in insects. The relictual Asian dragonfly genus *Epiophlebia* (Suborder Epiophlebioptera: Epiophlebiidae) allows us a novel opportunity to explore PaleoENM in the context of disjunct distributions due to their endemism to the Japanese islands, Himalayas, China, and North Korea. The aim of this paper is to investigate the potential causes behind the modern distribution of *Epiophlebia* by inferring the historical range of these species within the Last Glacial Maximum (LGM), thereby highlighting the utility of PaleoENM in the context of odonate biogeography. Our results indicate possible past routes of gene flow of *Epiophlebia* during the LGM due to high habitat suitability of the genus stretching from the Himalayas to Japan. Furthermore, our results predict several unsampled areas which have the potential to harbor new populations of the genus." (Authors)] Address: Goodman, A.M., American Museum of Natural History, Division of Invertebrate Zoology, NY, NY, 10024, USA. Email: agoodman@amnh.org

**23058.** Góral, N. (2024): Occurrence and mobility of dragonflies (Odonata) in fish ponds in Piaski (Lublin Province). *Odonatrix* 207: 11 pp. (in Polish, with English summary) ["In 2019, 24 species of dragonflies were recorded in five fish ponds, among them, three species legally protected in Poland – *Sympecma paedisca*, *Ophiogomphus cecilia* and *Stylurus flavipes* – as well as one species in the category VU (vulnerable) on the Red List of dragonflies of Europe – *Sympetrum depressiusculum*. Numerous individuals were also recorded of two "southern" species – *Crocothemis erythraea* and *Sympetrum fonscolombii*. At all the sites, the dragonfly species occurred somewhat later than the expected flight dates, and only a small number of the species were confirmed or probable breeders. The data suggest a high level of mobility of species in the study area and a dynamic faunal composition." (Authors)] Address: Góral, Nikola, Uniwersytet Adama Mickiewicza, Wydział Biologii, Laboratorium Dydaktyki i Ochrony Przyrody, ul. Uniwersytetu Poznańskiego 6, 61-614 Poznań, Poland. Email: goral.nikola@gmail.com

**23059.** Hämäläinen, M.; Fliedner, H. (2024): Etymology of the scientific names of the extant euphaeid damselflies (Odonata: Euphaeidae). *International Dragonfly Fund - Report* 187: 1-84. (in English) ["This publication details the etymology of all available scientific names given to the extant members of the odonate family Euphaeidae. Nine of the 15 available genus-group names are presently considered valid, two names have been rejected as homonyms and four are synonyms. Of the 101 available species-group names, 79 are presently regarded as valid species, one is a subspecies and 21 are synonyms. A synonymic checklist of extant Euphaeidae is presented, with an annotated list of the author names. Where available, information on the primary type of each species-group taxon is given, including type locality, collector and the present type depository. The historical development of knowledge of euphaeid diversity beginning in 1840 is discussed. A grouping of the 116 taxon names according to the meaning of their roots is presented as an appendix." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, Leiden, the Netherlands. Email: matti.hamalainen@hel-sinki.fi

**23060.** Hämäläinen, M. (2024): *Calopteryx virgo* (Linnaeus), The Beautiful Demoiselle - a species with royal connections. *J. Br. Dragonfly Society* 40(1): 30-38. (in English) ["The names, both common and scientific, given to the damselfly species *Calopteryx virgo* in Sweden and England in the 18th or early 19th century are discussed. All are somehow linked to

royalty, either originating from Carl Linnaeus\* early admiration of the young princess Louisa Ulrika, or from the similarity of the dark-blue wing colour of male *C. virgo* to the plumage of a kingfisher or the Windsor uniform." (Author)] Address: Härmäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**23061.** Hales, R.L.; Sutherland, L.N.; Sanchez Herrera, M.; Standring, S.; Bybee, S.M. (2024): Phylogeny of Hetaerina (Odonata: Calopterygidae): Settling taxonomic issues. <https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=1030&context=librarystudentposters2024>: 1 p. (in English) ["Recent phylogenetic work within Hetaerinae based on Sanger data highlighted classification issues (e.g., non-monophyly between the genera), however no changes were proposed at that time. We explore the phylogeny of Hetaerinae using a targeted enrichment approach (AHE) of 20KB (18.5KB of nuclear and 1.5 of mitochondrial DNA) in an attempt to resolve any discrepancies." (Authors)] Address: Hales, Reganne, Department of Biology, Brigham Young University, USA

**23062.** Hernández, M.A.; Casanueva, P.; Oscoz, J.; Sánchez-Sastre, L.F.; Ferreras-Romero, M.; Campos, F. (2024): Geographical variation in size of the three final stadia of *Cordulegaster boltonii* (Donovan, 1807) larvae in the Iberian Peninsula (Odonata: Cordulegastridae). *International Journal of Odonatology* 27: 77-84. (in English) ["A two-variable analysis of male and female *C. boltonii* larvae (head width and hindwing sheath length) in specimens from five Iberian populations was carried out with the objective of ascertaining whether these traits differ between populations. The results indicate that the southernmost population (Los Alcornocales, Andalusia) have larger sizes for both variables and a lower growth rate between the penultimate and final stadia. Winter water temperatures, which may cause a longer arrest of larval growth in northern populations, and possible differences in the number of larval stadia could be the origin of the size divergences." (Authors)] Address: Hernández, M. Ángeles, Depto de Biología Ambiental, Facultad de Ciencias, Universidad de Navarra, 31080 Pamplona, Spain

**23063.** Hopkins, K.E.; McKinney, M.A.; Saini, A.; Letcher, R.J.; Karouna-Renier, N.K.; Fernie, K.J. (2024): Characterizing the movement of Per- and Polyfluoroalkyl substances in an avian aquatic-terrestrial food web. *Environmental Science & Technology* 57(48): 20249-20260. (in English) ["The movement of per- and polyfluoroalkyl substances (PFAS) through linked aquatic-terrestrial food webs is not well understood. Tree swallows (*Tachycineta bicolor*) in such systems may be exposed to PFAS from multiple abiotic and/or biotic compartments. We show from fatty acid signatures and carbon stable isotopes that tree swallow nestlings in southwestern Ontario fed on both terrestrial and aquatic macroinvertebrates. The PFAS profiles of air, terrestrial invertebrates, and swallows were dominated by perfluorooctanesulfonic acid (PFOS). Short-chain perfluoroalkyl acids (PFAAs) were largely restricted to air, surface water, and sediment, and long-chain PFAAs were mainly found in aquatic invertebrates and tree swallows. PFOS, multiple long-chain perfluorocarboxylic acids [perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluorotridecanoic acid (PFTrDA)] and perfluorooctane sulfonamide precursors were estimated to bioaccumulate from air to tree swallows. PFOS bioaccumulated from air to terrestrial invertebrates, and PFOS, PFDA, and perfluorooctane sulfonamidoacetic acids (FOSAAs) bioaccumulated from water to aquatic invertebrates. PFOS showed biomagnification from both terrestrial and aquatic

invertebrates to tree swallows, and PFDA and FOSAAs were also biomagnified from aquatic invertebrates to tree swallows. The movement of PFAS through aquatic-terrestrial food webs appears congener- and compartment-specific, challenging the understanding of PFAS exposure routes for multiple species involved in these food webs. ... Terrestrial macroinvertebrate samples [ $n = 5$  each for PFAS and fatty acid (FA) analyses] were identified in the order, and only organisms from the following orders were retained: Hemiptera, Odonata, Diptera, and Ephemeroptera to reflect tree swallow diet. Of the aquatic macroinvertebrate samples, only organisms from the order Amphipoda were sampled as they were the only organisms caught with the HD samplers ( $n = 5$  each for PFAS and FAs). Samples were stored at  $-80\text{ }^{\circ}\text{C}$  until analysis." (Authors)] Address: Fernie, Kim, Ecotoxicology and Wildlife Health Division, Environment and Climate Change Canada, 867 Lakeshore Road, Burlington, ON L7R 4A6, Canada. Email: kim.fernie@ec.gc.ca

**23064.** Hopkins, P. (2024): A first survey of the dragonflies (Odonata) of Siem Pang Wildlife Sanctuary, northeast Cambodia. *Cambodian Journal of Natural History* 2024(1): 36-56. (in English, with Cambodian summary) ["Located in northeast Cambodia, Siem Pang Wildlife Sanctuary is an internationally important site for biodiversity. A significant feature of the wildlife sanctuary is the presence of at least 200 water bodies known as trapeangs, which are often ephemeral. This paper presents the first data on the Odonata fauna of the sanctuary which had not previously been studied. Fifty-seven species were recorded. These include the second record of *Copera chantaburii* (Asahina, 1984) for Cambodia and the first country record for *Aciagrion paludense* (Fraser, 1922), which was formerly considered a junior synonym of *A. occidentale* (Laidlaw 1924). A justification for why *A. paludense* should be considered a distinct species is also provided." (Author)] Address: Hopkins, P., 9 New Street, Penryn, Cornwall, TR10 8EB, United Kingdom. Email paulhopkins2@tinyworld.co.uk

**23065.** Huber, E.; Bodner, M.; Borovsky, R.; Brugger-Schieffmüller, E.; Burgsteiner, R.; Eckelt, A.; Friess, T.; Fröhlich, D.; Gergely, D.M.; Glatzhofer, E.; Gunczy, J.; Gratzler, T.; Greilberger, A.; Heimbürg, H.; Kargl, V.; Kerschbaumsteiner, H.; Koblmüller, S.; Kogler, M.; Kohler, F.; Kraker, F.; Kunz, G.; Lind, E.; Linzbauer, D.; Messner, S.; Niedringhaus, R.; Oswald, T.; Öttl, M.; Paill, W.; Ploner, S.; Polt, T.; Rösel, M.; Schattaneck-Wiesmair, B.; Schattaneck-Wiesmair, P.; Schäffer, S.; Schoder, S.; Schütz, A.; Sonnleitner, M.; Stahrmüller, M.; Strohsriegl, K.; Szucsich, N.; Uschnig, S.; Volkmer, J.; Zechmeister, T.; Zweidick, O. (2024): Bericht über das neunte ÖEG-Insektencamp: Artenvielfalt von steilen Magerwiesen bis zu schneebedeckten Blockschutthalden (Naturpark Weißbach, Salzburg). *Entomologica Austriaca* 31: 83-155. (in German, with English summary) ["Report on the 9th Insect Camp of the Austrian Entomological Society: species richness from steep extensive meadows to snow-covered gravel fields (Weißbach Nature Park, Salzburg, Austria). The 9th Insect Camp of the Austrian Entomological Society took place in the Nature Park Weißbach from 16th to 19th June 2023. A high number of taxonomic specialists and students of various entomological and arachnological groups attended the camp and/or supported the post-processing of the specimens. The participants of the camp had the opportunity to learn field research, different trapping, identification and preparation methods. Building a network between specialists on taxonomy, biodiversity and nature conservation and newcomers is essential for any work in biology. The camp provides the chance to gather knowledge on scientific work

and become part of these networks. The study area included 13 different localities in the Weißbach Nature Park, with different habitats, from water bodies to dry grassland, from 674m to 2,040m a.s.l. In total, 1,194 species from 16 orders were recorded: 2 species of Dermaptera, 2 of Blattodea, 9 of Odonata, 64 of Heteroptera, 57 of Auchenorrhyncha, 7 of Neuroptera, 3 of Raphidioptera, 5 of Mecoptera, 112 of Diptera, 45 of Trichoptera, 418 of Lepidoptera, 133 of Hymenoptera, 271 of Coleoptera, 8 of Diplopoda, 39 of Oribatida and 19 of Pulmonata. In addition, 350 plant species were documented. 68 species from eight orders were recorded from Salzburg for the first time. ... Odonata (Libellen) Roman Borovsky & Victoria Kargl: According to the Austrian Red List, around 2/3 of the dragonflies that occur in Austria are considered "endangered", "endangered" or "threatened with extinction" (Raab 2006). The main causes of danger are anthropogenic changes, such as destruction, construction and fragmentation of aquatic habitats, especially moors, floodplain areas and large rivers in the course of land reclamation for agricultural expansion or urbanization. In addition, water is polluted by climate change, chemicals, pesticides or invasive species (Goertzen & Suhling 2019, Wildermuth & Küry 2009). During the insect camp, nine dragonfly species were identified, which corresponds to around 12% of the Austrian species inventory. The spear damselfly *Coenagrion hastulatum* is considered "endangered" among the identified species in Austria. The remaining species are not listed in any endangerment category. The low number of species detected at the insect camp can be attributed to several reasons. Dragonfly mapping usually takes place on sunny and, if possible, windless days with air temperatures above 20°C (Chovanec 2019). The unfavorable weather conditions for dragonflies on some days of the study can be cited as one reason for the low number of species. Furthermore, many summer and autumn species could not yet be encountered due to the one-off inspection. For a complete survey of the species inventory, five to six inspections usually take place between April and September (Chovanec 2019). In addition, the topographical conditions for a species-rich dragonfly fauna in the study area are unfavorable; water bodies were only present in three of the ten sample areas. The highest number of species in the study area, eight species, was detected at a recently created pond (PF6). This underlines the relevance of creating new still waters for dragonflies (Wildermuth & Küry 2009)." (Authors)] Address: Borovsky, R., Hof 10, 9961 Hopfgarten in Defreggen, Austria. Email: borovskyroman@gmail.com

**23066.** Ikemeyer, D.; Schneider, T. (2024): Rare and endangered Odonata of Lebanon – an update with a discussion on the vanishing Levant endemic dragonfly fauna. *International Journal of Odonatology* 27: 47-59. (in English) ["The Levant is a hot spot of biodiversity, even for Odonata. Approximately 90 Odonata species were recorded for the Levant and 48 from Lebanon. Lebanon, as a central part of the Levant, was visited in 2022 and 2023 for searching dragonflies. Thirty four species including five of six Levant endemic Odonata: *Calopteryx hyalina*, *C. syriaca*, *Coenagrion syriacum*, *Pseudagrion syriacum*, *Gomphus davidi* as well as populations of the recently described *Cordulegaster cilicia* were found. *Ceriagrion georgifreyi* was recognized as new for Lebanon and increases the number of Odonata to 49. The dramatic decline of the Levant endemic Odonata caused by habitat loss and destruction is discussed." (Authors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. Email: DKJlkemeyer@t-online.de

**23067.** Ilyina, E.V.; Kosterin, O.E.; Onishko, V.V. (2024): First data on dragonflies (Odonata) of Dagestan highlands,

Russia. *Eurasian Entomological Journal* 23(1): 1-17. (in English, with Russian summary) ["Published data on Odonata of Dagestan in highland habitats, that is situated above the tree line, were confined to registration in 1924–1926 of *Aeshna juncea* (Linnaeus, 1758) at Kurush village (the southernmost settlement of Russia). During the focused studies on the dragonflies of Dagestan in 2021–2023, we accumulated data on those of seven highland habitats situated in six districts at elevations of 2000–2800 m a.s.l., five of which are lakes or lake groups. Thirteen species from five families were revealed, including *Cordulia aenea* recorded in Dagestan for the first time, its habitat at 2525 m a.s.l. at Lake Bezdonoie appearing the most elevated of those known for this species in the world. Elevation limits of other dragonflies of Dagestan are discussed. The huge population of *A. juncea crenatoides* Bartenef, 1925 of Lake Debrishara (2816 m a.s.l.) is unique in many respects: (1) the emerged dragonflies commence a downward vertical migration to the valley situated ca 400 m below; (2) about one quarter of specimens have an unusual pattern of the synthorax sides, with the additional pale stripe merging with the fore main stripe (the same morph was revealed in all specimens in populations in Armenia and South-eastern Turkey); (3) females thrice exceed males in number. Possible causes of these peculiarities are discussed." (Authors)] Address: Ilyina, E.V., Precaspian Institute of Biological Resources of the Dagestan Federal Research Centre of the Russian Academy of Sciences, State Reserve «Dagestansky», M. Gadzhiev Str. 45, Republic of Dagestan, Makhachkala 367000 Russia. E-mail: carabus@list.ru

**23068.** Indiati, S.W.; Bayu, M.S.I.; Yusmani (2024): Sweet potato pests and their natural enemies on tidal land in south Kalimantan. *International Conference on Environmental, Mining, and Sustainable Development 2022. AIP Conf. Proc.* 3001, 080055 (2024): 9 pp. (in English) ["Crop damage due to pest attacks is one of the obstacles to sweet potato development on tidal land. Information on the composition of pests in sweet potatoes and their natural enemies is a basic policy for integrated pest management in a location, so a survey is necessary to determine the dominance and status of sweet potato pests and their natural enemies in tidal land. The survey was conducted from June to November 2019 in South Kalimantan. Insect pests found in the survey location depended on the age/phase of plant growth at the time of recording. The composition and population of pests in Wanaraya sub-district, Barito Kuala District, South Kalimantan are black Diptera; black Coleoptera; grasshopper *Z. variegatus*; leaf roller of *H. hipponalis*; armyworm *S. litura*; tortoise beetle *Cassia* sp. with a total catch of 255 insects/15 swings. Sweet potato pest species diversity in South Kalimantan was moderately abundant, and there were no dominant pest species, with the Shannon-Wiener diversity index ( $H$ ) = 1.536 and the Simpson dominance index ( $c$ ) = 0.2602. In addition, farmers also informed that *C. formicarius* was the main pest that harms sweet potatoes in Wanaraya District, Barito Kuala Regency, South Kalimantan. Damage to sweet potato plants can reach 60% if sweet potato plants are planted late (planting in April). The composition of natural enemy species caught in Wanaraya District, Barito Kuala Regency, South Kalimantan were predators of *S. picipes* (17%), dragonflies (48%), parasites *Z. ciliate* (Tachinidae) 7%, parasites *Xanthopimpla* sp. (15%) and *Syrpidae* flies (13%). The number of sample insects caught was 83 natural enemies. The diversity of natural enemy species of sweet potato in South Kalimantan is moderately abundant, and there are no dominant natural enemy species, with the Shannon-Wiener diversity index ( $H$ ) = 1.3893 and the Simpson dominance index ( $c$ ) = 0.3044." (Authors)] Address: Indiati, S.W.,

Indonesian Legumes and Tuber Crops Research Institute (ILETRI), Jakarta, Indonesia. Email: swindiati@yahoo.com

**23069.** Islam, I.; Ullah, R.; Zia, A.; Bhatti, A.R.; Ilyas, M.; Hayat, S.; Hayat, K. (2024): Species complexity of order Odonata in District Dir Upper, Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Agricultural Research* 37(1): 56-61. (in English) ["With an important palearctic biogeographical position, district Dir Upper is located at Latitude 35.3356°N, Longitude 72.0468°E and altitude of 1840.57m within the Himalayan foothills in the northwestern Pakistan. Present study brought forward first data for the Odonata fauna inhabiting Dir Upper since inception of Pakistan. The areas represent one of the many ecologies that remain ignored and neglected for insect faunal surveys due to multiple factors like lack of education, awareness, social barriers and uncertain ground conditions being representing Pak-Afghan border territories in many of its valleys and villages. Such areas have a strong potential to come-up with important scientific records. Current study revealed four families, eleven genera and seventeen species and added new geographic range to Odonata fauna of the country. Among recorded fauna, family Libellulidae appeared to be the dominant group, representing 14 species, followed by family Aeshnidae, Calopterygidae and Coenagrionidae representing single species each. Being a flying insect group, seasonal surveys and temporal data for Odonata in this ecologically rich and geographically important area are highly suggested that can surely bring forward important information for the migratory species between Afghanistan and Pakistan." (Authors)] Address: Islam, I., Shaheed Benazir Bhutto University, Sheringal, Upper Dir, Khyber Pakhtunkhwa, Pakistan

**23070.** Janra, M.N.; Herwina, H.; Jefrial (2024): On the home-visiting dragons: a year-round observation of dragonflies (Insecta: Odonata) entering an urban residence. *IOP Conf. Series: Earth and Environmental Science* 1306 (2024) 01-2006. IOP Publishing. doi:10.1088/1755-1315/1306/1/01-2006: 9 pp. (in English) ["Wildlife intrusion into human settlement and residency has long been viewed as a disturbance rather than regarded from other perspectives, such as wildlife welfare or conservation. Insects were part of that wildlife that were considered as pests or nuisances whenever their existence intersected with human livelihood. In this study, we documented a year-round (August 2019 to August 2020) observation of dragonflies intruding into a residence in the densely populated urban area in Padang City, West Sumatra, Indonesia. The study used the descriptive method, where the data was recorded from any occasion an individual or more dragonflies entered the house. The observation recorded the date and time of entry, species identification, and sex which was later analyzed. During the observation, we recorded 41 individuals entering the residence. They were classified into two Zygoptera and ten Anisoptera species. *Orthetrum sabina*, *Tholymis tillarga* and *Gynacantha dornhi* became the most recorded species with 8, 7, and 7 total individuals, respectively. With 12 individuals recorded in a month, February 2020 was the most dragonfly-intruded period, much higher than the intrusion rate of 2.8 individuals per month. Dragonflies were observed entering the residence at midday (10 individuals), afternoon (12 individuals), evening (11 individuals) or night (8 individuals); this might suggest that night lighting might be what caused them to get into the residence. Both sexes were equal (18 females, 20 males, and three unsexed). The availability of tiny prey insects within the settlement area is another causative factor in this phenomenon. This intrusion should be alarming that the urbanization processes need to be reconsidered to be

more ecological-friendly." (Authors)] Address: Janra, M.N., Biology Dept, Faculty of Mathematics & Natural Sciences, Universitas Andalas, Padang, Indonesia. Email: m.nanra@sci.unand.ac.id

