

# Odonatological Abstract Service

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## 2001

**23169.** Brunelle, P.A. (2001): The 2000 season. *Mainensis* 2(1): 7-8. (in English) [USA, Maine "2000 was again a substantial year of contribution to our knowledge of Maine odonates. In spite of poor weather early in the season, 4,416 records were tendered, a substantial increase over the 2,535 records from 1999, and two species were added to the state list. In addition, two species were taken that had been known only historically (>50 years), one that was known only from exuviae, and there has been confirmation of the presence of two species that had been somewhat suspect in the state. Considerable information has been added in the two first years of MDDS; 6,951 records (+106.5% over the <1999 information), 5 state records (+3.23%), 305 county records (+25.4%), and 197 biophysical region records (+17.3%). We now have 13,208 records of 160 species, and it seems likely we will exceed 25,000 records by the end of MDDS, effectively doubling our knowledge every year of the Survey." (Author)] Address: deceased; <https://drive.google.com/open?id=0B985dSJVRA1mVzFTWEN0SXpzcIE>

**23170.** Nakamura, S.; Kameyama, T.; Katayama, S. (2001): The Insects in the Rivreside of Gono-kawa River. *Bull. Hoshizaki Green Found* 5: 17-114. (in Japanese, with English summary) ["The insects from Gonokawa river are listed up to 19 orders. 228 families and 1,576 species by the survey from 1999. 49 families and 558 species are belonging to Coleoptera. and so 33 families and 396 species are belonging to Lepidoptera. And the Insects from Gono river are listed up to 20 orders. 253 families and 2,108 species by the survey of 1991 and 1999. In this 2,108 species. 532 species are collected from only 1991. 703 species are collected from only 1999. 873 species are common to collect from 1994 and 1999." (Authors) Odonata are listed on pages 27-29.] Address: Nakamura, S., Nishihon-mac 1-7-7, Shobara, Hiroshima Prefecture, 727-0013, Japan

**23171.** Tojo, K.; Machida, R. (2001): Affinity of Ephemeroptera: a review of the proposed phylogenetic relationships of the major pterygote groups, the Ephemeroptera, Odonata, and Neoptera, based on comparative embryology. In: Bae, Y.J., [Ed.], 2001. *The 21st century and aquatic entomology in East Asia*. [Proc. 1st Symp. Aquat. Entomologists E Asia], Korean Soc. Aquat. Ent., Seoul, viii+146 pp.: 85-96. (in English) ["The Ephemeroptera, which represent one of the pterygote basal clades, were examined in light of comparative embryology, focusing on the following characters: 1)

amnioserosal fold, 2) germ type, 3) cleavage, 4) egg tooth, 5) formation of midgut epithelium, 6) invagination type of embryo, 7) formation of proctodaeum, 8) micropyle, 9) extension of embryonic area, 10) clypeolabral rudiment, 11) superlingua, and 12) caudal filament as an elongation of telson. The embryological and morphological ground plans in insects or pterygotes were discussed as well as their evolutionary transition. The pterygote phylogenies currently proposed were reviewed from the comparative embryological standpoint, and the phylogeny as [Ephemeroptera + (Odonata + Neoptera)] was supported." (Authors)] Address: Tojo, K, 'Institute of Biological Sciences, University of Tsukuba Tennoudai 1-1-1, Tsukuba, Ibaraki 305-8572, Japan

**23172.** White, H.B. (2001): Summary and reflections on Odonata in Hancock County, Maine, between August 1 and 10, 2000. *Mainensis* 2(1): 6 (in English) ["I visited seven sites and saw or collected a total of 45 species of Odonata. Most notable was the discovery of a population of the salt-tolerant species, *Erythrodiplax berenice* on Northeast Creek, Bar Harbor. This is the first record for the species on Mount Desert Island. Also observed for the first time on the island and in the same habitat was *Libellula luctuosa*. I note recent successional changes in two boreal habitats that may be indicators of climate change that is also correlated with the range extension into the area by species with southern affinities. Odonata I collected on Mount Desert Island between 1968 and 1997 were deposited in the Museum at Acadia National Park as stipulated by the park collecting permits." (Author)] Address: White, III, H.B., Dept of Chemistry & Biochemistry, Univ. of Delaware, Newark, Delaware 19716