**23071.** Jiang, B.; Wang, W.; Yao, Y.; Zhang, H.; Zhang, Y.; Sun, Y. (2024): Behavioral and transcriptomic analyses in the Indoxacarb response of a non-target damselfly species. *Insects* 2024, 15(5), 367; <https://doi.org/10.3390/insects-1505036>: 14 pp. (in English) ["Simple Summary: *Ischnura senegalensis*, a beneficial insect predator in the paddy fields, is perilously confronted with the survival challenges posed by insecticide application. In this study, we delved into the toxicity of indoxacarb on the larvae of *I. senegalensis*. Through behavioral experiments and transcriptome analyses, we uncovered that indoxacarb caused abnormal body movements and locomotory impairments, thereby posing a threat to larval survival. Notably, genes related to muscle function were significantly impacted. While lower concentrations of indoxacarb may be mitigated by the cytochrome P450 gene, higher concentrations significantly diminished the larvae's sensory abilities and hampered toxicity degradation. Our findings highlight the importance of meticulously considering the impact of insecticides on non-target predatory insects before their widespread application. Abstract: *I. senegalensis*, which widely spreads in paddy fields, has the potential to be used as a natural predator of insect pests. However, the application of insecticides in the field could pose a threat to the survival of *I. senegalensis*. Among these pesticides, indoxacarb, an oxadiazine insecticide, is renowned for its broad-spectrum efficacy against numerous insect pests. In this study, we examined the toxicity of indoxacarb towards the larvae of *I. senegalensis*. Behavioral experiments and transcriptome analyses were conducted under indoxacarb treatments. Results revealed that indoxacarb induced abnormal body gestures and significant locomotory impairments, which could ultimately reduce the survival rate of the larvae in their natural habitat. Moreover, transcriptome analyses indicated that genes related to muscle function were significantly affected. Interestingly, at lower concentrations of indoxacarb (0.004 mg/L), the larvae seem to detoxify the indoxacarb with the aid of the cytochrome P450 gene. However, under higher concentrations (0.4 mg/L), the sensory abilities of the larvae were significantly diminished, and they were unable to degrade the toxicity of indoxacarb. Our study underscores the importance of carefully evaluating the impact of insecticides on non-target predatory insects before their widespread application." (Authors)] Address: Jiang, B., Provincial Key Laboratory for Conservation and Utilization of Important Biological Resources in Anhui, College of Life Sciences, Anhui Normal University, Wuhu 241000, China

**23072.** Jödicke, R.; Lohr, M. (2024): Checkliste der Libellenfauna Deutschlands (Odonata). Stand: 15.02.2024. *Libellula* 42(3/4): 91-94. (in German) [82 taxa are considered, including some taxonomic remarks. No references to formerly published checklists are made.] Address: Lohr, M., Technische Hochschule Ostwestfalen-Lippe, An der Wilhelmshöhe 44, 37671 Höxter, Germany. Email: mathias.lohr@th-owl.de

**23073.** Johnson, J.T. (2024): An apparent *Aeshna* hybrid and a possible hybrid complex. *Argia* 36(1): 24-29. (in English) ["During a brief visit to Mono Co., California, USA, I netted a male *Aeshna* of the *constricta* group (possessing cerci armed with an ante-apical ventral spine) with an unusual mix of color characters leading me to suspect that it could be a hybrid. I provide some analysis of that individual and speculate on the possibility of a hybrid complex among the

more widespread species of the constricta group: *A. constricta*, *A. palmata*, and *A. umbrosa*. While visiting the DeChambeau Waterfowl Restoration Ponds (38.0504° N, 119.0837° W, 1960 m elev.) just northwest of Mono Lake on 26 September 2022, I recorded ten species of odonates including several *Aeshna palmata* identified in-hand. Before heading back to the car, I netted one last dragonfly—a male *Aeshna*, which I immediately assumed to be *A. umbrosa* because of its paired blue spots on the ventral surface of the abdomen. However, I noticed that several color characters were atypical for that species, so I took in-hand photos and preserved the specimen (Fig. 1). See Table 1 for descriptions and assessments of this individual's characteristics." (Author)] Address: Johnson, J. Email: gomphusjim@gmail.com

**23074.** Jones, S.P. (2024): First proof of successful breeding by *Anax ephippiger* (Burmeister, 1839) (Vagrant Emperor) in Britain. *J. Br. Dragonfly Society* 40(1): 39-44. (in English) [18-IX-2023, Windmill Farm, Lizard peninsula, UK] Address: Jones, S.P., Herland Bungalow, Godolphin Cross, Helston, Cornwall TR13 9RL, UK

**23075.** Joshi, S.; Sarkar, V.; Sawant, D.; Pawar, U.; Kunte, K. (2024): Description of *Protosticta khasia* sp. nov. and *Yunnanosticta siangi* sp. nov., with new records of *P. samtsensis* Gurung & Phan, 2023 from Northeast India (Odonata: Zygoptera: Platystictidae). *Zootaxa* 5448(3): 348-370. (in English) ["*Protosticta Selys* is a genus of damselflies of the family Platystictidae Kennedy found in forests of tropical Southeast Asia. The genus *Protosticta* has rarely been reported from Northeast India. In this paper, we describe *Protosticta khasia* sp. nov. (subfamily Protostictinae Dijkstra et al.) based on holotype male and paratype female collected from Maraikaphon, East Khasi Hills district, Meghalaya, India. *Protosticta khasia* can be identified by the markings of the prothorax and the shape of the male paraproct with two arms. We also describe *Yunnanosticta siangi* sp. nov. (subfamily Sinostictinae Wilson) from Arunachal Pradesh, India, based on two males and two females. This species is differentiated from its congeners by the thoracic and abdominal markings as well as the shape of male caudal appendages. The key for males of *Yunnanosticta* is provided. Additionally, we provide new records of *Protosticta samtsensis* Gurung & Phan, along with an updated key to the *Protosticta* species of Northeast India." (Authors)] Address: Joshi, S., Department of Biological Sciences, University of Arkansas, Fayetteville, 72701, Arkansas, USA. Email: sj058@uark.edu

**23076.** Kaczmarek, N.; Benlasri, M.; Schäfer, R.B.; Aabid, A.; Nothof, M.; Lazrak, K.; Ghamizi, M.; Berger, E. (2024): Macroinvertebrate community responses to salinity around non-saline-saline confluences in the Draa River basin, Morocco. *Hydrobiologia* 851: 2189-2204. (in English) ["Freshwater salinization increasingly threatens river ecosystems in arid regions. In situ studies on effects of salinity on freshwater communities are still scarce, especially in largely understudied areas of Africa. To compare macroinvertebrate communities [including "Odonata"] in differing salinity levels, we conducted a confluence-based study in the Draa River basin in Morocco by focusing on two tributaries and their joint downstream sections, in the immediate vicinity of three confluences. Our study revealed that  $\alpha$ -diversity differed only minimal. Although only around five taxa comprised over 90% of specimens per section, the more saline sections exhibited proportionally more salt-tolerant generalist species. There was lower  $\beta$ -diversity between the downstream section and each tributary compared to between tributaries, indicating a mixed community after the confluence. The trait

profile of the saline El Mellah displayed more resistance and resilience traits to disturbances than the less saline Iriri. Furthermore, low water flow reduced the abundance of sensitive taxa. Overall, we observed minimal differences in macroinvertebrate community composition, due to low gamma-diversity in the basin. However, the confluence-based study design remains valuable for investigating effects of specific stressors on ecosystems by excluding large-scale geographic patterns, as compared sites are close and therefore share the same climate, geology, and altitude." (Authors)] Address: Kaczmarek, N., iES Landau (Institute for Environmental Sciences), RPTU, Kaiserslautern-Landau, Landau, Germany. Email: kaczmarek@uni-landau.de

**23077.** Kafle, K.; Subedi, S.; Poudel, A. (2024): A review on edible Insects diversity, abundance, and conservation. *Journal of Entomology and Zoology Studies* 12(2): 137-142. (in English) ["Insects are the most varied category of creatures, with one million species accounting for 80% of all species on the planet. The practice of eating insects is called entomophagy. Edible insects are consumed and many species serve as good sources of nutrients all over the world. Over 2000 species of insects are consumed around different regions of the world. Coleoptera order consists of the major number of edible insects used as feed in the world followed by Lepidoptera, Hymenoptera, Orthoptera, Hemiptera, Isoptera, Odonata, Diptera, and other orders. These insect species also contain significant amounts of nutrients such as protein, fat, minerals, fiber, ash, amino acids, and others. Despite their potential as alternative human feed, there is still an aversion to the acceptance of insects as food due to a lack of research and study related to this aspect. This paper assesses the diversity and abundance of edible insects around different parts of the world, the nutritive values of these insects, and their conservation. This study is based on recent data available from different sources and literature." (Authors)] Address: Kafle, K., Faculty of Agriculture, Agriculture and Forestry University, Rampur, Chitwan, Nepal

**23078.** Karyaningsih, I.; Haqq, M.S.M.; Hendrayana, Y.; Nurlaila, A. (2024): Keanekaragaman serangga pada tiga tipe vegetasi di blok Lambosir Taman Nasional Gunung Ciremai. *Jurnal Belantara*, 7(1): 82-95. (in Indonesian, with English summary) ["This study aims to determine the diversity of insects ... namely mixed forest, shrubs and calliandra vegetation in the Lambosir Block area of Gunung Ciremai National Park. This research was carried out ... in February - June 2022 using ... Butterfly net, Sweep net, Light trap, Aerial bait trap and Yellow Trap, using the total density, frequency and the Shanon Weiner Diversity Index. The results showed that on the land cover of shrubs, calliandra and mixed forests, 42 species of insects were found from 8 orders with 246 individual species with a diversity value of 3.18 or in the high category." The list includes one Odonata species (*Orthetrum sabina*).] Address: Ika Karyaningsih, I., Program Studi Kehutanan, Fakultas Kehutanan, Universitas Kuningan Jl. Cut Nyak Dhien No.36A, Cijoho, Kec. Kuningan, Kabupaten Kuningan, Jawa Barat 45513, Indonesia. Email: ika.karyaningsih@uniku.ac.id

**23079.** Kawabe, H.; Aoki, Y.; Nakamura, T. (2024): Novel skin-reinforcement design by cross-longitudinal layout inspired by dragonfly wing. *American Institute of Aeronautics and Astronautics Journal* 62(4): 1311-1317. (in English) ["The objective of this study is to develop a novel aircraft design approach using biomimetics as an alternative to traditional airframes. This approach is primarily inspired by the dragonfly wing, which possesses reinforcement structures



composed of cross veins and longitudinal veins. These structures are assumed to regulate deformation and enhance stiffness, respectively. The cross veins were replicated using weighted centroidal Voronoi tessellation (WCVT) based on the out-of-plane displacement of the skin. In contrast, the longitudinal veins were replicated by extracting a centerline from the topology optimization (TO) results on the skin, achieved through image analysis techniques such as binarization and skeletonization. The longitudinal layout effectively reduces compliance by distributing internal loads, utilizing only essential reinforcements on the skin without increasing its mass. The WCVT layout significantly enhances the buckling resistance of the reinforced skin. As a result, the skin reinforced using both cross–longitudinal layouts from TO and WCVT exhibited a buckling load 2.7 times greater while maintaining a lower mass compared to conventional layouts." (Authors)] Address: Kawabe, H., The University of Tokyo, Kashiwa 5-1-5, Japan. Email: kawabe.hiroki19@ae.k.u-tokyo.ac.jp

**23080.** Keshari, S. (2024): Survey of dragonflies and damselflies (Odonata: Insecta) in Khunti, Ranchi, Jharkhand. *Journal of Experimental Zoology India* 27(1): 1467-1469. (in English) [ "Biodiversity conservation and management are a worldwide concern. They play a vital role as prey and predator to maintain the balance of tropic levels for food chain. They are also an important and widespread component of freshwater ecosystems, being the top predators. Dragonflies are potential biocontrol agents. In the present study, an attempt has been taken to know about the diversity of Odonates in Khunti at different locations. All together 15 species of dragonflies and 5 species of damselflies were recorded from various study sites." (Author)] Address: Keshari, Seema, University Department of Zoology, Ranchi University, Ranchi - 834 008, India. Email: seemakeshari@gmail.com

**23081.** Khan, S.; Bibi, M.; Akbar, B.; Ahmad, N.; Ahmad, W.; Rehman, A. (2024): Faunistic study of dragonflies (Anisoptera; Odonata) of Babuzai with some new records for district Swat, Pakistan. *Entomology and Applied Science Letters* 11(1): 23-29. (in English) ["An explorative study has been made on the dragonfly fauna of Babuzai, a tehsil in the tourist-attractive district of Swat, Pakistan. The study was conducted between April 2021 and June 2022, from 8:00 a.m. to 12:00 p.m. and 2:00 p.m. to 5:00 p.m. Collection was made from different areas of the study area, which are Odigram, Qambar, Rahim Abad, Gulkada, Islampur, Banr, Mingora, Kokarai, Tindodag, Manglawar, Bishbanh, Saidu Sharif, Marghuzar, Dangram, Jambil, and Sangar. A total of 18 species belonging to 2 families were documented. Libellulidae, with the highest percentage (94%), secured the richest among the families Family Aeshnidae was represented by a single species, accounting for 6% of the total documented species. Four species, *Orthetrum luzonicum*, *Sympetrum fonscolombii*, *S. commixtum*, and *Palpopleura sexmaculata*, were reported for the first time for District Swat. The current study contributes to the existing knowledge base regarding the Odonata fauna of district Swat. The findings offer valuable implications for biodiversity management and ecosystem conservation efforts in the area." (Authors)] Address: Ahmad, W., Dept Zoology, Univ. Peshawar, Peshawar, Pakistan. Email: waqaschakisar@uop.edu.pk

**23082.** Khoo, C.S.; Amar-Singh HSS; Suthagar, K.; Peeters, H. (2024): Predation, prey sizes and prey species diversity of the Black-thighed Falconet *Microhierax fringillarius*. *Malaysian Bird Report* 1/2024: 20-26. (in English) [Dragonflies significantly contribute to the prey of Black-thighed

Falconets *Microhierax fringillarius*.] Address: <https://malaysianbird.report/wp-content/uploads/3-Prey-Species-Diversity-of-the-Black-thighed-Falconet-Malaysian-Bird-Report-March-2024.pdf>

**23083.** Kirk, D.A.; Collins, S.J.; Martínez-Lanfranco, J.A.; Martin, A.E. (2024): Crop cover and nutrient levels mediate the effects of land management type on aquatic invertebrate richness in prairie potholes. *PLoS ONE* 19(4): e0295001. <https://doi.org/10.1371/journal.pone.0295001>: 28 pp. (in English) ["Aquatic invertebrates provide important ecosystem services, including decomposition and nutrient cycling, and provide nutrition for birds, fish, amphibians, and bats. Thus, the effects of agricultural land management practices on aquatic invertebrates are relevant to farmers, wildlife biologists, and policymakers. Here, we used data on aquatic invertebrates (159 taxa, 73 to species, 75 to genus/family) collected in 40 wetlands in the Canadian prairies to test for direct and indirect relationships among land management types (perennial cover, organic, minimum tillage, conventional), landscape structure (cropland and wetland cover within the surrounding landscape), and water quality (total nutrient levels, turbidity) on species richness of invertebrates using structural equation modelling. Additionally, we assessed variation in community composition within and among wetlands in different land use management types using a direct gradient analysis and variance partitioning. The direct effects of land management type were not supported but we found strong supportive evidence that effects of land management on richness were significantly mediated through cropland cover, nutrient levels, and turbidity. After controlling for these indirect effects, aquatic invertebrate richness decreased along a gradient from the lowest to the highest farming intensity, i.e., richness decreased from perennial cover sites to organic to minimum tillage to conventional sites. Support was also found for negative effects of nutrient levels and turbidity on richness. We did not find significant support for differences in gamma diversity or a simple test (homogeneity of multivariate dispersions) of differences in turnover among land management types; however, land management had a significant effect in distance-based redundancy analysis. Taken together, these results suggest that focusing conservation efforts on reducing cropland erosion and nutrient inputs to wetlands and creating more permanent cover may be effective strategies for conserving richness of aquatic invertebrates in agricultural landscapes in this region. ... In the case of organic, minimum tillage and conventional farms, *Lestes unguiculatus* [test statistic 0.397, P = 0.06624] was an indicator." (Authors)] Address: Martin, Amanda, Affiliations National Wildlife Research Centre, Environment and Climate Change Canada, Ottawa, Ontario, Canada, Department of Biology, Carleton University, Ottawa, Ontario, Canada. Email: Amanda.Martin@ec.gc.ca

**23084.** Köktürk, S.; Doğan, S.; Yılmaz, C.E.; Cetinkol, Y.; Mutlu, O. (2024): Expression of brain-derived neurotrophic factor and formation of migrasome increases in the glioma cells induced by the adipokinetic hormone. *Rev. Assoc. Med. Bras.* 2024; 70(5):e20231337: 5 pp. (in English) ["OBJECTIVE: It has been previously shown that brain-derived neurotrophic factor is linked with various types of cancer. Brain-derived neurotrophic factor is found to be highly expressed in multiple human cancers and associated with tumor growth, invasion, and metastasis. Adipokinetic hormones are functionally related to the vertebrate glucagon, as they have similar functionalities that manage the nutrient-dependent secretion of these two hormones. Migrasomes are new organelles that contain numerous small vesicles, which aid



in transmitting signals between the migrating cells. Therefore, the aim of this study was to investigate the effects of *Anax imperator* adipokinetic hormone on brain-derived neurotrophic factor expression and ultrastructure of cells in the C6 glioma cell line. **METHODS:** The rat C6 glioma cells were treated with concentrations of 5 and 10 *Anax imperator* adipokinetic hormone for 24 h. The effects of the *Anax imperator* adipokinetic hormone on the migrasome formation and brain-derived neurotrophic factor expression were analyzed using immunocytochemistry and transmission electron microscope. **RESULTS:** The rat C6 glioma cells of the 5 and 10  $\mu$ M *Anax imperator* adipokinetic hormone groups showed significantly high expressions of brain-derived neurotrophic factor and migrasomes numbers, compared with the control group. **CONCLUSION:** A positive correlation was found between the brain-derived neurotrophic factor expression level and the formation of migrasome, which indicates that the increased expression of brain-derived neurotrophic factor and the number of migrasomes may be involved to metastasis of the rat C6 glioma cell line induced by the *Anax imperator* adipokinetic hormone. Therefore, the expression of brain-derived neurotrophic factor and migrasome formation may be promising targets for preventing tumor proliferation, invasion, and metastasis in glioma." (Authors)] Address: Köktürk, Sibel, Istanbul University, Faculty of Medicine, Department of Histology and Embryology – İstanbul, Turkey. Email: sibelkokturk1@gmail.com

**23085.** Koperski, P. (2024): Windows into the recent past: Simple biotic indices to assess hydrological stability in small, isolated ponds. *Water* 2024, 16(9), 1206; <https://doi.org/10.3390/w16091206>: 16 pp. (in English) ["This article presents the four biotic indices used to assess the hydrological stability of small, fishless, lowland ponds in northern Poland's post-glacial landscape. The assessment was based on the analyses of the relative abundance of selected macroinvertebrate taxa caught using standard and non-lethal methods. The indices were derived from a multi-year analysis of data on invertebrate composition, abiotic water parameters, and publicly available satellite data. This allowed for the reconstruction of hydrological stability, including fluctuations in water level and surface area, as well as the frequency of drying, in small water bodies in the 5–10 years before sampling. The numerical relationships between the parameters describing hydrological stability and the relative abundance of several invertebrate taxa [including "Lestidae"] were described. A multiple regression analysis showed that hydrological stability was generally more strongly related to faunal composition than the other abiotic parameters. The indices used in this study can be a useful tool, particularly in citizen science. It is important that their numerical bases can be easily modified depending on the local conditions." (Authors)] Address: Koperski, P., Dept Hydrobiol., Fac. Biol., Univ. of Warsaw at Biological & Chemical Research Centre, Zwirki i Wigury 101, 02-089 Warsaw, Poland

**23086.** Komová, V.; Bílková, E.; Pyszko, P.; Dolný, A.; Ožana, S. (2024): What determines mate choices? Heterospecific mating in *Sympetrum* dragonflies. *Freshwater Biology* 69: 527-537. (in English) ["Heterospecific interactions are an important phenomenon of animal epigamic behaviour; however, they remain understudied within important groups, such as insects. Dragonflies are an ideal group for research on interspecific mating and possible hybridisation as they are easily identifiable, large insects, with a conspicuous mating process, often striking territorial behaviour and several mating systems. Using the genus *Sympetrum* as the model group, we examined heterospecific mating at three different levels. In the field, we identified whether species identity, time and

weather affected heterospecific mating frequency. One important part of heterospecific mating is whether the process is completed. For dragonflies, this means that flying in tandem is followed by successful copulation, gamete fusion and oviposition (which comprise mating completeness). In a mesocosm experiment, we determined mating completeness (tandems, copulation, oviposition) of hetero- and homospecific pairs and the possible role of species density in heterospecific mating. In the laboratory, we compared the viability of the offspring from heterospecific pairs with different epigamic behaviour. We found heterospecific mating to be a relatively common phenomenon unaffected by environmental variables, that was primarily influenced by species identity, temporal distribution and abundance of dragonfly species. Consequently, the presence of counterparts of other species is the main predictor of the frequency of heterospecific mating. The probability of completed epigamic behaviour (copulation and subsequent oviposition) connected with gamete fusion is lower in heterospecific mating. Generally, based on our results we can assume that successful heterospecific mating (leading to gamete fusion) occurs in closely related species (e.g., *Sympetrum striolatum* and *S. vulgatum*). However, as pre-copulatory barriers are not strongly developed in some dragonfly groups, less closely related species (e.g., *Sympetrum sanguineum* and *S. striolatum*) also may mate. This phenomenon requires further study as it may present a threat to the survival of some species in the context of changing environmental conditions, including climate change." (Authors)] Address: Dolný, A., Dept of Biology and Ecology, Faculty of Science, Univ. of Ostrava, Chittussiho 10, Ostrava 71000, Czech Republic. Email: ales.dolny@osu.cz