## 2002

**23173.** Endersby, I. (2002): Victorian dragonfly common names. *Victorian Entomologist* 32(1): 14-15. (in English) [List of common names of Victoria, Australia.] Address: Author deceased

**23174.** Lara Vazquez, J.A.; Villeda Callejas, M.P. (2002): Odonatos en la manifestación cultural de los pueblos. *Revista Chapingo Serie Ciencias Forestales y del Ambiente* 8(2): 119-124. (in Spanish, with English summary) ["Mankind since its beginning has been interested on insects, first observing their variety and abundance, then understanding their role in environment. As a consequence, cultural aspects have created surrounding these organisms, Odonata haven't been the exception; nevertheless their relevance comparing them with other insects groups, that's why this

writing's objective is to know different cultural views in which these insects have been considered, doing a bibliographical research. Several cultural expressions have been found, which topic is Odonata, from their common names to literature, going through traditions and believes we have, regarding these insects." (Authors)] Address: Villeda Callejas, M.P., Lab. Zoologia, FES-Iztacala, UNAM. Ave. de los Barrios No. 1, Los Reyes Iztacala. C.P. 54090, Mexico. Email: villeda@servidor.unam.mx

**23175.** Marabini, J. (2002): Zwischenbericht zum ABSP-Umsetzungsprojekt "Lebensraumnetz Moorweiher und Niedermoore", Landkreis Erlangen-Höchststadt und Landschaftspflegeverband Mittelfranken. Träger: Landkreis Erlangen-Höchststadt und Landschaftspflegeverband Mittelfranken: 50 pp. (in German) [<http://www.edelkrebs.de/zwischen.pdf>. 15 Odonata species are documented from 48 ponds, including species as *Coenagrion hastulatum*, *Lestes virens*, *Somatochlora flavomaculata*, *Leucorrhinia dubia*, *L. pectoralis* and *L. rubicunda*.] Address: Marabini, J., Landratsamt Erlangen-Höchststadt, Schlossberg 10, 91315 Höchststadt, Germany

#### 2004

**23176.** Trockur, B. (2004): Untersuchungen zum Status der FFH-Libellenart *Ophiogomphus cecilia* im Saarland – Grundlagen zum künftigen Monitoring - Sommer 2004. Im Auftrag des Landesamts für Umweltschutz, Don-Bosco-Str. 1, 66119 Saarbrücken, Germany: 16 pp. (in German) [Compilation of current records of this rare species in the Federal State Saarland, Germany.] Address: <http://www.naturschutzdaten-saarland.de/natura2000/Natura2000/Allgemeine%20Daten%20und%20gebietsuebergreifende%20Informationen/Daten%20zu%20Arten%20der%20FFH-Anhaenge/Ophiogomphus%20cecilia%20-%20Gruene%20Keiljungfer/FFH-Monitoring%202004.pdf>

#### 2005

**23177.** Torralba Burrial, A.; Ocharan, F.J. (2005): Catalogo de la entomofauna aragonesa 32. 3: 25- (in Odonata, faunistics, Aragon, Iberian Peninsula) [Check-list of the Odonata of Aragon (Spain): Odonata bibliographical records from Aragon (Spain) are critically reviewed. There are 58 species in the check-list (24 Zygoptera, 34 Anisoptera), that is ca. 76% of the species recorded from the Iberian Peninsula; four recorded species are removed from the check-list (*Coenagrion pulchellum*, *Platycnemis pennipes*, *Paragomphus genei*, *Sympetrum depressiusculum*). The available data are mapped on a UTM 10x10 km grid. Nevertheless, there are data for only 106 out of 599 squares, and only partial data are available for these. This pattern is more marked in Teruel province." (Authors)] Address: [https://www.researchgate.net/publication/237064008\\_Catalogo\\_de\\_los\\_odonatos\\_de\\_Aragon\\_Odonata](https://www.researchgate.net/publication/237064008_Catalogo_de_los_odonatos_de_Aragon_Odonata)

#### 2006

**23178.** Cervenka P. (2006): A contribution to the knowledge of dragonflies (Odonata) of the Lechotický pond (Moravia, Czech Republic). *Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminář uspořádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípě / editor sborníku Lubomír Hanel. – Vyd. 1. – Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 86-89. (in Czech, with English summary) ["In the years 2003 -*

2005 an exploration of dragonflies at the vicinity of the village Libiny in the area of the Lechotický pond was conducted (the district Kromiř, mapping quadrat 6771, altitude 213 m, a 2-hectare plot). Altogether 26 species were taken .... *Calopteryx virgo*, *C. splendens*, *Lestes viridis*, *L. sponsa*, *Sympecma fusca*, *Platycnemis pennipes*, *Erythromma viridulum*, *Coenagrion puella*, *C. scitulum*, *Enallagma cyathigerum*, *Ischnura pumilio*, *I. elegans*, *Aeshna mixta*, *A. cyanea*, *Anax imperator*, *A. parthenope*, *Gomphus vulgatissimus*, *Cordulia aenea*, *Somatochlora metallica*, *Libellula quadrimaculata*, *L. depressa*, *Orthetrum cancellatum*, *O. albistylum*, *Crocothemis erythraea*, *Sympetrum vulgatum*, *S. sanguineum*, *S. danae*.] Address: Cervenka P., Pionýrů 862, 763 02 Zlín-Malenovice, Czech Republic. E-mail: [petro.erithacus@seznam.cz](mailto:petro.erithacus@seznam.cz)

**23179.** Lagunov, A.V. (2006): [Insects from the Red book of the RF in the fauna of the Ilmensky Reserve and prospects for their conservation]. *Proceedings of the Chelyabinsk Scientific Center* 1(31): 106-109. (in Russian) [Verbatim/Google translate: *Anax imperator* Leach, 1815. According to an oral report by A.Yu. Kharitonov in July 2004, several specimens were found in the Uchalinsky region of Bashkiria. Due to the expansion of the species' range to the east, finds are very possible in the Chelyabinsk region, especially in the Chebarkul region and in the Ilmensky reserve. *Ischnura aralensis* Haritonov, 1979. The species is known in the world only from several local foci in the Syrdarya basin, on the Ilmen group of lakes [9], on lake. Aka-kul [10] and in the Uchalinsky region of Bashkiria (oral communication by A.Yu. Kharitonov).] Address: Lagunov, A.V., Ilmen State Reserve, Ural Branch of RAS, Miass, Russia. E-mail: [lagunov@ilmeny.ac.ru](mailto:lagunov@ilmeny.ac.ru)

**23180.** Outomuro, D.; Ocharan, F.J. (2006): Mordeduras y daños en las alas como resultado del combate territorial en *Calopteryx* (Odonata: Calopterygidae). *Boletín de la S.E.A.* 39: 421-422. (in Spanish) [Verbatim/Google translate: Introduction: Most interactions between odonates are intraspecific and usually occur between males (Lutz & Pittman, 1970). The family Calopterygidae is characterized by a complex male territorial behavior that distinguishes between territorial and non-territorial individuals. These territories, suitable for oviposition, are established based on different parameters, such as proximity to running water, radiation, availability of perches, presence of spawning substrate, topography of the riverbank and male density (Pajunen, 1966; Heymer, 1972). Their defense involves fights between males that imply intrasexual selection. Defense behavior is very varied, although physical contact is described as an accidental event (Pajunen, 1966). They frequently collide during encounters (Pajunen, 1966), which can damage their wings and legs (Meek & Herman, 1990, in Corbet, 1999), force them to fall to the surface of the water (Conrad & Herman, 1987) or even kill them (Lambert, 1994, in Corbet, 1999). Ruppell et al. (2005) show in one of their figures a male *Calopteryx splendens* (Harris, 1782) in copulation, with its wings bitten off by rival males trying to separate the pair. Complete intraspecific predation (cannibalism) is not rare in certain species of Coenagrionidae odonates such as *Ischnura elegans* (Parr, 1973, in Corbet, 1999). Behavior Description: This behavior has only been observed on two occasions, albeit in different species. *Calopteryx virgo meridionalis* Selys, 1873 and *Calopteryx xanthostoma*. In both cases they were localities of Asturias' C. *virgo meridionalis* on 08/01/04 in the Semeldón river (30TUN2092. Sealed) and C. *xanthostoma* on 06/03/2006 in the Píoña river (30TUP1803, Soto de Duñas). In both cases it was a behavior of territorial defense