**23087.** Kowobari, E.D.; Oladeji, T.A.; Adedapo, A.M.; Fagbohun, I.R.; Opanike, O.O.; Akindele, E.O. (2024): Heavy metal bioaccumulation in the macroinvertebrate functional feeding guilds of an impaired stream in South-West Nigeria. *Chemistry and Ecology* 40(3): 241-259. (in English) ["Anthropogenic impacts and the accumulation of heavy metals in water bodies have increased significantly as a result of increased urbanisation, endangering both aquatic biota and human health. The pace of urbanisation and its attendant freshwater ecosystem pollution in Nigeria is so fast that there are concerns for the nation's freshwater biota. To this end, six heavy metals were investigated in the water column, sediment, and tissues of macroinvertebrate functional feeding guilds (FFGs) of a Nigerian stream. Three heavy metals that are non-essential (As, Cd, and Pb) exceeded their WHO permissible limits for surface fresh waters. According to the geo-accumulation index (Igeo) and contamination factor (CF) used to assess heavy metal pollution, there was a high level of Cd contamination among all heavy metals found in the sediment. These heavy metals were all biomagnified (>1), especially among the predators. The study concluded that Opa Stream was moderately impacted based on the concentrations of heavy metals in the stream's water column, sediment, and macroinvertebrate tissues. Future research works can consider the remediation of heavy metals that are non-essential in freshwater systems to ensure the sustainability of freshwater biodiversity and human health." (Authors) The following odonate species are listed: *Phaon iridipennis*, *Chlorocypha curta*, *Pseudagrion kerseni*, *P. sublacteum*, *Lestiniogomphus* sp., *Paragomphus genei*, *Brachythemis leucosticta*, *Nesciothemis* sp., *Olpogastra lugubris*, *Orthetrum* sp., *Trithemis arteriosa*, *Zygonoidea* sp., *28 Phyllomacromia* sp., and *Mesocnemis singularis*.] Address: Akindele, E.O., Department of Zoology, Obafemi Awolowo University, Ile-Ife, Nigeria. Email: eoakindele@oauife.edu.ng

**23088.** Kunz, S.; Kefford, B.J.; Usseglio-Polatera, P.; Hawkins, C.P.; Poff, N.L.; Akamagwuna, F.; Odume, N.; Schmidt-Kloiber, A.; Graf, W.; Metzeling, L.; Matthaei, C.D.; Phillips, N.; Schäfer, R.B. (2024): Similarity of stream insect trait profiles across biogeographic regions. *Diversity and Distributions* 30(4), e13812: 17 pp. (in English) [ "Aim: Habitat templet theory predicts that the functional niches of species evolved in response to selection pressures imposed by each species' spatial–temporal environment. Consequently, similar environmental conditions should lead to convergence in the biological trait composition of biogeographically independent assemblages. Given their high diversity and ubiquitous occurrence, stream insects represent an ideal group to test convergence. Such an analysis should provide insight into both how spatially variable stream insect traits are and how transferable trait–environment relationships are across large spatial scales. We tested two hypotheses: (1) functional niches of stream insects are similar across Australia, Europe, North America, New Zealand and Southern Africa, and (2) the variability in trait profiles of stream insects is positively related to climatic variability within regions. Location: Australia, Europe, North America, New Zealand and Southern Africa. Methods: We used trait datasets from each region to compare functional niches and to delineate groups of insects with similar trait profiles (hereafter, trait profile groups or TPGs) in each region. We identified the traits most important in separating TPGs. Finally, we assessed if trait profile variability between TPGs was associated with climatic variability within each region. Results: We found that functional niches of families largely overlapped across the regions examined, except for partial deviations of some Australian families, but that only two trait combinations characterized TPGs across all regions. Feeding mode and respiration traits consistently drove the separation of families into TPGs. The variability of trait profiles slightly increased with increasing climatic variability. Main Conclusions: Although our study did not allow to demonstrate mechanisms, it is the first to show large similarities between stream insect functional niches across different biogeographic regions, which might be an indication of their convergence. An important factor shaping stream insect assemblages over these large scales might be climate, indicated by the higher trait profile variation in regions with more diverse climates." (Authors)] Address: Kunz, S., Institute for Environmental Sciences, RPTU Kaiserslautern Landau, Landau, Germany. Email: stkunz@uni-landau.de

**23089.** La Porta, G.; Hardersen, S. A (2024): Warm welcome to the Alps — The northward expansion of *Trithemis annulata* (Odonata, Libellulidae) in Italy. *Insects* 2024, 15, 340. <https://doi.org/10.3390/insects15050340>: 14 pp. (in English) ["Simple Summary: Climate warming has already changed the distribution and composition of European dragonflies, and this process is ongoing. One example is *Trithemis annulata*, which had been limited to southern Italy for over 150 years and which has expanded its range to the Po Plain in four decades. Recently, this species has established in some alpine valleys. We tracked the spread of this species by analysing all available data and modelled its preferred climatic conditions in Italy. Our results, which consider the years 1825–2023, indicate that *Trithemis annulata* has been moving northward since 1980 at a rate of approximately 12 km per year. Upon reaching the Po Plain in 2016, this rate increased to 34 km per year. Even though this species is known for its good dispersal ability, it was unable to keep up with the speed of the advancing climate. *Trithemis annulata* has expanded into new areas due to climate warming and is now established in Alpine valleys, which are potential gateways for the colonisation of central

Europe. Abstract: Climate warming has already influenced the distribution, community composition, and phenology of European Odonata. *T. annulata* had been confined to the southern regions of Italy for over 150 years. In only four decades, it has expanded its range and has recently been observed inhabiting several alpine valleys. A dataset of 2557 geographical distribution data points spanning the years 1825–2023 was compiled using various resources, with the aim to analyse the chrono-story of the expansion of *T. annulata*. A further aim was to investigate the climatic conditions that best explain its current and future distribution. Over a period of 43 years, the species steadily extended its northern range margin at an approximate rate of 12 km/year. Once it reached the Po Plain, the expansion accelerated to an average speed of 34 km/year. However, its northward shift lagged behind the warming climate as we estimated an average speed of 28 km/year. In the future, the area suitable for *T. annulata* is expected to significantly increase in Italy. Surprisingly, we did not observe any consistent upward shift. *Trithemis annulata* has considerably expanded its distribution due to human-induced climate warming. The northernmost populations now inhabit Alpine valleys, potential gateways to central Europe." (Authors)] Address: La Porta, G., Dept of Chemistry, Biology & Biotechnology, University of Perugia (PG), 06123 Perugia, Italy. Email: gianandrea.laporta@unipg.it

**23090.** Laucht, S.; Brulez, K.; Hanisch, J.; Blakey, A.; Weyman, G.; Ludwigs, J.-D.; Alvarez, T. (2024): Ornamental Phoenix palm trees as habitat for fauna in the Mediterranean Region – results from a full year monitoring. *Biodiversity Data Journal* 12: e123144. <https://doi.org/10.3897/BDJ.12.e123144>: 28 pp. (in English) ["In the European Mediterranean Region, palm trees are a common element in cities and semi-urban landscapes and have become important habitat structures for local fauna. This study aimed to monitor the invertebrate and vertebrate fauna occurring on and associated with ornamental palms of the genus *Phoenix*, over the course of one year. Five study sites were used in southern Spain, with varying levels of management. Several complementary methods were applied monthly in order to assess the vertebrates and invertebrates associated with the full seasonal cycle of palms, including flowering and fruiting. The study resulted in the identification of 216 invertebrate families from seven different classes and 89 vertebrate species, consisting of 62 bird, 20 mammal (including bats), six reptile and one amphibian species associated with *Phoenix* palms. It thus highlights that *Phoenix* palms provide a habitat for many species and individuals over the course of one year." (Authors)] Suppl 3: Insecta Odonata Anisoptera Aeshnidae darners predaceous (1 specimen); Insecta Odonata Anisoptera Libellulidae red-veined darter predaceous (2 specimens); Insecta Odonata Zygoptera Coenagrionidae narrow-winged damselflies predaceous (1 specimen)] Address: Laucht, Silke, RIFCON GmbH, Hirschberg, Germany. Email: silke.laucht@rifcon.de

**23091.** Lee, J.-S.; Lee, D.-J.; Lim, J.; Lee, H.; Kim, J.; Choi, M.-J.; Yeon, C.J.; Roh, S.J. (2024): Establishment of an integrated island species inventory for insects (Arthropoda: Insecta) in Korea. *Journal of Asia-Pacific Biodiversity* 17(2): 250-254. (in English) ["This study aimed to establish a systematic plan for an integrated inventory of insects based on long-term faunistic research of Korean islands. Preparing the plan involved the following processes: 1) examination of 6,117 species belonging to 402 families and 29 orders occurring on 541 islands, based on a survey of the status of insect species on Korean islands; 2) identification of 498 species belonging to 110 families and 14 orders, based on

preliminary faunistic surveys of 10 human-inhabited islands in 2021 for efficient research of island insects; and 3) a list of species, voucher specimen, habitat information, and image data for each species, in addition to the generation of 135 Cytochrome c Oxidase subunit I sequences of 70 species for DNA barcode analysis to resolve the identity of taxa that are challenging to identify morphologically. The results of this study may be used for establishing a long-term systematic plan for faunistic research and acquisition of comprehensive biological information on the insects native to Korean islands, while the results may also contribute to the establishment of criteria for the sustainable utilization of bio-resources and the conservation of species." (Authors)] Address: Roh, S.J., Division of Zoology, Honam National Institute of Biological Resources, Mokpo 58762, Republic of Korea. Email: sjroh@hnibr.re.kr

**23092.** Li, J.; Wei, P.; Su, C.; Xue, S. (2024): Research on bionic composite guidance law considering field of view angle. MATEC Web Conf. Volume 395, 2024, 2023 2nd International Conference on Physics, Computing and Mathematical (ICPCM2023), Article Number 01014: 10 pp. (in English) ["Due to the use of strapdown seeker in small missiles, a small field of view angle is required to ensure effective tracking and strike of the target during the final interception. Based on the tracking strategy of dragonfly chasing targets, a composite guidance law is studied. In the initial guidance section, the parallax angle is controlled by the sliding mode control law to adjust the missile to the tail following attitude. The final guidance section used the motion camouflage guidance law with the focus at infinity for target tracking, and between the initial guidance and the final guidance. The second-order smooth interface law is used for the transition. The simulation results show that compared with the traditional proportional guidance law, the required overload of the missile in the final guidance is small, and the target is closer to the center of the field of view, which can reduce the missile in the final guidance. The overload and the field of view of the seeker can be used to effectively improve the attack accuracy." (Authors)] Address: Li, J., Army Artillery Air Defense Force Academy, HeFei, China. Email: ljzq1314@163.com

**23093.** Lin, S.; Chou, N.; Li, G.; Bao, D.; Cai, Y.; Xie, Y.M.; Wang, G. (2024): A gradient-evolutionary coupled topology optimization for sheet reinforcement based on the mechanics of Voronoi pattern on dragonfly wings. *Advances in Engineering Software* 190, 103600: 27 pp. (in English) ["Highlights: • The mechanics of the vein domains are revealed to be correlated with morphology. • The layout of wing veins is explained by multi-objective optimization. • Structural biology is evolved based on the gradient optimization. Abstract: The intricate network of veins on dragonfly wings has captured the attention of many researchers due to its fascinating configuration and excellent mechanical properties. In this paper, based on the observation of the layout of the vein domains on the hind wing of dragonfly [*Hydrobasileus croceus*], the types of domains were characterized from the aspects of area and shape. The numerical analysis revealed that different shaped domains enhance either stiffness or vibration stability of the wing. According to this feature, a multi-objective gradient optimization algorithm based on stiffness, mass transport efficiency and first order frequency was proposed. Associated by the size constraints, the optimal layout of the venation was obtained and subsequently used to generate the Voronoi patterns, whose positions and shapes could be further optimized by an evolutionary algorithm to match the mechanical analysis results. The effectiveness

of this multi-cellular configuration was verified by testing the bending and vibration stability of the additive manufactured model. The aerodynamic simulation analysis of this flapping wing structure was also investigated. This study has important implications for understanding the evolutionary mechanisms of venation on biological wings and designing reinforcement for sheets." (Authors)] Address: Li, G., Shenzhen Automotive Research Institute (Shenzhen Research Institute of National Engineering Laboratory for Electric Vehicles), Beijing Institute of Technology, Shenzhen, Guangdong 518118, China. Email: gyli@hnu.edu.cn

**23094.** Liu, F.; Li, S.; Xiang, J.; Li, D.; Tu, Z. (2024): Numerical comparison between symmetric and asymmetric flapping wing in tandem configuration. *Physics of Fluids* 36, 041901 (2024); doi: 10.1063/5.0200547: 20 pp. (in English) ["Dragonflies show impressive flight performance due to their unique tandem flapping wing configuration. While previous studies focused on forewing-hindwing interference in dragonfly-like flapping wings, few have explored the role of asymmetric pitching angle in tandem flapping wings. This paper compares the aerodynamic performance of asymmetric dragonfly-like wings with symmetric hummingbird-like wings, both arranged in tandem. Using a three-dimensional numerical model, we analyzed wing configurations with single/tandem wings, advance ratios ( $J$ ) from 0 to 0.45, and forewing-hindwing phase differences ( $\beta$ ) from 0 to 180 at a Reynolds number of 7000. Results show that asymmetric flapping wings exhibit higher vertical force and flight efficiency in both single and tandem wing configurations. Increasing the phase difference ( $\beta$ ) improves flight efficiency with minimal loss of vertical force in the asymmetric flapping mode, while the symmetrical flapping mode significantly reduces vertical force at a 180 phase difference. Additionally, symmetric tandem flapping wings unexpectedly gain extra vertical force during in-phase flapping. This study uncovers the flow characteristics of dragonfly-like tandem flapping wings, providing a theoretical basis for the design of tandem flapping wing robots." (Authors)] Address: Tu, Z., Institute of Unmanned System, Beihang University, Beijing, China. Email: zhantu@buaa.edu.cn

**23095.** Liu, Y.-X.; Chen, P.-C.; Shi, C.-F.; Ren, D.; Yang, Q. (2024): The oldest aktasiid dragonfly (Odonata: Petaluridae) from the Middle Jurassic of China. *Palaeoentomology* 7(2): 237-244. (in English) ["A new genus and species of true dragonfly *Hongtaous caii* gen. et sp. nov. is described from the Middle Jurassic of Inner Mongolia, China. It is assigned to the family Aktasiidae based on the following: large and broad wings; narrow postnodal area with many cells distal of elongated pterostigma; very long and straight IR1; and widened area between RP1 and RP2, which is the oldest member of this family to date. *Hongtaous caii* sp. nov. differs from other genera by the configuration of wing venation such as: two rows of cells between RA and RP1 at level of Pt, and extending to the end of the wing; an elongated IR1, not distally vanishing; discoidal triangle and subdiscoidal triangle divided into multiple cells by transverse veins; presence of Rspl. In addition, its special cerci are simply discussed." (Authors)] Address: Liu, Y.-X., School of Life Sciences, Key Laboratory of Conservation and Application in Biodiversity of South China, Guangzhou Univ., Guangzhou 510006, China; College of Life Sciences & Academy for Multidisciplinary Studies, Capital Normal Univ., Beijing 100048, China

**23096.** Mardulyn, H. (2024): Trente ans d'évolution de la réserve naturelle agréée du Bec du Feyi (Wibrin - Houffalize). *Naturalistes Belges* 105(3): 1-21. (in French) ["The nature

reserve of Bec du Feyi near Wibrin has been the object of protection and nature conservation management measures for over 30 years to ensure its perennity. The reserve consists mainly of a mosaic of hay meadows, marshes, ponds, aquatic environments and old clear-cuts in the process of recolonization. The manager shares his thoughts on the evolution of nature through the various environments and habitats that make up this natural site, based on the impact of management actions, but also based on the influence of the numerous factors affecting the local environment and, more broadly, climate change." (Author) Verbatim: "Monitoring odonate populations: The abundance and diversity of odonates is also a good indicator of the state of conservation of wetlands and aquatic environments. wetlands and aquatic environments. Overall, each year I was able to observe a number of different species between 21 and 29, which nevertheless shows that the quality of the wetlands in the nature reserve remains interesting (eg. Mardulyn, 2000, 2017). In all, over 30 years, 40 species of dragonfly have been inventoried at the Bec du Feyi. An analysis of the data reveals the loss of a species that is highly characteristic of cool, damp environments with small, fast-flowing streams in the streams in the Ardennes. This is *Cordulegaster boltonii*. Although it was present every year in the reserve reserve, its last sighting was in 2009, with two timid appearances in 2019 and 2020. This absence is probably related to the degradation of the environment described above, or perhaps a consequence of the gradual warming of the climate in recent years. Another species that has disappeared is *Sympetrum flaveolum*. However, this is a more general phenomenon affecting the whole of Wallonia. *Gomphus pulchellus* remained well represented until 2008. In 1999 I even observed a maximum of 30 individuals. Then, after 2008, I didn't see it again for 12 years. And very recently it reappeared in 2020 and 2023. Its eclipse could also be due to environmental degradation. The major works carried out by the Life Plateau des Tailles project have restored hundreds of hectares of fens and peat bogs, eliminated large areas of spruce plantations and created a multitude of new ponds. These interventions have had a major impact on the plateau's odonate populations, as confirmed by several studies carried out by Wallonia's Department for the Study of the Natural and Agricultural Environment (DEMNA). The Bec du Feyi reserve, some 5 or 6 km to the south, has also benefited. As a result, *Aeshna juncea*, a species that thrives in the oligotrophic waters of acidic sphagnum peat bogs, characteristic of the Fagnard environments, made its appearance in the reserve in 2014 and has been observed every year since. Similarly, the appearance of an individual of *Leucorhinia dubia* in 2020 can be linked to the restoration work at the Plateau des Tailles. Similarly, one species that has become a regular sight in the reserve is *Orthetrum coerulescens*, Fig. 15). This species prefers small streams and ditches in meadows and acidic low marshes. A small population of *O. coerulescens* has been present in the reserve without interruption since 2010." (Google translate)] Address: Mardulyn, H.: Email: [harry.mardulyn@natagora.be](mailto:harry.mardulyn@natagora.be)

**23097.** Margetts, W.; Heise, B.A. (2024): Small mouth, big appetite: diet analysis of invasive smallmouth bass (*Micropterus dolomieu*) in Cultus Lake, British Columbia. *Environmental Biology of Fishes* 107(4): 1-19. (in English) ["As aquatic invasive species spread, their impacts on native systems are variable and important to understand from a management perspective. DNA sequencing and morphological analysis of stomach contents can provide insight into the diet of invasive opportunistic feeders, such as smallmouth bass (*Micropterus dolomieu*). Since their illegal introduction in 2017, smallmouth bass have proliferated in Cultus Lake,

British Columbia and potential impacts on two species-at-risk (sockeye salmon and pygmy sculpin) are currently unknown. Bass (n = 204) were sampled in the spring/summer of 2020–2021 in Cultus Lake. DNA barcoding (n = 145) and visual analysis (n = 204) of diet were completed. Diet composition, factors influencing the predation of species-at-risk, and dietary shifts were analyzed. DNA analysis identified 32 more taxa at the family level than morphological analysis. Multiple logistic regression showed that bass were more likely to predate on *Oncorhynchus nerka* within the bass spawning grounds, and over 90% of bass had sculpin in their diets. Diet composition did not shift as bass size changed, demonstrating sustained predation on fish from 100 to > 300 mm total length. These results highlight the importance of understanding the potential impacts of an invasive species before investing in suppression to create effective plans and leverage funding opportunities." (Authors) [https://www.tru.ca/\\_shared/assets/Wendy\\_Margetts\\_thesis55758.pdf](https://www.tru.ca/_shared/assets/Wendy_Margetts_thesis55758.pdf)] Address: Margetts, Wendy, Dept Natural Resource Sci. Thompson Rivers Univ., Kamloops, British Columbia, Canada

**23098.** Marinov, M. (2024): [Collection of dragonflies from Bulgaria]. National natural science museum at the BAS Sofia, e-ISBN 978-954-8828-16-1: 101 pp. [It is about the Bulgarian names of the species recorded in my home country as breeding or just accidental. The names come from: a) names which I collected while travelling within the country, b) suggestions from kids - I gave them my guide and asked them to come up with an idea just by looking at the photos or catching live individuals and showing them (500 suggestions collected and sieved through), c) consultations with experts on Bulgarian folklore from the Institute of Bulgarian folklore, d) two names published in the Bulgarian scientific literature, and e) my humble contribution - two names which I made up. The book is available for free download with only limited number of hard copies published. I also have photos of people who have contributed to the studies of Bulgarian fauna - including foreign scientists visiting my country. Unfortunately it took me more than 20 years to get to this stage and meanwhile we lost some of the people who deserved to see this book and their contribution acknowledged." (Author, via email)] Address: <https://www.nmnh.com/downloads/e-pubs/e-mvk.pdf>

**23099.** Mark, M.; Drake, E.; Kerwin, K.; Maslo, B. (2024): Non-native plants influence forest vegetative structure and the activity of eastern temperate insectivorous bats. *Forests* 2024, 15, 711. <https://doi.org/10.3390/f15040711>: 17 pp. (in English) ["Temperate insectivorous bats value high prey abundance and appropriate vegetative structure when selecting foraging habitats. Forests, particularly in the eastern United States, provide prime foraging habitats for bats but can be heavily impacted by non-native plants, which may alter arthropod diversity and abundance, as well as vegetative structure. To investigate the associations between non-native plants and insect abundance, vegetative structure, and, consequently, bat activity, we performed vegetation surveys, insect trapping, and acoustic monitoring at 23 forested plots in northern New Jersey, USA. We predicted that non-native vegetation would either positively influence bat activity by increasing structural openness (thus, facilitating flight) or negatively influence bat activity by lowering the abundance of putative prey. We also hypothesized that vegetative characteristics, and therefore non-native vegetation, impact bats differently depending on their foraging habitat preferences. The percent of non-native cover of the ground and midstory vegetative layers of our study plots ranged from 0 to 92.92% ( $x = 46.94 \pm 5.77$  SE) and was

significantly correlated with structural vegetative characteristics, such as midstory clutter ( $\beta = 0.01 \pm 0.006$  SE), but not putative prey abundance ( $\beta = -0.81 \pm 2.57$  SE). Generalized linear models with only vegetative characteristics best predicted overall bat activity and foraging, which were greatest in areas with a high percent non-native vegetation and low midstory clutter. Although percent non-native vegetation and midstory clutter were also significant effects for bats that prefer to forage in open areas, neither vegetative characteristics nor prey abundance were significant effects for clutter-loving bats. Such findings suggest that vegetative structure is more important than prey availability for predicting overall insectivorous bat activity, but other factors, such as foraging strategy and life history traits, can impact how bat guilds respond to non-native vegetation. Therefore, more research is required to reveal additional mechanisms by which non-native plants impact bats." (Authors) Four specimens of Odonata were collected in blacklight traps deployed at 23 plots in northern New Jersey, USA, in summer 2020, without further consideration.] Address: Maslo, Brooke, Dept of Ecology, Evolution, and Natural Resources, Rutgers, The State University of New Jersey, New Brunswick, NJ 08901, USA. Email: brooke.maslo@rutgers.edu

**23100.** Martens, A. (2024): First record of *Isoaeschna isoceles* (Müller) on the island of Crete, Greece (Odonata: Aeshnidae). *Libellula* 42(3/4): 163-165. (in English, with German summary) ["On 28 May 2023, one male of *Isoaeschna isoceles* (formerly known as *Aeshna isoceles*) was recorded at a large spring pool south of the Agia Lake (Chania district, Crete). This record filled the gap between the records from the Peloponnese and the recently reported ones from Cyprus." (Author)] Address: Martens, A., University of Education Karlsruhe, Institute for Biology, Bismarckstrasse 10, 76133 Karlsruhe, Germany. Email: martens@ph-karlsruhe.de

**23101.** McKercher, L.J.; Kimball, M.E.; Scaroni, A.E.; White, S.A.; Strosnider, W.H.J. (2024): Stormwater ponds serve as variable quality habitat for diverse taxa. *Wetlands Ecology and Management* 32: 109-131. (in English) ["Stormwater ponds are primarily designed for flood control and water quality protection, but they often serve as habitats of differing quality for a variety of organisms. Floral and faunal distributions within stormwater ponds are dependent on the environmental and biological characteristics of each pond and surrounding ecosystem which are inherently linked to management. Increasing stormwater pond size and habitat complexity can promote more diverse floral and faunal communities. However, aquatic pollution and the presence of invasive species can reduce biodiversity. Robust submerged and emergent macrophyte assemblages are critical in maintaining rich and abundant populations of other taxa. Phytoplankton are key primary producers in stormwater ponds; however, some groups are toxic. Zooplankton distribution in stormwater ponds is primarily determined by aquatic connectivity, trophic status, salinity, and predator presence. Fish may be naturally or unnaturally introduced to stormwater ponds, and impaired water quality can threaten their health. Various bird species use stormwater ponds as temporary or permanent habitat, and emergent macrophytes can provide roosting habitat. In some cases, birds may become nuisances and impair stormwater pond water quality. Semi-aquatic mammals may inhabit stormwater ponds with the potential to physically alter these habitats through shelter construction. For some taxa, stormwater ponds represent ecological traps which reduce organismal fitness. This review critically examines the many factors that determine floral and faunal communities within stormwater ponds, with insight into best management practices

to promote healthy pond ecosystems, advance stakeholder engagement and awareness, and avoid the creation of ecological traps in an increasingly urbanizing world." (Authors) This review includes data on Odonata.] Address: McKercher, L.J., Department of Biological Sciences, University of South Carolina, 700 Sumter St #401, Columbia, SC, 29208, USA. Email: levim@email.sc.edu

**23102.** Mei, Z.; Kuzhir, P.; Godeau, G. (2024): Update on chitin and chitosan from insects: Sources, production, characterization, and biomedical applications. *Biomimetics* 2024, 9(5), 297; <https://doi.org/10.3390/biomimetics9050297>: 58 pp. (in English) ["Insects, renowned for their abundant and renewable biomass, stand at the forefront of biomimicry-inspired research and offer promising alternatives for chitin and chitosan production considering mounting environmental concerns and the inherent limitations of conventional sources. This comprehensive review provides a meticulous exploration of the current state of insect-derived chitin and chitosan, focusing on their sources, production methods, characterization, physical and chemical properties, and emerging biomedical applications. Abundant insect sources of chitin and chitosan, from the Lepidoptera, Coleoptera, Orthoptera, Hymenoptera, Diptera, Hemiptera, Dictyoptera, Odonata, and Ephemeroptera orders, were comprehensively summarized. A variety of characterization techniques, including spectroscopy, chromatography, and microscopy, were used to reveal their physical and chemical properties like molecular weight, degree of deacetylation, and crystallinity, laying a solid foundation for their wide application, especially for the biomimetic design process. The examination of insect-derived chitin and chitosan extends into a wide realm of biomedical applications, highlighting their unique advantages in wound healing, tissue engineering, drug delivery, and antimicrobial therapies. Their intrinsic biocompatibility and antimicrobial properties position them as promising candidates for innovative solutions in diverse medical interventions." (Authors) References are made to *Sympetrum fonscolombii*, *Cordulia aenea* and *Libellula quadrimaculata*.] Address: Godeau, G., Univ. Côte d'Azur, Institut Méditerranéen du Risque de l'Environnement et du Développement Durable, 9 rue Julien Laupêtre, 06200 Nice, France. Email: guilhem.godeau@univ-cotedazur.fr

**23103.** Mosquera-Murillo, Z.; Córdoba-Aragón, K.E.; Mosquera-Mosquera, M.M.; Sanchez, S.P.; Palacios-Palacios, L. (2024): Aquatic insects associated with macrophytes in wetlands of the middle basin of Atrato River, Chocó - Colombia. *Rev. U.D.C.A. Act. & Div. Cient.* 27(1):e2409: 10 pp. (in English, with Spanish summary) ["Aquatic macrophytes play an important role in lentic systems, since they constitute the particular habitat of several groups of aquatic insects and play a fundamental role in structuring their communities. The objective of this study was to contribute to the knowledge of the aquatic entomofauna associated with macrophytes in wetlands of the middle basin of the Atrato River, Chocó-Colombia. For four months, collections of aquatic insects associated with the roots of different aquatic plants were made, using a quadrat of one m<sup>2</sup>, equipped with a 0.5 mm mesh, with three replicates per swamp. Simultaneously, some physical and chemical variables of the water were measured. The community of aquatic insects was composed of 6 orders, 23 families, and 36 genera. The most representative orders were Hemiptera (Heteroptera) and Odonata [treated at genus level] and the most abundant families were Noteridae (Coleoptera) and Libellulidae (Odonata). The diversity index presented a range between 2.39 and 2.07 bits/ind, with Plaza Seca as the most representative wetlands, while the dominance was between 0.16 and 0.11. The

most abundant functional group was that of predators. The variables pH, water temperature and transparency presented significant differences between swamps and there were important associations between the aquatic entomofauna, and the abiotic variables analyzed." (Authors)] Address: Mosquera-Murillo, Zuleyma, Universidad Tecnológica del Chocó, Programa de Biología. Quibdó, Chocó-Colombia. Email: dzuleyma.mosquera@utch.edu.co

**23104.** Muni, N.; Bhadra, P.; Chakravorty, J. (2024): Historical account of entomophagy among the Apatani tribe of Arunachal Pradesh: Current status and future trends. *Indian Journal of History of Science* 59: 28-37. (in English) ["This review focuses on tracing the history of entomophagy practice since the time of ancient archaic humans and the development of this practice that persisted until today among ethnic communities, with particular reference to the Apatani tribe of Arunachal Pradesh, India. Insects [including Odonata] as food is a trending research topic due to their potential as a future sustainable food. Until the mid-nineteenth century, the tribal population of Arunachal Pradesh was largely isolated, though the practice of eating insects prevailed among the majority of its tribal groups. Only in recent times has the need for alternative food resources, due to the impact of globalization, climatic crisis, and resource depletion worldwide, pushed for scientific exploration, which is gaining momentum. The history of anthro-entomophagy and its sociocultural significance is explored in this study. The present paper also describes the ongoing scientific exploration toward the value of edible insects as nutraceutical, entomocuticular, and pest control tools historically being used by Apatanese and the prospect of these edible insects for the tribe in the future." (Authors)] Address: Chakravorty, J., Biochemical and Nutritional Laboratory, Department of Zoology, Rajiv Gandhi University, Rono Hills, Itanagar, Arunachal Pradesh, 791112, India

**23105.** Muthukanagavel, M.; Vasanth, N.; Selvakumaran, J.; Ragavendran, K.; Anthonysamy, M.; Subramanian, M.; Ignacimuthu, S.; Alharbi, N.S.; Thiruvengadam, M.; Ganesan, P. (2024): Mosquitocidal susceptibility and non-target effects of *Tricholoma equestre* (L.) P. Kumm. On the immature stages of *Aedes aegypti* (Linnaeus in Hasselquist), *Anopheles stephensi* Liston and *Culex quinquefasciatus* Say. *International Journal of Medicinal Mushrooms* 26(3): 41-53. (in English) ["The worldwide scientific community is well aware that mosquitoes are the sole agents responsible for transmitting various dreadful diseases and critical illnesses caused by vector-borne pathogens. The primary objective of this current research was to evaluate the effectiveness of methanol extract from *T. equestre*, in controlling the early life stages of *C. quinquefasciatus*, *A. stephensi*, and *A. aegypti* mosquitoes. The larvae, pupae and eggs of these mosquitoes were exposed to four different concentrations (62.5 to 500 ppm). After 120 hours of treatment, the methanol extract of *T. equestre* exhibited ovicidal activity ranging from 66% to 80% against the eggs of the treated mosquitoes. It also demonstrated promising larvicidal and pupicidal activity with LC50 values of 216-300 and 230-309 ppm against the early life stages of all three mosquito species. Extensive toxicity studies revealed that the methanol extract from *T. equestre* had no harmful effects on non-target organisms. The Suitability Index (SI) or Predator Safety Factor (PSF) indicated that the methanol extract did not harm *Poecilia reticulata* Peters 1859, (predatory fish), *Gambusia affinis* S. F. Baird & Girard 1853, Dragonfly nymph and *Diplonchus indicus* Venkatesan & Rao 1871 (water-bug). Gas chromatography-mass spectrometry (GCMS) analysis identified key compounds, including

3-Butenenitrile, 2-Methyl-(25.319%); 1-Butanol, 2-Nitro-(18.87%) and Oxalic Acid, Heptyl Propyl Ester (21.82%) which may be responsible for the observed activity. Furthermore, the formulation based on the methanol extract demonstrated similar effectiveness against all three Address: Ganesan, P., Interdisciplinary Research Centre in Biology, Xavier Research Foundation, St Xavier's College (Manonmaniam Sundaranar Univ.), Palayamkottai, Tirunelveli, Tamil Nadu, India. Email: pathalamganesan@stxavierstn.edu.in

**23106.** Nel, A. (2024): Two new damselflies from the Eocene Green River Formation (Odonata, Zygoptera, Dysagrionidae, Thaumtoneuridae). *Zootaxa* 5446(4): 588-594. (in English) ["Two new damselflies are described on the basis of isolated wings from the Eocene Green River Formation (Colorado, USA), the eodysagrionine new genus and species *Gusagrion coloratum* and the dysagrionid new species *Petrolestes inexpectatus*. These new taxa confirm the great diversity of the fauna of large damselflies in this formation, currently much more important than the smaller damselflies of Lestoidea and Coenagrionoidea clades and of the large Anisoptera. It seems that important changes occurred in the faunal composition of the Odonata between the Eocene and Oligocene." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**23107.** Nel, A.; Ribeiro, G.C. (2024): New fossil wings shed light on Lower Cretaceous Araripechlorogomphidae and minimum age of the Chlorogomphoidea (Odonata: Anisoptera): Crato Formation, Araripe Basin, NE Brazil. *Cretaceous Research* 156, April 2024, 105811: (in English) ["This paper presents two newly discovered fossil wings belonging to the extinct species *Araripechlorogomphus* Bechly & Ueda, the type genus and species of the Cretaceous 'libelluloid' family Araripechlorogomphidae, previously known by incomplete hind wings from the same outcrop. *Araripechlorogomphus* *muratai* is of particular interest as it is the oldest-known member of the Chlorogomphoidea and its only known representative outside of the Oriental Region. These findings also support the hypothesis of a close relationship between Araripechlorogomphidae and Chlorogomphidae." (Authors)] Address: Ribeiro, G.C., Universidade Federal do ABC, Centro de Ciências Naturais e Humanas (CCNH), Santo André, São Paulo, Brazil. Email: guilherme.ribeiro@ufabc.edu.br

**23108.** Nelson, S.J.; Willacker, J.; Eagles-Smith, C.; Flanagan Pritz, C.; Chen, C.Y.; Klemmer, A.; Krabbenhoft, D.P. (2024): Habitat and dissolved organic carbon modulate variation in the biogeochemical drivers of mercury bioaccumulation in dragonfly larvae at the national scale. *Science of The Total Environment* 912(6):169396: 12 pp. (in English) ["We paired mercury (Hg) concentrations in dragonfly larvae with water chemistry in 29 U.S. National Parks to highlight how ecological and biogeochemical context (habitat, dissolved organic carbon [DOC]) influence drivers of Hg bioaccumulation. Although prior studies have defined influences of biogeochemical variables on Hg production and bioaccumulation, it has been challenging to determine their influence across diverse habitats, regions, or biogeochemical conditions within a single study. We compared global (i.e., all sites), habitat-specific, and DOC-class models to illuminate how these controls on biotic Hg vary. Although the suite of important biogeochemical factors across all sites (e.g., aqueous Hg, DOC, SO<sub>4</sub><sup>2-</sup>, and pH) was consistent with general findings in the literature, contrasting the restricted models revealed more nuanced controls on biosentinel Hg. Comparing habitats, aqueous (filtered) total mercury (THg) and SO<sub>4</sub><sup>2-</sup> were important in lentic systems whereas aqueous (filtered) methylmercury (MeHg),

DOC, pH, and  $\text{SO}_4^{2-}$  were important in lotic and wetland systems. The ability to identify important variables varied among habitats, with less certainty in lentic (model weight ( $W$ ) = 0.05) than lotic ( $W$  = 0.11) or wetland habitats ( $W$  = 0.23), suggesting that biogeochemical drivers of bioaccumulation are more variable, or obscured by other aspects of Hg cycling, in these habitats. Results revealed a contrast in the importance of aqueous MeHg versus aqueous THg between DOC-classes: in low-DOC sites (<8.5mg/L), availability of upstream inputs of MeHg appeared more important for bioaccumulation; in high-DOC sites (>8.5 mg/L) THg was more important, suggesting a link to in-situ controls on bioavailability of Hg for MeHg production. Mercury bioaccumulation (indicated by bioaccumulation factor) was more efficient in low DOC-class sites, likely due to reduced partitioning of aqueous MeHg to DOC. Together, findings highlight substantial variation in the drivers of Hg bioaccumulation and suggest consideration of these factors in natural resource management and decision-making." (Authors)] Address: Nelson, Sarah, Appalachian Mountain Club, Gorham, NH 03581, USA. Email: snelson@outdoors.org

**23109.** Nguyen, M.T.; Ignatius, K.J.; Sunprasit, S.; Phan, Q.T.; Keetapithchayakul, T.S. (2024): Description of final stadium larva of *Dysphaea gloriosa* Fraser, 1938, (Odonata: Euphaeidae) with notes on its habitat and biology. *Zootaxa* 5447(3): 385-396. (in English) ["The final instar larva of the genus *Dysphaea* Selys, 1853 is described and figured for the first time based on specimens of *D. gloriosa* from Khao Yai National Park, Thailand. The larvae of *D. gloriosa* are very rarely encountered. The larvae are characterized by the relatively larger head, the swollen heavily spined genae extending well beyond the eyes, the swollen postocular lobes bearing a disordered row of dense strong marginal spines, the outer armature of the mandibles and the unusual labrum. Notes on the habitat and biology of the larvae are also provided." (Authors)] Address: Nguyen, M.T., Institute of Applied Technology, Thu Dau Mot University, No. 06 Tran Van On, Phu Hoa Ward, Thu Dau Mot City, Binh Duong province, Vietnam. Email: tynm@tdmu.edu.vn

**23110.** Nieto, J.D.; Martínez-Toro, L.M.; Ospina, J.S.; Valencia-Rodríguez, D.; Restrepo-Santamaria, D.; Jiménez-Segura, L.F. (2024): Trophic niche partitioning among non-native fish species coexisting in a Colombian high Andean reservoir. *Biological Invasions*: 13 pp. (in English) ["The introduction of non-native species to a new environment poses a threat to local biological diversity, causing instability in the functioning of the ecosystem. The ecological effects caused by these species have been scarcely documented in the Magdalena basin. By studying predator-prey interactions, we characterized the trophic niche of three non-native species (*Cyprinus carpio*, *Micropterus salmoides*, and *Oncorhynchus mykiss*) that dominate a high Andean reservoir in the Magdalena basin. This study allows us to understand their specific feeding behaviors and how these behaviors facilitate their establishment in the reservoir. We evaluated the diversity of the prey they consume, their feeding strategy, and possible differences in the feeding scheme. Forty individuals were analyzed, with the highest representation of *M. salmoides* with 17 individuals, followed by *C. carpio* (13 individuals), and finally *O. mykiss* with 10 individuals. We identified twenty categories of food as prey for these species, with aquatic invertebrates and vegetation material being the predominant prey. The analysis of stomach contents in these samples suggested that they are representative for determining specialized or generalist feeding strategies. There were no differences in the number of prey items consumed by these

three species. The analysis revealed that the feeding strategies are specific for each species. There was no overlap in the diet of *C. carpio* with the other two species, however, the composition of the diet is similar between *M. salmoides* and *O. mykiss*. Analyzing the diet of these non-native fish provides a useful tool for describing trophic interactions in this aquatic environment. Our results contribute information on the existing interactions amongst non-native species in the Magdalena basin, which is important for the development of strategies to manage and mitigate their impact." (Authors) *O. mykiss* and *O. salmoides* are feeding on Odonata, as documented in the supplementary material.] Address: Martínez-Toro, Lina María, Grupo de Ictiología, Depto de Biología, Univ. de Antioquia, Medellín, Colombia

**23111.** Noorhidayah, M.; Azrizal-Wahid, N.; Low, V.L.; Yusoff, N.-R. (2024): Genetic diversity and phylogeographic patterns of the peacock jewel-damselfly, *Rhinocypha fenestrella* (Rambur, 1842). *PLoS ONE* 19(4): e0301392: 17 pp. (in English) ["Despite is known to have widespread distribution and the most active species of the family Chlorocyphidae, the molecular data of *R. fenestrella* are relatively scarce. The present study is the first that examined the genetic diversity and phylogeographic pattern of *R. fenestrella* by sequencing the cytochrome C oxidase I (*cox1*) and 16S rRNA gene regions from 147 individuals representing eight populations in Malaysia. A total of 26 and 10 unique haplotypes were revealed by the *cox1* and 16S rRNA genes, respectively, and 32 haplotypes were recovered by the concatenated sequences of *cox1*+16S. Analyses indicated that haplotype AB2 was the most frequent and the most widespread haplotype in Malaysia while haplotype AB1 was suggested as the common ancestor haplotype of the *R. fenestrella* that may arose from the Negeri Sembilan as discovered from *cox1*+16S haplotype network analysis. Overall haplotype and nucleotide diversities of the concatenated sequences were  $H_d = 0.8937$  and  $P_i = 0.0028$ , respectively, with great genetic differentiation ( $F_{ST} = 0.6387$ ) and low gene flow ( $N_m = 0.14$ ). Population from Pahang presented the highest genetic diversity ( $H_d = 0.8889$ ,  $P_i = 0.0022$ ,  $N_h = 9$ ), whereas Kedah population demonstrated the lowest diversity ( $H_d = 0.2842$ ,  $P_i = 0.0003$ ,  $N_h = 4$ ). The concatenated sequences of *cox1*+16S showed genetic divergence ranging from 0.09% to 0.97%, whereas the genetic divergence for *cox1* and 16S rRNA genes were 0.16% to 1.63% and 0.01% to 0.75% respectively. This study provides for the first-time insights on the intraspecific genetic diversity, phylogeographic pattern and ancestral haplotype of *R. fenestrella*. The understanding of molecular data especially phylogeographic pattern can enhance the knowledge about insect origin, their diversity, and capability to disperse in particular environments." (Authors)] Address: Azrizal-Wahid, N., Department of Biology, Faculty of Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia. Email: noorazrizal@upm.edu.my

**23112.** Nose, M.; Hoffmann, C. (2024): Libelle (Odonata) *Cymatophlebia longialata* (Münster in German, 1839), Oberjura, ca. 150 Millionen Jahre, „Solnhofener Plattenkalke“, Eichstätt, Oberbayern Größe der Platte: 14x14cm. *Fossil des Monats* 351: 1 p. (in German) [Verbatim/Google translate: "The piece exhibited here comes from the collection of Karl Friedrich Häberlein, a country doctor from Pappenheim. Together with his son Ernst Otto, the Häberleins owned by far the largest and most valuable private collection of limestone fossils from the 19th century. By building up these collections and passing them on, especially to scientific institutions, the Häberleins have made great contributions to paleontology. In 1856, Karl F. Häberlein sold an extensive and



extremely valuable part of his collection (including the dragonfly exhibited here) to the Munich collection for 11,000 guilders. The sum was provided by the Bavarian King Maximilian II Josef." ] Address: <https://bspg.snsb.de/wp-content/uploads/sites/7/2023/12/3ffaeb02.pdf>

**23113.** Novais Souza, F.; Lopes da Silva, R.M.; Campiolo, S. (2024): Spatial and environmental influence on the community of aquatic insects in Atlantic forest streams. *Revista de Gestão Social e Ambiental* 18(1): 1-15. (in English, with Spanish summary) ["Purpose: Investigate the influence of environmental variables and spatial autocorrelation on aquatic insect communities within the same water flow in Atlantic Forest streams. Theoretical framework: The organisms in lotic environments are influenced by both local and non-local factors, in addition to other processes, which result from the dynamics of the environment. Alterations in these factors can provide evidence regarding the organization of aquatic communities. Given the high sensitivity insect are used in ecosystems quality studies around the world. Method: Sampling campaigns were conducted every three months. A total of 24 samples were collected across four campaigns and six collection sites were established along the same stream. In-situ measurements of physical and chemical variables were performed. The environmental quality of the surroundings was assessed using the Habitat Integrity Index. Results and conclusion: No spatial dependence was found between the sampling sites. Closer points no longer exhibited resemblance. For the studied situation, the surrounding and turbidity have a stronger relationship with the biota, acting as environmental filters and suggesting that the organization of is driven by local environmental conditions. Environments that are locally less disturbed are more influential in shaping for aquatic insect communities. Thus, considering the effect of habitats on organisms and recognizing the importance of local conservation efforts for preserving the aquatic biodiversity of the Atlantic Forest biome, we emphasize need for the implementation permanent monitoring programs in hydrographic basins, mainly for the BHRA, and the development of strategies aimed at minimizing the impacts on these environments. Research implications: We affirm the applicability of aquatic insects as valuable indicators for assessing the quality and biodiversity of streams and suggest studies with these organisms as a strategy to support management in freshwater environments. Originality/value: Studies that evaluate water bodies and their surroundings are essential in view of the pressures exerted through the different land uses. The study region deserves attention in view of the implementation of large constructions." (Authors) The List of taxa of aquatic insects in the Almada river basin, Bahia, Brazil includes Hetaerina/Mnesarete, Telebasis, Aphylla, Gomphoides, Lestes, Brechmorhoga, Erythrodiplax, Planiplax, Orthemis, and Macrothemis.] Address: Novais Souza, Francine, Univ. Estadual do Sudoeste da Bahia (UESB), Vitória da Conquista, Bahia, Brasil. Email: [francine.souza@uesb.edu.br](mailto:francine.souza@uesb.edu.br)

**23114.** Novella-Fernandez, R.; Chalmandrier, L.; Brandl, R.; Pinkert, S.; Zeuss, D.; Hof, C. (2024): Trait overdispersion in dragonflies reveals the role and drivers of competition in community assembly across space and season. *Ecosphere* 2023: e06918: 14 pp. (in English) ["Our understanding of how biotic interactions influence animal community assembly is largely restricted to local systems due to the difficulty of obtaining ecologically meaningful assemblage data across large spatial extents. Here, we used thousands of spatio-phenologically high-resolution assemblages across three distinct European regions together with a functional diversity approach to understand community assembly of Odonata, an

insect group characterized by a pronounced competitive reproductive biology. We found that adult dragonfly, but not damselfly, assemblages were consistently composed of species morphologically more different than expected by chance based on the traits that enhance their interspecific reproductive encounters. These results provide consistent evidence for the role of competition in the assembly of animal communities, which we interpret is most likely caused by the territorial reproductive biology of dragonflies. Support for competition varied both spatially and seasonally following theoretical expectations, as it was strongest in locations and seasonal moments with low thermal stress (i.e. warm conditions) and high niche packing. Our study illustrates how spatio-temporal diversity patterns arise from variation in assembly processes." (Authors)] Address: Novella-Fernandez, R., Dept for Life Science Systems, Terrestrial Ecology Research Group, School of Life Sciences, Technical Univ. of Munich, Freising, Germany. Email: [r.novellaf@outlook.com](mailto:r.novellaf@outlook.com)

**23115.** Novelo-Gutiérrez, R., Gómez-Anaya, J.A. (2024): The rediscovery of *Epigomphus sulcatistyla* Donnelly, 1989, with a description of its larva and female (Odonata: Gomphidae). *Zootaxa* 5446(1): 133-142. (in English, with Spanish summary) ["The larva of *E. sulcatistyla* is described, figured and compared with other described Mexican larvae. It is characterized by 3rd antennomere spindle-shaped, almost twice longer than its widest part; ligula with a ventral row of eight short, truncate teeth on middle; abdomen lateral spines on S7–9 slightly divergent; male epiproct dorsal tubercles rounded apically and divergent distally. It differs from other Mexican species mainly in shape of 3rd antennomere, number of teeth on ligula, serrations on lateral margins of S8–9, and shape of cerci. Also, the hitherto unknown female is described, for the first time, based on four teneral female from reared larvae." (Authors)] Address: Novelo-Gutiérrez, R., Inst. de Ecol., A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: [rodolfo.novelo@inecol.edu.mx](mailto:rodolfo.novelo@inecol.edu.mx)

**23116.** Odigie, O.; Elimhngbovo, I.; Ekrakene, T.; Owadayo, H.O.; Imoobe, T.O.T. (2024): Relative abundance, richness and diversity of bottom sediment of macroinvertebrates in Okhuaihe River, Ikpe community, Ikpoba Okha Local Government Area, Edo State, Nigeria. *Journal of Applied Sciences and Environmental Management* 28(5): 1327-1334. (in English) ["Components of species diversity involves species richness and relative abundance within a biological community. Hence, this paper is set out to assess the relative abundance, richness and diversity of bottom sediment of macroinvertebrates in Okhuaihe River, Ikpe Community, Ikpoba Okha Local Government Area, Edo State, Nigeria, using standardized analytical techniques. Data obtained reveals that most of the metrics in the sediment samples fell within the tolerable ranges allowed by the Federal Ministry of Environment and the World Health Organization. Dipterans were the majority group among the twenty-eight (28) taxa that made up the 931 individuals collected, and an analysis of variance (ANOVA) showed no significant difference in the overall density ( $p > 0.05$ ) between the sampling stations. Shannon (H) showed that Station 2 was more diverse (2.723) and least in Station 4 (2.496), while evenness (E) was highest in Station 2 (0.6342) and lowest in Station 3 (0.5248). Species richness as measured by Margalef's index showed that Station 1 was highest (4.873) and least in Station 4 (3.99). There was a remarkable presence of Diptera, Coleoptera, Odonata, and Haplotaxida, while the nonappearance of sensitive species suggests possible contamination and pollution. Regular monitoring of the river's sediment quality, including the

activities and effluents that are discharged into the river is advised." (Authors) All (odonate) specimens are misidentified as they are exclusively of European origin.] Address: Odi-  
gie, O., Dept of Biological Sciences, Fac. of Science, Benson  
Idahosa University, P.M.B. 1100, Benin City, Nigeria.  
Email: oodigie@biu.edu.ng

**23117.** Omuse, E.R.; Tonnang, H.E.Z.; Yusuf, A.A.; Honest  
Machekano, H.; Egonyu, J.P.; Kimathi, E.; Mohamed, S.F.;  
Kassie, M.; Subramanian, S.; Onditi, J.; Mwangi, S.; Ekesi,  
S.; Niassy, S. (2024): The global atlas of edible insects: ana-  
lysis of diversity and commonality contributing to food sys-  
tems and sustainability. *Scientific Reports* | (2024) 14:5045:  
17 pp. (in English) ["The future of the food system on the  
planet is increasingly facing uncertainties that are attribu-  
table to population growth and a surge in demand for nutri-  
tious food. Traditional agricultural practices are poised to  
place strain on production, as well as natural resources and  
ecosystem services provided, particularly under a changing  
climate. Given their remarkable attributes, including a low  
environmental footprint, high food conversion ratio, rapid  
growth and nutritional values, edible insects can play a vital  
role in the global food system. Nonetheless, substantial  
knowledge gaps persist regarding their diversity, global dis-  
tribution, and shared characteristics across regions, poten-  
tially impeding effective scaling and access to edible insects.  
Therefore, we compiled and analysed the fragmented data-  
base on edible insects and identified potential drivers that  
elucidate insect consumption, globally, focusing on promo-  
ting a sustainable food system. We collated data from vari-  
ous sources, including the literature for a list of edible insect  
species, the Global Biodiversity Information Facility and iNat-  
uralist for the geographical presence of edible insects, the  
Copernicus Land Service library for Global Land Cover, and  
FAOSTAT for population, income, and nutritional security  
parameters. Subsequently, we performed a series of analy-  
tics at the country, regional and continental levels. Our study  
identifies 2205 insect species, consumed across 128 coun-  
tries globally. Among continents, Asia has the highest num-  
ber of edible insects (932 species), followed by North Ame-  
rica (mainly Mexico) and Africa. The countries with the high-  
est consumption of insects are Mexico (450 species), Thai-  
land (272 species), India (262 species), DRC (255 species),  
China (235 species), Brazil (140 species), Japan (123 spe-  
cies), and Cameroon (100 species). Our study also revea-  
led some common and specific practices related to edible  
insect access and utilisation among countries and regions.  
Although insect consumption is often rooted in cultural prac-  
tices, it exhibits correlations with land cover, the geographi-  
cal presence of potentially edible insects, the size of a  
country's population, and income levels. The practice of ea-  
ting insects is linked to the culture of people in Africa, Asia,  
and Latin America, while increased consciousness and the  
need for food sustainability are driving most of the European  
countries to evaluate eating insects. Therefore, edible insects  
are becoming an increasingly significant part of the future of  
planetary food systems. Therefore, more proactive efforts  
are required to promote them for their effective contribution  
to achieving sustainable food production." (Authors)] Address:  
Niassy, S., Inter-African Phytosanitary Council of African  
Union (AU-IAPSC), P.O Box 4170, Yaoundé, Cameroon.  
Email: NiassyS@africa-union.org

**23118.** Palacino-Rodríguez, F. (2024): Reproductive beha-  
vior of *Erythrodiplax abjecta* (Rambur, 1842) from Andean  
Mountains. *International Journal of Odonatology* 27: 93-102.  
(in English) ["Research about the behavior of Neotropical  
species is crucial to understand how the rapid environmental

changes in the Neotropics affect the reproduction of various  
organisms. The reproductive behavior of insects in tropical  
ecosystems, such as those belonging to the order Odonata,  
is as yet scarcely known. In this article, the reproductive be-  
havior of *Erythrodiplax abjecta* is described from several lo-  
calities in the Colombian Andean Mountains. Playing out  
between 10:00 and 14:30 h, male individuals of this species  
may exhibit either territorial or satellite behavior. Sexually  
mature males and females engage in tandem and copulation  
behaviors, which are brief and may occur either perched or  
in flight. Females of *E. abjecta* oviposit directly in the water  
at various times, alternating with periods of rest. During ovi-  
position, males stand guard over females, perched or hovering,  
in a quest to protect them against other males. Conspecific  
males have been observed to engage in sieges of perching  
or ovipositing females, as well as mating pairs. Following a siege,  
either the female or the original pair flees, or the besieging  
male will succeed in outcompeting the original male, take  
the female in tandem, copulate with her, and then guard her  
while she oviposits. If the female flees, she may perch else-  
where, continue ovipositing, or may be taken by another  
male. The intense male guarding behavior during oviposi-  
tion could represent an adaptation to temporarily high male  
densities at oviposition sites and a high level of competition  
during the short period in which active copulation takes  
place." (Author)] Address: Palacino-Rodríguez, F., Sección  
Etología, Fac. de Ciencias, Universidad de la República,  
Montevideo, Uruguay. Email: odonata107@gmail.com

**23119.** Pan, Y.; Guo, S.; Whidborne, J.; Huang, X. (2024):  
Aerodynamic performance of a flyable flapping wing rotor  
with dragonfly-like flexible wings. *Aerospace Science and  
Technology* 148, May 2024, 109090: 14 pp. (in English) ["Draw-  
ing inspiration from insect flapping wings, a Flapping Wing  
Rotor (FWR) has been developed for Micro Aerial Vehicle  
(MAV) applications. The FWR features unique active flapping  
and passive rotary kinematics of motion to achieve a high lift  
coefficient and flight efficiency. This study thoroughly inves-  
tigates the aerodynamic performance and design of a bio-  
inspired flexible wing for FWR-MAVs, emphasizing its novel  
backward-curved wingtip and variable spanwise stiffness  
resembling a dragonfly's wing [*Sympetrum sanguineum*].  
The research departs from previous aerodynamic studies of  
FWR, which focused predominantly on rectangular and rigid  
wings, and delves into wing flexibility. Employing Computa-  
tional Fluid Dynamics (CFD), Computational Structural  
Dynamics (CSD), and experimental measurements, the  
study demonstrates the aerodynamic benefits of the dra-  
gonfly-inspired FWR wingtip shape and its reinforced  
structure. Fluid-Structure Interaction (FSI) analysis is used to  
examine the effects of elastic deformation encompassing  
twist and bending on aerodynamic forces. The results un-  
derscore the importance of bending deformation in enhan-  
cing lift and power efficiency and propose a method for ana-  
lysing variable stiffness along the wingspan using a vortex  
delay mechanism that is induced by delayed flapping mo-  
tion. By comparing modelled and measured stiffness, the  
study validates the flexibility of the FWR wing, revealing op-  
timal aerodynamic efficiency is achieved through moderate  
flexibility and spanwise stiffness variation. The curving lea-  
ding-edge beam forming the sweep-back wingtip offers a  
practical approach to obtaining variable stiffness and aero-  
dynamic benefits for FWR-MAVs. Using the same pair of  
dragonfly-like flexible wings, FWR-MAVs have effectively  
exhibited VTOL and hovering flight capabilities, spanning  
from a 25-g single-motor drive model to a 51-g dual-motor  
drive model. This research provides valuable insights into  
flexible wing design for FWR-MAVs, leveraging biomimicry

to improve flight efficiency." (Authors)] Address: Pan, Y., Centre for Aeronautics, School of Aerospace, Transport and Manufacturing, Cranfield University, Bedford, UK

**23120.** Parnova, R.G. (2024): Unique dragonfly hunting strategies and exceptionally high eicosapentaenoic acid levels in brain lipids: Is there a link? *Journal of Evolutionary Biochemistry and Physiology* 60: 1-9. (in English) ["Docosahexaenoic acid (DHA, C22:6?3) and, to a much lesser extent, eicosapentaenoic acid (EPA, C20:5?3) are the main long-chain omega-3 polyunsaturated fatty acids (PUFAs) in mammalian brain phospholipids. A huge number of studies conducted in recent years indicate the important role of omega-3 PUFAs in the regulation of behavior, memory, mental and cognitive development in humans and animals. DHA and EPA are essential for neuro- and synaptogenesis, neural network formation, stimulation of neurotrophic factor production, neuronal and synaptic plasticity. Omega-3 PUFA deficiency leads to a decrease in spatial memory, cognitive development, learning ability, visual impairment, and psychomotor functions. In the context of modern concepts on the role of omega-3 PUFAs in cognitive processes, the author discusses her previously published data on a sharp increase in brain phospholipid EPA levels in the adult dragonfly *Aeshna grandis* L. compared to its larvae in an attempt to link this phenomenon to a significant complication of behavior in adult dragonflies and the development of their highly effective pursuit and visual processing strategies." (Author)] Address: Parnova, R.G., Sechenov Inst. of Evolutionary Physiology & Biochemistry, Russian Acad. of Sciences, St. Petersburg, Russia

**23121.** Paulson, D.R.; Dunkle, S.W.; Johnson, J.T. (2024): A Checklist of North American Odonata including English name, etymology, type locality, and distribution. 2024 Edition. Originally published as Occasional Paper No. 56, Slater Museum of Natural History, University of Puget Sound, June 1999. Completely revised March 2009; updated February 2011, February 2012, October 2016, November 2018, February 2021, and January 2024: 94 pp. (in English) ["The checklist includes all 471 species of North American Odonata (Canada and the continental United States) considered valid at this time. For each species the original citation, English name, type locality, etymology of both scientific and English names, and approximate distribution are given. Literature citations for original descriptions of all species are given in the appended list of references." (Authors)] Address: Paulson, D.R., 1 1724 NE 98th Street, Seattle, WA 98115, USA

**23122.** Pawar, G.N.; Bendre, N.N.; Bhoite, S.H. (2024): Entomofaunal diversity and prey-predator relationship associated with organic paddy field at Mahadare Conservation Reserve, Satara District, Maharashtra. *Journal of Entomology and Zoology Studies* 12(3): 20-28. (in English) ["Paddy fields are natural wetland ecosystems that supply rice for the people and provide the shelter to wildlife especially insect diversity of different functional aspects. In the present study, we investigated entomofaunal diversity in organic paddy field at Mahadare conservation reserve, Satara district Maharashtra. A total of 275 insects belonging to 56 species and eight orders, viz., Coleoptera (10), Diptera (1), Hemiptera (4), Lepidoptera (24), Mantodea (2), Odonata (10), Orthoptera (4), and Thysanoptera (1) were recorded. The most abundant order was Lepidoptera and the least one was Diptera. The abundance of insects varying in different growth stages of the rice. Total (53%) insects act as pest and predators comprising (41%) individuals of insect pests with remaining (6%) were visitors of the paddy field. We concluded from our study that these rice fields were cultivated

without use of any type of insecticide, pesticide or inorganic chemical fertilizer honouring traditional Indian culture. So, even the pest insects were diverse the predators serve as most effective agents for the biological control and farmers produce high crop yield." (Authors)] Address: Pawar, Gayatri, Research Scholar, Dept Zool., Lal Bahadur Shastri College of Arts Commerce & Science, Satara, Maharashtra, India

**23123.** Pebrianti, H.; Ilhamdi, M.L.; Yamin, M. (2024): Diversity and Distribution Patterns of Dragonflies in The Region Bagek Kembar Ecotourism, Sekotong. *Jurnal Biologi Tropis* 24(2): 169-177. (in Indonesian, with English summary) ["Dragonflies have an important role ... especially as indicators of the success of mangrove ecosystem restoration projects and their distinctive color has become an ecotourism attraction, so this research is important to do. This research aims to determine the diversity and distribution patterns of dragonflies in the Bagek Kembar Sekotong Mangrove Ecotourism area. This is an explorative descriptive study and was carried out between December 2023-January 2024. The research method used was catching dragonflies with insect nets following three transect paths along the river flow in the Bagek Kembar Sekotong Mangrove Ecotourism area. Analysis of species diversity data using the Shannon Wiener diversity index and calculation of the dragonfly distribution pattern index using the variance test. Based on the research results, 9 species of Odonata were obtained, including 8 Anisoptera and 1 Zygoptera. The diversity index (H') of dragonflies at the observation location is 1,866. The conclusion is that diversity of dragonflies at the research location is in the medium category. The distribution pattern of dragonflies at the research location shows that one *Potamarcha* congener species has a regular distribution pattern and the other 8 species that had groups distribution pattern." (Authors)] Address: Pebrianti, Hasita, Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Mataram, Mataram, Nusa Tenggara Barat, Indonesia. Email: haasitapebrianti10@gmail.com

**23124.** Petzold, F. (2024): Erster Entwicklungsnachweis des Spitzenfleckes (*Libellula fulva*) in Thüringen (Insecta: Odonata). *Mitteilungen des Thüringer Entomologenverbandes e.V.* 31(1): 18-25. (in German, with English summary) [Germany "On 04.06.2023, imagines of *L. fulva* were found at 2 ponds near Unkenroda in the Wartburg district. Exuviae were also found at one pond. This is the first evidence of development of the species in Thuringia. The characteristics of the water bodies and the circumstances under which they were found are reported. In addition, a compilation of the previous scattered findings of mostly single imagines in Thuringia is given. There has been an increase in detections in the last 6 years, which is seen in connection with the current climatic changes." (Author) The list of records also includes *Coenagrion scitulum*.] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: petzold.falk@googlemail.com

**23125.** Pietroni, L.; Balsamo, M.F.; Cangelosi, G.F. (2024): Modularity in the insect world as a strategy for bio-inspired and sustainable design. Published: 03 April 2024 by MDPI in The 1st International Online Conference on Biomimetics session Biomimetics of Materials and Structures: (in English) ["The morphological and functional diversity of insects provides a valuable source of inspiration for the bio-inspired design of innovative and sustainable products and processes. This paper proposes to examine the principles and strategies that guide nature's evolutionary and adaptive activities, with a focus on the concept of a "module" as a measure and standard for achieving resilience and sustainability

in natural ecosystems. The concept of a module, relevant in all living organisms, is particularly evident in insects: redundant and hierarchical geometries capable of generating high and unprecedented performances, such as, for example, the structural color observed in *Chrysinia gloriosa*, the superadhesion capacity observed in *Hydaticus pacificus*, and the thermoregulation and structural strength of the Odonata dragonfly. Modularity in insect structures manifests itself at different scales of observation, from nano to micro and macro scales, and at different levels, including morphology, structural organization, mechanisms of functioning, and behavioral processes. Emulating the principles and strategies of inherent modularity in insects in the design of processes and products can significantly contribute to increased sustainability, introducing new perspectives in the field of design for environmental sustainability in synergy with bio-inspired design. Examples of insect morphological/functional diversity will be analyzed and related to case studies of bio-inspired designs and products, and the advantages gained in imitating some of their aspects and characteristics will be made explicit. In addition, it will be highlighted how computational design—that is, the application of algorithmic and systems thinking through the use of analysis tools, generative modeling, and 3D printing—enables the replication of complex forms by imitating the modularity present in insects, which, in different aggregations, generates resilient, sustainable, and well-performing structures." (Authors) <https://sciforum.net/paper/view/17073> ]

**23126.** Pires, M.; Martins, F.; del Palacio, A., Muzón, J.; Varella, L.; Juen, L.; Périco, E. (2024): Assessing the spatial knowledge gaps of Odonata diversity and conservation in the South American Pampa. *Aquatic Conservation: Marine and Freshwater Ecosystems* 34(5): 13 pp. (in English) ["(1) Anthropogenic activities highly threaten neotropical freshwater habitats. Aquatic insects are sensitive to environmental alterations and thus considered under great risk due to such pressures. However, large-scale gaps regarding the knowledge of the distribution of aquatic insect species remain in the Neotropics, particularly in the South American temperate grasslands (Pampas), hindering the knowledge of hotspots of aquatic insect diversity and the prioritization of conservation areas destined to protect their populations. (2) Here, we review the current knowledge regarding the geographical distribution of Odonata species and use ecological niche models to estimate the areas with the highest potential richness of Odonata species in the Pampas. We also calculate a sampling effort index and interpolate it with maps of protected areas to identify the spatial knowledge gaps regarding their conservation in the region. (3) Our compilation of Odonata species records retrieved 237 species for the Pampa. However, Odonata species were recorded in less than 2% of the Pampa. Our findings indicated a higher potential diversity of Odonata in northeastern Argentina, southern Uruguay and southern Brazil. Interpolations of sampling effort index and protected areas showed that 95% of the area potentially rich in Odonata species fall outside protected areas. (4) Our study highlights the shortfall regarding the knowledge of the distribution of Odonata diversity in non-forest landscapes of the Neotropical region. It also shows that protected areas of the Pampa cover a minor area of the Odonata species range in the region." (Authors).] Address: Pires, M.N., Universidade do Vale do Taquari (UNIVATES), Av. Avelino Tallini, 171, PO 95914-014, Lajeado, RS, Brazil. Email: [marquespiresm@gmail.com](mailto:marquespiresm@gmail.com)

**23127.** Pires, M.M.; Perico, E. (2024): Preliminary checklist of dragonflies (Insecta: Odonata) of the Santa Catarina State,

Brazil. *Biota Neotropica* 24(1), e20241614: 11 pp. (in English, with Portuguese summary) ["In this study, we provide a checklist of the species of Odonata (Insecta) from the state of Santa Catarina (southern Brazil), along with their location records in the municipalities across the state (whenever possible). We compiled 147 species from 60 genera and nine families, making Santa Catarina the second state with the most Odonata species recorded in southern Brazil. The families with the highest number of species were Libellulidae (54 species from 18 genera), followed by Coenagrionidae (36 species from 17 genera), Gomphidae (20 species from ten genera) and Aeshnidae (15 species from eight genera). Several regions of Santa Catarina are unexplored (mostly the westernmost and central regions of the state), whereas the knowledge in the southern coast and the subtropical highland grasslands remains restricted to sparse occurrence records. Moreover, the distribution records in the state show an enormous historical track associated with the establishment of late entomologists in the region. Our study highlights the role of Atlantic Forest biome in maintaining high levels of diversity of Odonata species richness in Brazil and also shows that many areas in subtropical forests in Brazil are not adequately sampled." (Authors)] Address: Pires, M., Universidade do Vale do Taquari, Programa de Pós-graduação em Ambiente e Desenvolvimento, Laboratório de Ecologia e Evolução, Lajeado, RS, Brasil. Email: [marquespiresm@gmail.com](mailto:marquespiresm@gmail.com)

**23128.** Pomorska-Grochowska, J.; Ostrowski, K. (2024): New records of *Sombre Goldenring Cordulegaster bidentata* Selys, 1843 (Odonata: Cordulegasteridae) in the Bystrzyckie Mountains (SW Poland). *Odonatrix* 205: 4 pp. (in Polish, with English summary) ["In 2023, 3 new localities of *C. bidentata* were found in the Bystrzyckie Mountains (south-western Poland). *C. boltonii* was also identified at one of the localities, which means that these species are sympatric in this area. These are new localities of *C. bidentata* in this part of the Sudety Mountains." (Authors)] Address: Ostrowski, K., Marcinkowice 55-020 Zórawina, Poland. Email: [ostrowski85@go2.pl](mailto:ostrowski85@go2.pl)

**23129.** Preuss, A.; Appel, E.; Gorb, S.N.; Büsse, S. (2024): Tanning of the tarsal and mandibular cuticle in adult *Anax imperator* (Insecta: Odonata) during the emergence sequence. *Interface Focus* 14(2), <https://doi.org/10.1098/rsfs.2023.0076>: (in English) ["The arthropod cuticle offers strength, protection, and lightweight. Due to its limit in expandability, arthropods have to moult periodically to grow. While moulting is beneficial in terms of parasite or toxin control, growth and adaptation to environmental conditions, it costs energy and leaves the soft animal's body vulnerable to injuries and desiccation directly after ecdysis. To investigate the temporal change in sclerotization and pigmentation during and after ecdysis, we combined macrophotography, confocal laser scanning microscopy, scanning electron microscopy and histological sectioning. We analysed the tarsal and mandibular cuticle of the blue emperor dragonfly to compare the progress of tanning for structures that are functionally involved during emergence (tarsus/tarsal claws) with structures whose functionality is required much later (mandibles). Our results show that: (i) the tanning of the tarsal and mandibular cuticle increases during emergence; (ii) the tarsal cuticle tans faster than the mandibular cuticle; (iii) the mandibles tan faster on the aboral than on the oral side; and (iv) both the exo- and the endocuticle are tanned. The change in the cuticle composition of the tarsal and mandibular cuticle reflects the demand for higher mechanical stability of these body parts when holding on to the substrate during emergence

and during first walking or hunting attempts." (Authors)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**23130.** Qi, P.; Liu, P.; Xiao, C.; Zheng, D. (2024): A new hemeroscopid dragonfly (Odonata, Anisoptera) from the Lower Cretaceous of the Jiuquan Basin, northwestern China. *Zootaxa* 5432(4): 567-572. (in English) ["Parahemeriscopus jiuquanensis gen. et sp. nov., is described from the Lower Cretaceous Zhonggou Formation of the Jiuquan Basin, northwestern China. Parahemeriscopus gen. nov. has the mixed characters of the hemeriscopid genera *Hemeriscopus* Pritykina, 1977 and *Abrohemeriscopus* Ren, Liu & Cheng, 2003, and probably represents a transitional dragonfly from *Abrohemeriscopus* to *Hemeriscopus*. The new finding not only adds to the diversity of the Hemeriscopidae Pritykina, 1977, but also provides clues for revealing the early evolution of the hemeriscopid dragonflies." (Authors)] Address: Qi, P., School Geosciences, Yangtze Univ., Wuhan; 430100, China

**23131.** Rasheed, N.; Shahzad, U.; Panhwar, W.A.; Saddam, B.; Rasheed, Z.; Ahmed, Z.; Ali, M. A.; Ali, M.A.; Hussain, F.; Khan, H.A.F. (2024): Folklores to facts: Human psychology toward insects in Punjab, Pakistan. *Journal of Wildlife and Ecology*. 8: 15-26. (in English) ["Insects are the most abundant animals on the planet and have various impacts on humans. Invertebrates, with a few exceptions, are generally disliked. This widespread hatred can be attributed to our preference for animals that are aesthetically pleasing or similar to humans, as well as those that are considered beneficial to us. These perceptions strongly influence how we understand, interact with, and manage insects. Because humans unlike many species of insects due to cultural norms, folklore, and other economic factors, this study was designed to understand human interactions with insects in Punjab, Pakistan. We randomly chose 300 people from the crowds and described the goal of our study. We collected data about the views and common philosophies of respondents to understand how Punjabis feel about insects. We noted that most people don't have knowledge about insect species, and they feel creeped out and/or dislike cockroaches, houseflies, ants, lice, and mosquitoes, even though these species are involved in disease transmission and/or directly harm humans. Humans fear honeybees and wasps because both have stings, even though honeybee products are commonly used in society. People in the area like butterflies, fireflies, beetles, dragonflies, and beetles. Locusts and grasshoppers are liked and even eaten in some places in south Punjab. In conclusion, people in Punjab often have negative thoughts towards insects. People often kill insects, such as cockroaches and mosquitoes, for personal reasons. Additionally, insects that cause harm to crops are eradicated using pesticides. It is worth noting that cultural, folklore, and psychological aspects significantly impact human attitudes towards insects." (Authors)] Address: Ali, A., Biotechnology Programme, Faculty of Science & Natural Resources, Universiti Malaysia Sabah, Jalan UMS, Kota Kinabalu 88400, Sabah, Malaysia. Email: mdarshad.ali@ums.edu.my

**23132.** Rawat, N.; Acharya, B.K. (2024): Rediscovery of rare Anisoptera, *Camacinia* harterti, Karsch 1890 (Odonata: Libellulidae) from Sikkim Himalaya, India. *International Journal of Tropical Insect Science* 44(2): 989-993. (in English) ["Odonata ... contribute significantly to pest population control due to their predatory nature during both larval and adult stage. The genus, *Camacinia*, ... is known to comprise three species globally, *Camacinia gigantea*, *C. harterti* and *C.*

*othello*. In India, *C. harterti* was first reported from Sikkim by Martin (*Bull Mus Hist Nat* 1900:103-108, 1900) and was enlisted in Indian Odonata fauna by Fraser (*J Bombay Nat Hist Soc* 27:253-269, 1920). However, the species was removed from Indian Odonata list and was not enlisted in majority of the recent literatures on Odonates of India. Here we report the recent sighting of *C. harterti*, Karsch (*Berl Entomol Z* 33: 347-392, 1890) from Namphing in Namchi District, Sikkim, India. There was no report of occurrence of *C. harterti* from Sikkim after Martin (*Bull Mus Hist Nat* 1900:103-108, 1900) record, and recent sighting of this species from Sikkim, India is a rediscovery of this species after a gap of 122 years. The implications of this rediscovery are significant, prompting thorough and extensive research on Odonates in the Himalaya." (Authors)] Address: Acharya, B.K., Ecol., Biogeography & Conservation Biol. Lab., Dept of Zool., School of Life Sciences, Sikkim Univ., Gangtok, Sikkim, Tadong-737102, India

**23133.** Rohman, A.; Karlita Nurwulan, F.S.; Subchan, W.; Buana, Y.C. (2024): Community structure of dragonflies (Odonata) at Garahan Resort, Sempolan, Perhutani, Forest Management Unit (KPH) Jember. *BIO Web Conf.*, 101 (2024) 03004, The 5th International Conference on Life Sciences and Biotechnology (ICOLIB 2023): 11 pp. (in English) ["A community is a conglomeration of diverse groups coexisting within a shared geographical location and temporal framework. Different approaches can be used to explain community structure, focusing on species diversity, species interactions, and functional organization. The biodiversity of dragonflies in Indonesia is significantly abundant. Dragonflies play multiple ecological roles and inhabit diverse habitats, as evidenced by recent research conducted in January 2023. This study aimed to investigate the composition and organization of the dragonfly community. The research design employed in this study is exploratory and descriptive. The identification of station sites through the purposive sampling method. The sampling locations consisted of a pine forest and the Garahan jungle. The road sampling approach utilizes the sweeping technique. The investigation yielded a total of 13 distinct species of dragonflies. The study reveals the presence of two endemic species, *Paragomphus reinwardti* and *Heliocypha fenestrata*, with a diversity index value ( $H'$ ) of 1.653, falling into the medium group. The dominance index ( $D$ ) exhibits a value of 0.263, indicating its classification within the low group. The evenness index ( $E$ ) value at 0.401 falls into the medium group. A species similarity index ( $SI$ ) of 75% is categorized as high. Canonical Corresponding Analysis (CCA) reveals a positive correlation between the species *Orthetrum sabina*, *O. glaucum*, *Vestalis luctuosa*, *Diplacodes trivialis*, *Euphaea variegata*, *Coeliccia membranipes*, *Gynacantha subinterrupta*, *Paragomphus reinwardti*, and *Zygonyx ida* with light intensity, air humidity, and wind speed.] Address: Rohman, A., Biology Education, University of Jember, Kalimantan St., Sumbersari, Jember, East Java, 68121, Indonesia. Email: abdu.fkip@unej.ac.id

**23134.** Rota, T.; Jabiol, J.; Lamothe, S.; Lambrigt, D.; Chauvet, E.; Lecerf, A. (2024): Phenotypes of predator individuals underpin contrasting ecosystem effects. *Freshwater Biology* 69(5): 739-753. (in English) ["(1) Intraspecific variability has implications for our understanding of ecosystem functioning. Yet, beyond ontogenetic variation in body size, we know little about how phenotypic differences between individuals modulate ecosystem functioning. (2) We addressed this question empirically within a forested stream, by studying the ecosystem effects triggered by conspecific predatory dragonfly larvae that varied in sex, body shape, behaviour and growth rate. With the help of stream enclosures, we were able to

evaluate how different predator phenotypes drive cascading effects on litter-dwelling prey, fungal biomass and leaf litter decomposition, in uncontrolled natural conditions. (3) Some individual predators increased leaf litter standing stocks and fungal biomass compared to controls (without dragonfly larvae added), but others had the opposite effect. These contrasting effects were repeatable between the two runs of our experiment. Phenotypic effects were related to the sex and the position of individuals along a life history—behavioural continuum, and were possibly mediated by differential top-down control of prey, or by inter-individual variability in non-consumptive effects. (4) Several phenotypic dimensions are likely to mediate individual variability in predator effects on ecosystem processes, even in a complex and stochastic natural context such as a forested stream. (5) We invite further investigations that seek to understand the mechanisms (e.g., non-consumptive effects) driving individual variability in predator effects on ecosystem processes." (Authors)] Address: Rota, T., Inst. Microbiol., Univ. Applied Sci. & Arts of Southern Switzerland, Mendrisio, Switzerland. Email: thibaut.rota@supsi.ch

**23135.** Sadasivan, K.; Samuel, K.A.; Nair, V.P.; Murukesh, M.D. (2024): Dragonflies and damselflies (Odonata) of Silent Valley National Park, Kerala, India and its environs. *Entomol* 49(1): 151-158. (in English) ["The odonate diversity of the Silent Valley National Park (SVNP) in the Western Ghats (WG) of Kerala state, in southern India, is discussed. A total of 111 species of odonates (41 Zygoptera and 70 Anisoptera) including 29 endemics were recorded for the SVNP region, out of the 181 species (14 families, 87 genera with 68 WG endemics). SVNP harbours 53.37 per cent of WG and 61.34 per cent of the odonate diversity of Kerala. In addition, this includes 42.64% endemic odonates of Kerala and 35.80% of WG. With respect to IUCN Red List status, there were two vulnerable, three near threatened, 84 least concerned, 17 data deficient, and five species whose status was not assessed. Libellulidae (40 species) dominated the diversity, followed by Coenagrionidae and Gomphidae (16 species each). None of the species listed from SVNP is protected under the Indian Wildlife (Protection) Amendment Act, 2022." (Authors)] Address: Sadasivan, K., Greeshmam, BN439, Bapuji Nagar, Thiruvananthapuram 695011, Kerala, India. Email: kaleshs-2002in@gmail.com

**23136.** Salomão, R.P.; Córdoba-Aguilar, A.; Rodríguez, P.; Rocha-Ortega, M. (2024): Biodiversity of aquatic insects in the Neotropics: Perspectives and challenges. In: León-Cortés, J.L., Córdoba-Aguilar, A. (eds) *Insect Decline and Conservation in the Neotropics*. Springer, Cham. <https://doi.org/10.1007/978-3-031-49255-615>: 301-311. (in English) ["This chapter is aimed to provide an assessment of the conservation status of Neotropical aquatic insects. Thus, we outline the taxonomic and geographic gaps and bias of information, identify some hotspots and conservation strategies of aquatic insects (using Brazil as a study case) and review key human threats to biodiversity loss. In general, odonate insects are the best well-sampled insects in the regions. Unfortunately, only three Neotropical countries have lists of aquatic insect species under threat: Brazil, Bolivia, and Colombia. This contrasts with the large number of hotspots we detect for the region: Mexico (Jalisco, Nayarit, and Central Veracruz), Colombia (Turrano, Manrique, Las Nevadas), Venezuela (Hueque, Piedemonte, Perija, Rios de Guanare, Sierra de San Luis, Ciudad de Coro, Lago de Maracaibo, Ticopuro), Guyana (Kamuku), and Brazil (Jacamira). Major environmental threats include pesticides (this even in protected areas) and cattle ranching. Only Brazil emerges prominently with legal

practices that can be used as the framework to protect aquatic insects: a Red List and the use of Conservation Units. Some recommendations for the Neotropics include higher sampling efforts to feed current species lists, formation of specialists in different aquatic insect taxonomic groups, national and international collaborations, and interaction with the government to reach legal frameworks that protect aquatic insects." (Authors)] Address: Córdoba-Aguilar, A., Depto Ecol. Evolutiva, Instituto de Ecología, Univ. Nac. Autónoma de México, Ciudad Universitaria, Apdo. Postal 70-275, 04510 México DF, Mexico. E-mail: acordoba@ecologia.unam.mx

**23137.** Salur, A.; Suludere, Z. (2024): Rare eggshell structure in Odonata: *Lindenia tetraphylla* (Vander Linden) (Anisoptera: Gomphidae). *Microscopy Research and Technique* 87(6): 1168-1172. (in English) ["*L. tetraphylla* eggs exhibit an egg structure that is very rare in other Gomphidae species. They have a well-developed surface reticulation structure. The anterior pole of the egg has a small, rounded micropylar area consisting of seven orifices arranged radially around a central area. The posterior pole has a sessile, truncated cone that carries 55–65 coiled filaments. The filament structure found at the posterior pole of the egg has been observed in the gomphid species *Lestinogomphus africanus* (Fraser, 1926), *Ictinogomphus australis* (Selys, 1873), and *I. rapax* (Rambur, 1842). However, *L. tetraphylla* eggs differ from these species in both morphology and filament structure. This study provides a detailed analysis of the ultrastructure of *L. tetraphylla* eggs using scanning electron microscopy, and the functional and taxonomic significance of the eggshell are discussed. Research Highlights: The aim of this study is to examine the ultrastructure of the *L. tetraphylla* eggshell, emphasizing its function and taxonomic value. In this context, the general morphology of the egg, the reticulations on its surface, the micropylar region and micropylar structure, and the posterior filament coil were examined. In this study, the ultrastructure of *L. tetraphylla* egg was examined for the first time using scanning electron microscopy (SEM). As a result of the examination, it was detected for the first time that the posterior filament coil, which is rarely seen in odonate eggs, is also present in *L. tetraphylla* eggs. By comparing the *L. tetraphylla* egg with the eggs of *I. ferox*, *I. rapax*, *I. australis*, and *L. africanus* species, which are similar in terms of the posterior filament coil, the features that distinguish the *L. tetraphylla* egg." (Authors)] Address: Salur, A., Dept Biol., Fac. Art & Sci., Hitit Univ., Çorum, Turkey. Email: alisalur@gmail.com

**23138.** Salur, A.; Miroglu, A. (2024): Parasitism of *Platycnemis pennipes* (Insecta: Odonata) larva by water mite of *Arrenurus* sp. *Munis Entomology & Zoology* 19(1): 116-119. (in English) ["*P. pennipes* (Pallas, 1771): 1 specimen, Tokat, Niksar, Kümbetli, 27/06/2005, 40°37' N 36°48' E, 258 masl. An *Arrenurus* sp. mite was found attached and living on the mentum of *P. pennipes* as a parasite. It was determined that this mite did not cause any deformity in the mentum. However, the presence of this mite in the mentum may negatively affect the hunting and feeding of the larva" (Authors)] Address: Miroglu, A., Ordu University, Fatsa Faculty of Marine Sciences, Fisheries Technology Engineering, Fatsa / Ordu, Turkey. Email: alimiroglu@gmail.com

**23139.** Sanchez-Guillen, R.A.; Arce-Valdes, L.R.; Ballen-Guapacha, A.V.; Ordaz-Morales, J.E.; Stand-Perez, M. (2024): Interspecific hybridization in insects in times of climate change. *Rosa Ana Sandiez-Guillen et al interspecific hybridization in insects in times of climate change* In: *Effects of Climate Change on Insects* Edited by: Daniel Gonzdlez-Tokman and Wesley Ddtillo. Oxford University Press © Oxford University

Press (2024). DOI: 10.1093/OSO/9780192864161.003.0008: 133-156. (in English) ["8.9 Odonates: Odonates are an especially sensitive order to global warming. Termaat et al. (2019) identified that forty-five odonate species (63 percent of the studied species) have increased their distribution range during last forty years. Of these species, six are already involved in hybridization events. These include five cases of introgression, both unidirectional ( $n = 2$ ) and bidirectional ( $n = 3$ ), one case of simple admixture, two cases of reinforcement of reproductive isolation and one case of the local extinction of one of the involved species. The expansion of hybrid zones can lead to their destabilization (Buggs 2007). During range expansions, hybridization and introgression can counteract the loss of genetic diversity due to the founder effect and genetic drift (Pfennig et al. 2016). *Ischnura elegans*, which has drastically expanded its distribution in Spain over the last twenty years, is an example in damselflies of how genetic diversity is counteracted by introgressive hybridization with its sister species, *Ischnura graellsii*. Both genetic diversity and genetic differentiation in populations of *I. elegans* from Spain were larger than in populations of *I. elegans* where the two species are allopatric (Sanchez-Guillen et al. 2011; Wellenreuther et al. 2018). However, the advantage for the expanding species is disadvantageous for the native species *I. graellsii*, which is endemic to the Iberian Peninsula and is experiencing local extinction in most of the localities occupied by *I. elegans* (Sanchez-Guillen et al. 2011; Wellenreuther et al. 2018). Another case of introgressive hybridization between two sister dragonfly species is that of *Cordulegaster boltonii* and *C. trinacriae*, whose range overlap has increased in central Italy due to a northern shift of *C. trinacriae* in the last few thousand years, probably driven by climate change (Solano et al. 2018). In this study, the authors detected unidirectional introgression of genes from the autochthonous *C. boltonii* into the expanding *C. trinacriae* (Solano et al. 2018). Another consequence of hybridization is the reinforcement of reproductive isolation, which is usually detected in patchy hybrid zones, as is the case of *I. elegans* and *I. graellsii* in Spain (Sanchez-Guillen et al. 2011; Wellenreuther et al. 2018). Preliminary evidence suggests that pre-mating reproductive isolation has been strengthened (Arce-Valdes et al. 0000) and that there has been reproductive character displacement in female pronotum in *I. elegans* from Spain (personal observation, RAS-G). This pattern has also been detected in the process of introgressive hybridization between *Mnais costalis* and *M. pruinosa* (Hayashi et al. 2005)." (Authors/Verbatim)] Address: Sánchez-Guillén, Rosa, Depto de Ecología e Biología Animal, E.U.E.T. Forestal, Univ. de Vigo, Pontevedra, Spain. E-mail: rguillen@uvigo.es

**23140.** Schafft, M.; Nikolaus, R.; Matern, S.; Radinger, J.; Maday, A.; Klefoth, T.; Wolter, C.; Arlinghaus, R. (2024): Impact of water-based recreation on aquatic and riparian biodiversity of small lakes. *Journal for Nature Conservation* 78, March 2024, 126545: 17 pp. (in English) ["Lakes offer important recreational sites for people; however, water-based recreation may interfere with conservation objectives. In this study, we examined the impact of recreational use of small stagnant water bodies (< 22 ha) on several aquatic and riparian biodiversity indicators (species richness, Simpson diversity-index, and number of endangered species) across multiple taxa (waterfowl, songbirds, Odonata, amphibians, fishes, submerged macrophytes, riparian herbs and trees). Samples were generated from 39 gravel pit lakes in Lower Saxony, Germany. Recreational use intensity was quantified using a stratified roving creel survey design involving citizen scientists. Recreational use had little correlation with the different biodiversity indicators that we examined. Most of the

variance in biodiversity was explained by non-recreation related environmental and land use variables. Yet, a consistent negative relationship between recreation and biodiversity was found for dog walking, which was negatively associated with the species richness of songbirds, fish, and riparian herbs. Other recreational effects were positive, e.g., increased human use intensity correlated positively with the species richness of fishes and riparian herbs. Moreover, lakes used exclusively by anglers hosted a larger fish species richness at the expense of amphibian richness, likely due to predation impacts by fish. The abundance of dogs was found to be more influential in terms of recreation-related impacts than human density per se, possibly because wildlife perceives dogs as a stronger threat stimulus than human presence. Experimental work is needed to substantiate the correlative evidence presented here." (Authors)] Address: Schafft, Malwina, Dept of Fish Biology, Fisheries and Aquaculture, Leibniz Institute of Freshwater Ecology & Inland Fisheries (IGB), Müggelseedamm 310, 12587 Berlin, Germany

**23141.** Schoenle, A.; Scepanski, D.; Floß, A.; Büchel, P.; Koblitz, A.-K.; Scherwaß, A.; Arndt, H.; Waldvogel, A.M. (2024): The dilemma of underestimating freshwater biodiversity: morphological and molecular approaches. *BMC Ecology and Evolution* 24(69): 18 pp. (in English) ["Background: Anthropogenic impacts on freshwater habitats are causing a recent biodiversity decline far greater than that documented for most terrestrial ecosystems. However, knowledge and description of freshwater biodiversity is still limited, especially targeting all size classes to uncover the distribution of biodiversity between different trophic levels. We assessed the biodiversity of the Lower Rhine and associated water bodies in the river's flood plain including the river's main channel, oxbows and gravel-pit lakes, spanning from the level of protists up to the level of larger invertebrate predators and herbivores organized in size classes (nano-, micro, meio- and macrofauna). Morphological diversity was determined by morphotypes, while the molecular diversity (amplicon sequencing variants, ASVs) was assessed through eDNA samples with metabarcoding targeting the V9 region of the 18S rDNA. Results: Considering all four investigated size classes, the percentage of shared taxa between both approaches eDNA (ASVs with 80–100% sequence similarity to reference sequences) and morphology (morphotypes), was always below 15% ( $5.4 \pm 3.9\%$ ). Even with a more stringent filtering of ASVs (98–100% similarity), the overlap of taxa could only reach up to 43% ( $18.3 \pm 12\%$ ). We observed low taxonomic resolution of reference sequences from freshwater organisms in public databases for all size classes, especially for nano-, micro-, and meiofauna, furthermore lacking meta-information if species occur in freshwater, marine or terrestrial ecosystems. Conclusions: In our study, we provide a combination of morphotype detection and metabarcoding that particularly reveals the diversity in the smaller size classes and furthermore highlights the lack of genetic resources in reference databases for this diversity. Especially for protists (nano- and microfauna), a combination of molecular and morphological approaches is needed to gain the highest possible community resolution. The assessment of freshwater biodiversity needs to account for its sub-structuring in different ecological size classes and across compartments in order to reveal the ecological dimension of diversity and its distribution." (Authors) The list of taxa includes *Libellula depressa*.] Address: Arndt, H., Ecological Genomics, Dept of Biology, Institute of Zoology, Biocenter Cologne, University of Cologne, Cologne, Germany. Email: hartmut.amdt@uni-koeln.de



**23142.** Seehausen, M.; Dawn, P. (2024): *Lyriothemis lucifera* spec. nov. from the Andaman Islands, India (Odonata: Libellulidae). *Zootaxa* 5447(2): 273-281. (in English) ["*Lyriothemis lucifera* spec. nov. (holotype male: 18.iv.1998, Long Island, Rangat county, North and Middle Andaman district, Andaman Islands, India, ex.-coll. M. Hämäläinen, Wen-Chi Yeh, RMNH.INS. 1152914; deposited at Naturalis Biodiversity Centre Leiden, the Netherlands), is described and figured. This new species belongs to the 3rd group of *Lyriothemis* Brauer, 1868. Photographs of the name-bearing specimens of *Lyriothemis magnificata* (Selys, 1878), *Lyriothemis dau* Krüger, 1902, and *Lyriothemis laui* Krüger, 1902 are provided. ... However, after study of both holotypes via photographs we confirm the junior synonymy of *L. dau* and *L. laui* with *L. magnificata*. According to the pinned labels, also Krüger subsequently determined both as *L. magnificata* in 1926." (Authors)] Address: Seehausen, M., Zoologisches Museum der CAU zu Kiel, Hegewischstr. 3, 24105 Kiel, Germany. Email: mseehausen@zoolmuseum.uni-kiel.de

**23143.** Šigutová, H.; Pyszko, P.; Bílková, E.; Prieložná, V.; Dolný, A. (2024): Sum or mean in calculation of qualitative scoring methods using the Dragonfly Biotic Index, and an alternative approach facilitating conservation prioritization. *Scientific Reports* volume 14, Article number: 11356: 8 pp, Suppl- (in English) ["Qualitative scoring methods are tools for rapid freshwater health assessments. Total score is often calculated as the sum or mean of the values of the species involved, with minor nuances in interpretation, but with significant implications. We used the Dragonfly Biotic Index (DBI) calculated on Central European odonate species to demonstrate these implications. Each species within a community has a score ranging from 0 (widespread generalists) to 9 (sensitive specialists). A total score is calculated as the sum of the scores of all species (DBIsum) or is calculated by dividing by species richness (DBImean). Despite this duality, there has been little debate on either approach. Using simulated scenarios (high vs low richness, presence or absence of high- or low-scoring species), we tested the implications of DBIsum and DBImean and suggested a total score calculation for conservation prioritization based on permutation. This algorithm shows the percentile of a community compared to a set of randomly assembled communities of the same species richness. We also present the 'dragDBI' package for the statistical software R, a tool for more automated DBI-based environmental health assessments. Our permutational calculation is applicable to other macroinvertebrate-based scoring methods, such as the Biological Monitoring Working Party and the Average Score Per Taxon." (Authors)] Address: Dolný, A., Dept of Biology & Ecology, Fac. of Science, Univ. of Ostrava, Chittussiho 10, CZ-710 00 Slezská Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**23144.** Simeone, D. (2024): Effect of logged forests on diet of small characids from Neotropical streams. *Ecology of Freshwater Fish* 33(1), e12743: 9 pp. (in English) ["Studies relating to fish trophic ecology provide important insights regarding their life history. However, there is a lack of information linking fish diet composition with riparian cover in small streams. To investigate whether diet composition varied between streams with pristine and logged forests, I compared the food items consumed by four characid species: *Bryconops melanurus*, *Moenkhausia collettii*, *Moenkhausia dichroua*, and *Moenkhausia oligolepis*. I sampled 18 first-order streams in the eastern Amazon: six with pristine forest, six with conventional logging, and six with selective logging. All fish species were classified as omnivorous, with diverse food categories recorded in their diets: mainly terrestrial insects for

*Moenkhausia* species and aquatic insect nymphs for *B. melanurus*. However, the relative importance of each category varied only in streams with conventional logged forests. In these streams, all fish species consumed mainly autochthonous items, especially aquatic insect nymphs. In addition, terrestrial insects and seeds were absent in these streams with reduced riparian cover. In summary, this study highlighted that fish diet in conventional logged forests strongly differed from areas with pristine and selective logged forests. This finding states that managed forests may support a diverse diet for fish community, similar to that found in pristine forests. Therefore, management and conservation strategies of riparian vegetation in Amazonian streams are important to maintain habitat and food quality, which may be associated with a diverse diet for fish species. ... In pristine and selective logged forests, *M. oligolepis* similarly consumed all food categories especially terrestrial insects and aquatic insect nymphs (Trichoptera, Odonata and Diptera had a similar feeding index). In conventional logged forests, the diet of *M. oligolepis* significantly differed, with the consumption of aquatic insect nymphs (especially Odonata) and filamentous algae. In pristine and selective logged forests, *M. collettii* and *M. dichroua* similarly consumed terrestrial insects, aquatic insect nymphs (Trichoptera, Odonata and Diptera had a similar feeding index) and filamentous algae. In conventional logged forests, the diet of both fish species significantly differed, with the consumption of only aquatic insect nymphs (especially Odonata). In pristine and selective logged forests, *B. melanurus* similarly consumed aquatic insect nymphs (Trichoptera, Odonata and Diptera had a similar feeding index), filamentous algae and seeds. In conventional logged forests, the diet of *B. melanurus* significantly differed, with the consumption of only aquatic insect nymphs (especially Odonata)." (Author)] Address: Simeone, D., Lab. de Bioestatística, Instituto Tocantinense Presidente Antônio Carlos, Bragança, Pará, Brazil. Email: diegosimeone.bio@gmail.com

**23145.** Simon, E.; Kolozsvári, I.; Dévai, G.; Illár, M.; Szalay, P.E.; Miskolczi, M.; Tóthmérész, B. (2024): Environmentally friendly assessment of ecological quality of watercourses based on banded demoiselle, *Calopteryx splendens*. *Entomologia Experimentalis et Applicata* 172(4): 345-353. (in English) ["Odonata are excellent bioindicators of the quality of both aquatic and terrestrial ecosystems. In our study, we assessed the usefulness of metric and meristic morphological traits as environmentally friendly and cost-effective indicators of the integrative ecological quality of watercourses. Our study species of choice was *C. splendens*. Adult *C. splendens* specimens were collected at three study sites along the trophic gradient of the Tisza River in Hungary and Ukraine. Body and abdomen length, head width, and distances between wing landmarks were assessed as metric traits, and the number of wing cells as meristic traits. The concentration of chlorophyll-a was used to classify the three study sites into having a low, intermediate, and high trophic condition based on earlier studies. Significant differences were found along the trophic gradient based on the measured metric and meristic traits. Especially, insects from the site with the highest trophic condition had the largest body length, head width, and distances between wing landmarks, as well as the highest number of cells in the fore wings. There were also differences between males and females, but we did not find differences in fluctuating asymmetry (FA), i.e., differences between the left and the right wings. These results indicated that the morphological traits of adult banded demoiselles could be indicative of the environmental quality of a watercourse." (Authors)] Address: Simon, Edina, Dept of

Ecology, University of Debrecen, H-4032 Debrecen, Egyetem square 1, Hungary. Email: edina.simon@gmail.com

**23146.** Sinclair, T.; Craig, P.; Maltby, L.L. (2024): Climate warming shifts riverine macroinvertebrate communities to be more sensitive to chemical pollutants. *Global Change Biology* 30(4), e17254: 13 pp. (in English) ["Freshwaters are highly threatened ecosystems that are vulnerable to chemical pollution and climate change. Freshwater taxa vary in their sensitivity to chemicals and changes in species composition can potentially affect the sensitivity of assemblages to chemical exposure. Here we explore the potential consequences of future climate change on the composition and sensitivity of freshwater macroinvertebrate assemblages to chemical stressors using the UK as a case study. Macroinvertebrate assemblages under end of century (2080–2100) and baseline (1980–2000) climate conditions were predicted for 608 UK sites for four climate scenarios corresponding to mean temperature changes of 1.28 to 3.78°C. Freshwater macroinvertebrate toxicity data were collated for 19 chemicals and the hierarchical species sensitivity distribution model was used to predict the sensitivity of untested taxa using relatedness within a Bayesian approach. All four future climate scenarios shifted assemblage compositions, increasing the prevalence of Mollusca, Crustacea and Oligochaeta species, and the insect taxa of Odonata, Chironomidae, and Baetidae species. Contrastingly, decreases were projected for Plecoptera, Ephemeroptera (except for Baetidae) and Coleoptera species. Shifts in taxonomic composition were associated with changes in the percentage of species at risk from chemical exposure. For the 3.78°C climate scenario, 76% of all assemblages became more sensitive to chemicals and for 18 of the 19 chemicals, the percentage of species at risk increased. Climate warming-induced increases in sensitivity were greatest for assemblages exposed to metals and were dependent on baseline assemblage composition, which varied spatially. Climate warming is predicted to result in changes in the use, environmental exposure and toxicity of chemicals. Here we show that, even in the absence of these climate-chemical interactions, shifts in species composition due to climate warming will increase chemical risk and that the impact of chemical pollution on freshwater macroinvertebrate biodiversity may double or quadruple by the end of the 21st century." (Authors)] Address: Maltby, Lorraine, School Biosci., Univ. Sheffield, Alfred Denny Building, Western Bank, Sheffield S10 2TN, UK. Email: l.maltby@sheffield.ac.uk

**23147.** Soh, Z.S.-H.; Ngiam, R.W.J. (2024): Biodiversity record: Occurrence of the damselfly, *Aciagrion borneense*, at Admiralty Lane. *Nature in Singapore* 17: e2024011: 2 pp. (in English) [Singapore Island, Admiralty Lane; 23 December 2023.] Address: Soh, Zick; Email: ss82zick@gmail.com

**23148.** Stoltefaut, T.; Haubrock, P.J.; Welti, E.A.R.; Baker, N.J.; Haase, P. (2024): A long-term case study indicates improvements in floodplain biodiversity after river restoration. *Ecological Engineering* 198, January 2024, 107143: 12 pp. (in English) ["Natural floodplains are complex systems embodying an interwoven network of biodiverse aquatic and terrestrial ecosystems. Many floodplains have been impaired and disconnected from the river, leading to declines in biodiversity. River restorations often affect floodplains, yet monitoring programs rarely investigate effects on floodplain organisms. This study examined a river restoration project, which improved river hydromorphology and partly reconnected the adjacent floodplain. We applied a 'control-impact' design to investigate changes in floodplain community composition and diversity four, six, eight, and ten years after the

restoration of the Nidda River in central Germany. Investigated taxonomic groups included ground beetles, birds, dragonflies, and spiders. We examined trends of abundance, richness, Shannon diversity, Shannon evenness, and temporal turnover over time post-restoration by comparing restored sites to a non-restored control site. Abundance and diversity increased in bird, dragonfly, and spider communities after the restoration. Effect sizes between restored and un-restored sites were mainly positive, indicating that restoration benefitted the investigated taxonomic groups. However, initially high abundance and diversity numbers of ground beetles declined at the restored sites over time, indicating differing responses across taxonomic groups. Our study accentuates and underlines the necessity for ongoing post-restoration monitoring of both floodplain and aquatic biota." (Authors)] Address: Haase, P., Senckenberg Research Institute & Natural History Museum Frankfurt, Dept of River Ecology & Conservation, Clamecystr. 12, 63571 Gelnhausen, Germany. Email: peter.haase@senckenberg.de

**23149.** Sumanapala, A.P. (2024): Sri Lankan insects with an overview of diversity and biogeography. *Biodiversity Hotspot of the Western Ghats and Sri Lanka*. Edition 1st Edition. First Published 2024. Academic Press. eBook ISBN 978-1003408758: 467-504. (in English) ["Systematic work on insect taxonomy and research in Sri Lanka goes back to the 19th Century. Early descriptive taxonomy and recent work have resulted in documenting about 11,500 insect species from Sri Lanka. This chapter provides an overview on the diversity of major insect orders in the country, that is, Coleoptera, Hymenoptera, Hemiptera, Lepidoptera, Diptera, Odonata, Mantodea, Ephemeroptera, Orthoptera, Neuroptera, Phasmatodea, Plecoptera, Dermaptera, Blattodea, Thysanoptera, and Trichoptera. The present knowledge on the biogeography of Sri Lankan insects and distribution zones recognized, are discussed with a general overview on the distribution of insects in the country. Gaps in the current knowledge are discussed providing recommendations for the future work on Sri Lankan insects." (Author)] Address: not available

**23150.** Sun, W.; Wang, Y.; He, G.; Wang, Q.; Yu, F.; Song, W. (2024): Effects of kinematic parameters and corrugated structure on the aerodynamic performance of flexible dragonfly wings. *Journal of Fluids and Structures* Volume 125, March 2024, 104058: (in English) ["The effects of unsteady motions of flapping flat plates and corrugated structures in different parameters are studied using fluid-solid coupling and overlapping grid methods. Based on the dragonfly's right forewing and right hindwing model, these actions include sweeping and pitching, take-off acceleration, and tandem wings cruising in the reverse phase at 180°. The results show that when the advance ratio  $J = 0.36$ , the "inflow deflection" improves the aerodynamic force in two degrees of freedom compared to simple flapping. When considering only the impact of flexibility, the aerodynamic forces of flexible flat plates and corrugated structures are better than those of the rigid wing models. Considering the effect of corrugated structures, the lift of flexible corrugated wings diminishes, but more thrust is generated. From the perspective of vortex street, vortex rings materialize only in the downstroke stage, while the attachment effect of leading-edge vortices is noticeable in several models. In the same phase flapping, the two wings combine to form a giant wing, which generates significant forward flight momentum. In out-of-phase flapping mode, the series wings generate two lifts and two or three thrust peaks to attain the required forward flight speed while sustaining a high lift." (Authors)] Address: He, G., School

of Aircraft Engineering, Nanchang Hangkong University, Nanchang 330063, China. Email: 70190@nchu.edu.cn

**23151.** Susanto, M.A.D.; Millah, N.; Leksono, A.S.; Gama, Z.P. (2024): Composition and diversity of dragonflies (Odonata) in several habitat types in Lumajang Regency, East Java province, Indonesia. *Journal of Tropical Biodiversity and Biotechnology* 9(2): 21 pp. (in English) ["Lumajang is one of the regency in East Java Province that has various types of freshwater ecosystems and have great potential as habitats for various insects, especially dragonflies. .... This study aims to compare the composition and diversity of dragonfly species in various habitat types in Lumajang. The study was conducted in lentic and lotic ecosystems in Lumajang. The method used was the Visual Encounter Survey (VES) technique adapted from the sweeping net. The data analysis used to determine differences in dragonfly species composition was the Bray-Curtis similarity analysis, while diversity analysis was conducted using the Shannon-Wiener index. This study recorded 29 species from seven families, including seven endemic dragonfly species found only on several islands in Indonesia. In the analysis of the Shannon-Wiener diversity index, the results show that in all research locations have a value of  $H' = 1.07-2.11$ , where the Rice Field habitat is the location with the highest value among other locations, with a value of  $H' = 2.11$ . The similarity analysis of dragonfly species composition using Bray Curtis similarity showed that it was divided into three groups. The composition of dragonflies found in several habitats in Lumajang is different, which can be influenced by many factors such as site elevation, habitat type (lentic or lotic), and habitat condition, as well as several other factors such as microclimate and vegetation (related to food availability)."] (Authors)] Address: Gama, Zulfaidah Penata, Dept of Biology, Fac. of Mathematics & Natural Sciences, Univ. Brawijaya, Malang, Indonesia. Email: gama@ub.ac.id

**23152.** Swaby, E.J.; Coe, A.L.; Ansoorge, J.; Caswell, B.A.; Hayward, S.A.L.; Mander, L.; Stevens, L.G.; McArdle, A. (2024): The fossil insect assemblage associated with the Toarcian (Lower Jurassic) oceanic anoxic event from Alderton Hill, Gloucestershire, UK. *PLoS ONE* 19(4): e0299551. <https://doi.org/10.1371/journal.pone.0299551>: 51 pp. (in English) ["Extreme global warming and environmental changes associated with the Toarcian (Lower Jurassic) Oceanic Anoxic Event (T-OAE, ~ 183 Mya) profoundly impacted marine organisms and terrestrial plants. Despite the exceptionally elevated abundances of fossil insects from strata of this age, only assemblages from Germany and Luxembourg have been studied in detail. Here, we focus on the insect assemblage found in strata recording the T-OAE at Alderton Hill, Gloucestershire, UK, where <15% of specimens have previously been described. We located all known fossil insects ( $n = 370$ ) from Alderton Hill, and used these to create the first comprehensive taxonomic and taphonomic analysis of the entire assemblage. We show that a diverse palaeoentomofaunal assemblage is preserved, comprising 12 orders, 21 families, 23 genera and 21 species. Fossil disarticulation is consistent with insect decay studies. The number of orders is comparable with present-day assemblages from similar latitudes (30°–40°N), including the Azores, and suggests that the palaeoentomofauna reflects a life assemblage. At Alderton, Hemiptera, Coleoptera and Orthoptera are the commonest (56.1%) orders. The high abundance of Hemiptera (22.1%) and Orthoptera (13.4%) indicates well-vegetated islands, while floral changes related to the T-OAE may be responsible for hemipteran diversification. Predatory insects are relatively abundant (~ 10% of the total assemblage) and we

hypothesise that the co-occurrence of fish and insects within the T-OAE represents a jubilee-like event. The marginally higher proportion of sclerotised taxa compared to present-day insect assemblages possibly indicates adaptation to environmental conditions or taphonomic bias. The coeval palaeoentomofauna from Strawberry Bank, Somerset is less diverse (9 orders, 12 families, 6 genera, 3 species) and is taphonomically biased. The Alderton Hill palaeoentomofauna is interpreted to be the best-preserved and most representative insect assemblage from Toarcian strata in the UK. This study provides an essential first step towards understanding the likely influence of the T-OAE on insects. ... Odonata is represented by three families and accounts for 11.5% ( $n = 30$ ) of the total Alderton Hill palaeoentomofauna. The order is mainly represented by partial wing fragments that possess clear venation aiding identification, however complete, well-preserved forewings and hindwings are also present."] (Authors)] Address: Swaby, Emily, School of Environment, Earth and Ecosystem Sciences, The Open University, Walton Hall, Milton Keynes, Buckinghamshire, United Kingdom. Email: emily.swaby@open.ac.uk

**23153.** Tanczuk, A. (2024): Recenzja — Review. Tarborton W., Tarborton M. *A Guide to the Dragonflies and Damselflies of South Africa*. Penguin Random House South Africa, 2019, 224 s. *Odonatrix* 206 (2024): 3 pp. (in Polish, with English summary) ["The field guide covers 164 species found in South Africa, Lesotho and Eswatini (former Swaziland). It contains professional photographs and useful illustrations of key features of both Zygoptera and Anisoptera. There are distribution maps to all of the species, information about size, occurrence and identification. All dragonfly names are in English, Latin and Afrikaans – spoken in those countries. Tables and plates are well designed for comparison of similar species. Wing venation and pterostigma pictures are especially important features for African species to distinguish them from one another. Additionally, apart from Red Listing, there is also Dragonfly Biotic Index (DBI) to monitor water quality in aquatic systems in a form of a scale from 0 to 9, whereas 0 is a widespread species, and 9 – threatened. Moreover, some larvae pictures were also added by the authors at the end of the guide."] (Author)] Address: Tanczuk, Agnieszka, Univ. Marii Curie-Skłodowskiej, Instytut Nauk Biol., Katedra Zoologii i Ochrony Przyrody, ul. Akademicka 19, 20-033 Lublin, Poland. Email: atanczuk@gmail.com

**23154.** Taylor, P. (2024): Obituary: Jill Silsby (1925 - 2023). *J. Br. Dragonfly Society* 40(1): 1-3. (in English) [Jill was a formative personality in the British Dragonfly Society and the early days of the Worldwide Dragonfly Society.] Address: Taylor, Pam, Potter Heigham, Norfolk, UK

**23155.** Tchiboza, S. (2024): Discovery of a new locality in Sètoko (Republic of Benin) for the endangered damselfly *Ceragrion citrinum* Champion, 1914 (Insecta: Odonata: Zygoptera: Coenagrionidae). *Revista Nicaragüense de Entomología* 335: 3-9. (in English, with French and Spanish summaries) ["*C. citrinum* was recently discovered in a swamp forest area of Sètoko in southern Benin. Six female and 18 male individuals were encountered in about 2 hours of observation in the afternoon of 11/03/2024. This report extends the information that was provided by Tchiboza (2021) on *C. citrinum* occurring in the Lokoli swamp of southern Benin. Reasons that could possibly explain the observed male-biased sex ratio in *C. citrinum* are briefly discussed."] (Author)] Address: Tchiboza, S., Centre de Recherche pour la Gestion de la Biodiversité (CRGB), 04 B.P. 0385 Cotonou, Bénin. Email: s.tchiboza@crgbj.org

**23156.** Tennesen, K.T. (2024): *Polythore vexilla* sp. nov. from southwestern Ecuador (Odonata: Polythoridae). *Zootaxa* 5424(4): 467-475. (in English, with Spanish summary) ["*Polythore vexilla* sp. nov. (holotype male, allotype female: Ecuador, Azuay Province, small tributary of Río Pijili, about 4.1 km SE of Victoria, -2.940°, -79.5625°; approximate elev. 730 m, 11-IV-2008, K. J. Tennesen leg., deposited in Florida State Collection of Arthropods) belongs in the Andean clade of *Polythore* Calvert. Based on genital ligula morphology it appears to be most closely related to *P. gigantea* (Selys). The male is distinct from all congeners by the narrow, medial black band in all four wings; the central band in the female wings is similar to the male.] Address: Tennesen, K.T., P.O. Box 585, Wautoma, Wisconsin 54982, USA. Email: ktennesen@centurytel.net

**23157.** Toofani, A.; Eraghi, S.H.; Basti, A.; Rajabi, H. (2024): Complexity biomechanics: a case study of dragonfly wing design from constituting composite material to higher structural levels. *Interface Focus* 14(2), <https://doi.org/10.1098/rsfs.2023.0076>: (in English) ["Presenting a novel framework for sustainable and regenerative design and development is a fundamental future need. Here we argue that a new framework, referred to as complexity biomechanics, which can be used for holistic analysis and understanding of natural mechanical systems, is key to fulfilling this need. We also present a roadmap for the design and development of intelligent and complex engineering materials, mechanisms, structures, systems, and processes capable of automatic adaptation and self-organization in response to ever-changing environments. We apply complexity biomechanics to elucidate how the different structural components of a complex biological system as dragonfly wings, from ultrastructure of the cuticle, the constituting bio-composite material of the wing, to higher structural levels, collaboratively contribute to the functionality of the entire wing system. This framework not only proposes a paradigm shift in understanding and drawing inspiration from natural systems but also holds potential applications in various domains, including materials science and engineering, biomechanics, biomimetics, bionics, and engineering biology." (Authors)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zool. Inst., Christian-Albrecht Univ. Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**23158.** Wahyuni, T.; Wiharti, T.; Nugroho, A.A. (2024): Diversity of water insects in Colo dam, Sukoharjo Regency. *Jurnal Biologi Tropis* 24(1): 620-628. (in Indonesian, with English summary) ["The aim of this research was to determine the diversity index, species richness index and dominance index of aquatic insects in Colo Dam, Nguter District, Sukoharjo Regency. This research method is quantitative descriptive. Quantitative analysis includes measuring the Diversity Index (H'), Species Richness Index (R1) and Dominance Index (D). The results of research on water insects at Colo Dam found 27 species. The highest number of individuals is the Water Strider with 75 species, while the fewest species are *Rhinocypha perforata* with 16 species. The conclusion of this research is that the Diversity Index of 3.23 is considered moderate. The type of Wealth Index obtained at 3.67 is considered medium and the Dominance Index at 0.0416 is considered low. Recommendations for further research include adding a Biotic Index to see the quality of the waters in the Colo Dam. It is hoped that the results of this research can become a reference or further research." (Authors)] Address: Wahyuni, Tri, Biology Education Program, Fac. of Teacher Training & Education, Univ. of Veteran Bangun Nusantara, Sukoharjo, Indonesia. Email: triwahyuni201299@gmail.com

**23159.** Wati, M.; Janra, M.N.; Gusman, D. (2024): Inventarisasi Capung (Odonata) Yang Berkunjung Ke Perumahan Di Kota Bengkulu, Sumatera. *Jurnal Biologie Universitas Andalas* 12(1): 21-27. (in Indonesian, with English summary) ["Inventory of dragonflies (Odonata) visiting a settlement in Bengkulu city, Sumatra: ... This research aims to do the inventory on dragonfly species that intrude to a settlement area in Bengkulu City, Sumatra. It was conducted by observing any adult dragonfly visiting the resident in Bentiring of Bengkulu City within 2020-2023 period. As result, a total of 43 individuals recorded intruded the study site; they were identified into 10 species, 8 genera and 3 families of the two existing Odonata suborders. Zygoptera are represented by *Agriocnemis femina*, while Anisoptera are with *Anaciaeschna jaspidea*, *Gynacantha bayadera*, *G. dohrni*, and *G. sub-interrupta* as well as *Orthetrum sabina*, *Pantala flavescens*, *Potamarcha congener*, *Tholymis tillarga*, and *Zyxomma petiolatum*. January, February, and October become the months with most individuals recorded, in which 87% incidents happened during night time and 13% on afternoon. *Gynacantha bayadera*, *G. dohrni*, *Orthetrum sabina* and *Zyxomma petiolatum* are species with the most significant individual counted." (Authors)] Address: Wati, Meliya, Jurusan Biologi, Fak. Matematika dan Ilmu Pengetahuan Alam, Univ. Bengkulu, Bengkulu, Indonesia. Email: meliya.wati@unib.ac.id

**23160.** Wos, G.; Palomar, G.; Golab, M.J.; Marszalek, M.; Sniegula, S. (2024): Effects of overwintering on the transcriptome and fitness traits in a damselfly with variable voltinism across two latitudes. *Scientific Reports* volume 14, 12192. (in English) ["Winter diapause consists of cessation of development that allows individuals to survive unfavourable conditions. Winter diapause may bear various costs and questions have been raised about the evolutionary mechanisms maintaining facultative diapause. Here, we explored to what extent a facultative winter diapause affects life-history traits and the transcriptome in the damselfly *Ischnura elegans*, and whether these effects were latitude-specific. We collected adult females at central and high latitudes and raised their larvae in growth chambers. Larvae were split into a non-diapausing and post-winter (diapausing) cohort, were phenotyped and collected for a gene expression analysis. At the phenotypic level, we found no difference in survival between the two cohorts, and the post-winter cohort was larger and heavier than the non-winter cohort. These effects were mostly independent of the latitude of origin. At the transcriptomic level, wintering affected gene expression with a small fraction of genes significantly overlapping across latitudes, especially those related to morphogenesis. In conclusion, we found clear effects of diapause on the phenotype but little evidence for latitudinal-specific effects of diapause. Our results showed a shared transcriptomic basis underpinning diapause demonstrated, here, at the intraspecific level and supported the idea of evolutionary convergence of the response to diapause across organisms." (Authors)] Address: Wos, G., Institute of Nature Conservation Polish Academy of Sciences, Al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: wos@iop.krakow.pl

**23161.** Yin, P.; Duan, C.; Zhou, F.; Gong, L.; Gunathilaka, M.D.K.L.; Liu, X.; Liu, D.; Shen, A.; Pan, Y. (2024): Microplastics affect interspecific interactions between cladoceran species in the absence and presence of predators by triggering asymmetric individual responses. *Water Research* 248, 120877: 12 pp. (in English) ["Highlights: • *D. magna* ingested the used microplastics (MPs, 32–38 µm), but *S. kingi* did not. • MPs affected anti-oxidant traits, behavior, and grazing rate of *D. magna*. • MPs changed life-history and inhibited

population growth of *D. magna*. • MPs suppressed *D. magna* through resource and apparent competition. • MPs' risks have been underestimated without multiscale risk assessment. Although many studies have reported the negative effects of microplastics on aquatic organisms, most research is focused on individual scales. Individual studies highlight harm mechanisms, but understanding broader ecological effects necessitates evidence from multiscale perspectives, particularly those based on interspecific interactions. Therefore, in this study, we investigated the impacts of different microplastic concentrations (0, 0.4, 2, and 10 mg/L) on individual characteristics (physiology, behavior, and grazing rate) and population dynamics of two cladoceran species *Daphnia magna* and *Scapholeberis kingi*, and their interrelationships within communities in the absence and presence of predators (larvae of *Agriocnemis pygmaea*). We used 32–38  $\mu\text{m}$  polyethylene microplastics; these particles were detected in the guts of *D. magna*, especially at higher concentrations, but were not found in *S. kingi*. Consequently, with increasing microplastic concentrations, the grazing and reproductive capacity of *D. magna* diminished, weakening their dominance in the coexistence system without damselfly larvae. Additionally, as microplastic concentration increased, *D. magna* faced greater oxidative damage and a reduction in mobility, making this species more susceptible to predation by damselfly larvae and less dominant in the predator-inhabited coexistence system. This study reveals the mechanism by which asymmetric impacts of microplastics on individual traits altered interspecific competition between zooplankton species, thereby illuminating the role of microplastics in altering zooplankton communities." (Authors)] Address: Pan, Y., Yunnan Intern. Cooperative Center of Plateau Lake Ecological Restoration & Watershed Management & Yunnan Think Tank of Ecological Civilization, Kunming, Yunnan, 650091, China. Email: panying@ynu.edu.cn

**23162.** Zeng, G.; Dong, Y.; Luo, J.; Zhou, Y.; Li, C.; Li, K.; Li, X.; Li, J. (2024): Desirable strong and tough adhesive inspired by dragonfly wings and plant cell walls. *ACS Nano* 18, 13: 9451-9469. (in English) ["The production of wood-based panels has a significant demand for mechanically strong and flexible biomass adhesives, serving as alternatives to nonrenewable and toxic formaldehyde-based adhesives. Nonetheless, plywood usually exhibits brittle fracture due to the inherent trade-off between rigidity and toughness, and it is susceptible to damage and deformation defects in production applications. Herein, inspired by the microstructure of dragonfly wings and the cross-linking structure of plant cell walls, a soybean meal (SM) adhesive with great strength and toughness was developed. The strategy was combined with a multiple assembly system based on the tannic acid (TA) stripping/modification of molybdenum disulfide ( $\text{MoS}_2@TA$ ) hybrids, phenylboronic acid/quaternary ammonium doubly functionalized chitosan (QCP), and SM. Motivated by the microstructure of dragonfly wings,  $\text{MoS}_2@TA$  was tightly bonded with the SM framework through Schiff base and strong hydrogen bonding to dissipate stress energy through crack deflection, bridging, and immobilization. QCP imitated borate chemistry in plant cell walls to optimize interfacial interactions within the adhesive by borate ester bonds, boron–nitrogen coordination bonds, and electrostatic interactions and dissipate energy through sacrificial bonding. The shear strength and fracture toughness of the SM/QCP/ $\text{MoS}_2@TA$  adhesive were 1.58 MPa and 0.87 J, respectively, which were 409.7% and 866.7% higher than those of the pure SM adhesive. In addition,  $\text{MoS}_2@TA$  and QCP gave the adhesive good mildew resistance, durability, weatherability, and fire resistance. This bioinspired design

strategy offers a viable and sustainable approach for creating multifunctional strong and tough biobased materials." (Authors)] Address: Li, X., Coll. Materials Science & Engineering, Nanjing Forestry Univ., Longpan Rd 159, Xuanwu Dist., Nanjing 210037, China. Email: xiaona510@njfu.edu.cn

**23163.** Zhang, L.; Zhang, X.; Wang, K.; Gan, Z.; Liu, S.; Liu, X.; Jing, Z.; Cui, X.; Lu, J.; Liu, J. (2024): Effect of blood circulation in veins on resonance suppression of the dragonfly wing constructed by numerical method. *Journal of Bionic Engineering* 21: 877-891. (in English) ["To reveal the resonance suppression mechanism of the blood circulation in dragonfly wings, a numerical modeling method of dragonfly wings based on Voronoi diagrams is proposed, and the changes in mass, aerodynamic damping, and natural frequencies caused by blood circulation in veins are investigated. The equivalent mass of blood, boundary conditions, and aerodynamic damping are calculated theoretically. Modal analysis and harmonic response analysis of wing models with different blood circulation paths are performed using the finite-element method (FEM). The vibration reduction ratio  $d$  is introduced to compare the damping efficiency of different mass regions. Finally, a natural frequency testing device is constructed to measure the natural frequencies of dragonfly wings. The results indicate that the shape, mass, and natural frequencies of the dragonfly wing model constructed by numerical method agree well with reality. The mass distribution on the wing can be altered by blood circulation, thereby adjusting the natural frequencies and achieving resonance suppression. The highest  $d$  of 1.013 is observed in the C region when blood circulates solely in secondary veins, but it is still lower than the  $d$  of 1.017 when blood circulates in complete veins. The aerodynamic damping ratio (1.19–1.79%) should not be neglected in the vibration analysis of the beating wing." (Authors)] Address: Zhang, L., College of Mechanical & Electronic Engineering, China University of Petroleum, Qingdao, 266580, China

**23164.** Zhang, X.; Nel, A.; Wang, H.; Zhang, H.; Zheng, D. (2024): A new genus of aeschniid dragonfly (Odonata: Anisoptera) from the Lower Cretaceous of the Jiuquan Basin, NW China. *Historical Biology* 36(1): 12-18. (in English) ["A new aeschniid dragonfly, *Gansuaeschnidia hongii* gen. et sp. nov., is established based on three hind wings from the Lower Cretaceous Chijinpu Formation of the Jiuquan Basin, northwestern China. The new taxon is characterised by the strongly closed Ax1 and Ax2, only one row of cells in the lower and middle parts of the discoidal triangle, and subdiscoidal area not divided by a clear AAspl vein. This new discovery indicates that the Chijinpu Formation can be correlated with the Yixian Formation, i.e. the second evolution stage of the Jehol Biota, adding to the diversity of the aeschniid dragonflies in China during Early Cretaceous." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology and Center for Excellence in Life & Palaeoenvironment, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing, China. Email: drzheng@nigpas.ac.cn

**23165.** Zheng, M.; Peng, L.; Su, G.; Pan, T.; Li, Q. (2024): Experimental investigation on aerodynamic performance of inclined hovering with asymmetric wing rotation. *Biomimetics* 2024, 9, 225. <https://doi.org/10.3390/biomimetics9040225>: 17 pp. (in English) ["This study presents a model experiment method that can accurately reproduce the flapping motion of insect wings and measure related unsteady aerodynamic data in real time. This method is applied to investigate the aerodynamic characteristics of inclined hovering,

which distinguishes it from normal hovering by having asymmetric wing rotation during the two half strokes. In the study of the aerodynamic influence of the downstroke rotational angle, it is found that the rotational angle affects lift generation by changing the angle between the wing surface and the horizontal plane in the mid-downstroke. When the wing is almost parallel to the horizontal plane in the mid-downstroke, the vortex structure can maintain structural integrity and a large magnitude, which is conducive to the generation of high lift. In the study of the aerodynamic effect of the upstroke rotational angle, the windward conversion mechanism is proposed to explain the influence of the upstroke rotational angle on the direction and magnitude of thrust. Obtaining the rotational angle that is most conducive to maintaining the flight state of hovering in the present study can provide guidance for the structural design and kinematic control of micro aerial vehicles. ... The geometric data of the model wing profile are extracted from the forewing of *Pantala flavescens* captured at Beihang University." (Authors)] Address: Zheng, M., Res. Inst. Aero-Engine, Beihang Univ. Beijing 100191, China

**23166.** Zhou, Y.; Luo, J.; Jing, Q.; Ge, S.; Chen, S.; Guo, Z.; Li, J.; Liu, Z.; He, P.; He, X.; Xu, B.B. (2024): Tough, waterproofing, and sustainable bio-adhesive inspired by the dragonfly wing. *Advanced Functional Materials* 2024, 2406557: 10 pp. (in English) ["The development of multifunctional bio-adhesive plays a critical role in achieving a sustainable society, where the intrinsic sensitivity to water and poor dynamics severely bottlenecks its scale-up application. Inspired by the microstructure of dragonfly wings, a strong and tough adhesive with excellent reprocessability is designed and developed by creating a dynamic network consisting of a lignin polyurea (LPU) framework with soybean protein (SP). The LPU framework act as the rigid nervures to slow crack propagation and transfer stress, while the SP dissipate the strain energy through the interplay from the graded hydrogen and imine bonds generated between LPU and SP. The bio-adhesive achieves significant enhancements in fracture toughness and water resistance by 7 and 23 folds, respectively, compared with SP. Furthermore, the capacity for diffusion and restoration of dynamic network endows the adhesive with superior reprocessability, enabling recycled particleboard to achieve high retention of modules (over 80%). This sustainable bio-adhesive approach offers a promising eco-friendly alternative to the conventional petrochemical adhesive." (Authors)] Address: Xu, B.B., Department of Mechanical and Construction Engineering, Faculty of Engineering and Environment, Northumbria University, Newcastle Upon Tyne NE1 8ST, UK. Email: ben.xu@northumbria.ac.uk

**23167.** Zi, F.; Wang, B.; Yang, L.; Huo, Q.; Wang, Z.; Ren, D.; Huo, B.; Song, Y.; Chen, S. (2024): Ecology of saline watersheds: An investigation of the functional communities and drivers of benthic fauna in typical water bodies of the Irtysh River basin. *Biology* 2024, 13, 27. 17 pp. (in English) ["Simple Summary: In this study, we explored the impact of saline-alkaline environments on the diversity and functional traits of benthic organisms. In environments with varying levels of salt, we noticed changes in living organisms, like improved swimming abilities and better adaptation to breathing in high-salinity conditions. These findings offer crucial insights to understand and manage ecosystems in saline-alkaline environments, particularly in the face of climate change. This study provides a practical foundation for conservation efforts, emphasizing the importance of recognizing the unique roles of benthic organisms across varying salinity levels. By revealing adaptive strategies and their

ecological significance, our research contributes to global initiatives that address environmental challenges and promote enhanced ecosystem resilience. Abstract: In this study, we investigated how changes in salinity affect biodiversity and function in 11 typical water bodies in the Altai region. The salinity of the freshwater bodies ranged from 0 to 5, the brackish water salinities ranged from 5 to 20, and the hypersaline environments had salinities > 20. We identified 11 orders, 34 families, and 55 genera in 3061 benthic samples and classified them into 10 traits and 32 categories. Subsequently, we conducted Mantel tests and canonical correlation analysis (CCA) and calculated biodiversity and functional diversity indices for each sampling site. The results indicated that biodiversity and the proportion of functional traits were greater in freshwater environments than in saline environments and decreased gradually with increasing salinity. Noticeable shifts in species distribution were observed in high-salinity environments and were accompanied by specific functional traits such as swimming ability, smaller body sizes, and air-breathing adaptations. The diversity indices revealed that the species were more evenly distributed in high-diversity environments under the influence of salinity. In contrast, in high-salinity environments, only a few species dominated. The results suggested that increasing salinity accelerated the evolution of benthic communities, leading to reduced species diversity and functional homogenization. We recommend enhancing the monitoring of saline water resources and implementing sustainable water resource management to mitigate the impact of salinity stress on aquatic communities in response to climate-induced soil and water salinization. .... However, the abundances of the orders Trichoptera and Odonata significantly increased in saline environments, surpassing their presence in freshwater habitats and crucially influencing the composition of saline benthic communities. In high-salinity environments, the species distribution sharply decreased, with only four orders [including Odonata] identified, and their relative abundance was notably lower than that of their counterparts in the other two environments." (Authors)] Address: Zi, F., Tarim Research Center of Rare Fishes, College of Life Sciences and Technology, Tarim University, Alar 843300, China

**23168.** Zia, A.; Shabnem, B.; Mehmood, S.A.; Mastoi, M.I.; Shehzad, A.; Ahmed, S. (2024): *Aeshna mixta* (Latreille, 1805), a new record for the Odonata (Anisoptera: Aeshnidae) fauna of Pakistan. *Arthropods* 13(2): 87-93. (in English) ["*A. mixta* is added to the Anisoptera fauna of Pakistan by reporting it from district Neelum of Azad Jammu and Kashmir, Pakistan. Geopolitically the study area lies in an area facing uncertain ground conditions since inception of Pakistan. It is a hard to reach valley between India and Pakistan, very close to the line of control. Out of twenty sampling sites, specimens of *A. mixta* were found from fifteen localities of the district. With the addition of this taxon, Anisoptera fauna of Pakistan now count 74 species. The area under district Neelum represents many lush green valleys with lots of natural water bodies that support a broad complex of Odonata. More surveys in the area are suggested to unveil more important records from the area." (Authors)] Address: Zia, A., National Insect Museum, NARC Islamabad, Pakistan. Email: saiyedahmed@gmail.com