resolved in partial intraspecific predation. After one of the usual territorial disputes, one of the males involved falls to the surface of the water laterally so that the surface tension prevents it from opening its wings. The rival male then perches on the fallen y, while he holds the rival's wings with his paws, he begins to bite his wings. The attacker consumes the bitten parts of the opponent. Both males are dragged down the river until the attacker decides to take flight. Tears or breaks in the wings are common in individuals of the genus *Calopteryx*. However, the marks on the wings of the victim are clear and different from a casual tear. It is easy to distinguish these semicircular marks left by the attacker's jaws. It is probable that part of the damage observed in the wings of some *Calopteryx* males have been caused by conflict situations similar to those described (see figs. 1 and 2). Discussion: The observed behaviour could be exceptional, or it could occur whenever the right situation occurs. This situation would occur under a set of circumstances such as high population density, low availability of territories and high levels of radiation. All these situations promote an increase in the activity and metabolism of males, both territorial and non-territorial. So far, examples of cannibalism have been observed mainly on juvenile individuals and normally by females. In these cases, it is believed that this behaviour occurs due to a failure in specific recognition by not recreating a defence posture (juveniles) or by not recognising it (mature females) (Utzeri, 1980). This hypothesis has been supported by experimental data with *Ischnura graellsii* (Cordero, 1992). From the point of view of biological efficiency, the advantages of the aggressor male are clear. In addition to reinforcing its status as territory holder and obtaining an atypical source of nutrients, the rival's biological efficiency is diminished by damaging one of the main characters used in intersexual selection, namely wing morphology and colouration. Intersexual selection in the genus *Calopteryx* is believed to be based mainly on body colourations that act as secondary sexual characters (Córdoba-Aguilar, 2002), and may be the main mechanism of speciation in this group of odonates (Svensson et al., 2006). Evolution has tended towards the avoidance of these intraspecific conflicts. Thus, the usual territorial behaviours in the genus *Calopteryx* all involve an exposure of the male's potential capacity as a rival, avoiding physical contact as much as possible. These threatening behaviours would have evolved as an alternative to physical fighting and always develop in flight. It is likely that situations such as the one described, in which the rival remains immobile and unable to show a defensive posture (Pajunen, 1966), awaken primitive predatory behaviours, which would be the most primitive form of aggression (Pajunen, 1964, in Corbet, 1999). These aspects require further study, and may represent a significant intrasexual selective force.] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**23181.** Giroud, M.; Mora, F. (2007): Note sur quelques zygoptères de Bresse du Jura. *Falco* 38: 143-147. (in French) [The following species are treated: *Lestes sponsa*, *L. Lestes virens*, *Coenagrion mercuriale*, *C. pulchellum*, *Sympetma fusca*, *Ceragrion tenellum*, *Erythromma viridulum*, *Ischnura pumilio*] Address: Giroud, M., 12, rue de la Cassotte, 25 000 Besançon, France. Email: le\_juv@yahoo.fr

## 2007

**23182.** Kadoya, T. (2007): Spatial ecological approach to evaluating the potential of immigration of dragonflies to newly created habitats. Ph.D. Thesis, The University of Tokyo,

Tokyo: II, 138 pp. (in English) [<https://repository.dl.itc.u-tokyo.ac.jp/record/4303/files/K-122459.pdf>] Address: Kadoya, T., Dept Ecosyst. Studies, Inst. Agr. and Life Sci., Bunkyo Ku, Univ. Tokyo, 1-1-1 Yayoi, Tokyo, 1138657, Japan. E-mail: aa47143@mail.ecc.u-tokyo.ac.jp

**23183.** Moltmann, J.F.; Liebig, M.; Knacker, T.; Keller, M.; Scheurer, M.; Temes, T. (2007): Gewässerrelevanz endokriner Stoffe und Arzneimittel. Neubewertung des Vorkommens, Erarbeitung eines Monitoringkonzepts sowie Ausarbeitung von Maßnahmen zur Reduzierung des Eintrags in Gewässer. UBAFBNr 001032. Förderkennzeichen 205 24 205. Umweltbundesamt: 129 pp. (in German) [The study refers to impacts of the insecticide Carbofuran on larvae of *Brachythemis contaminata* (Shukla, G.S.: Mishra, P.K. (1980): Bioassay studies on effects of carbamate insecticides on dragonfly nymphs. *Indian J. Environ. Health* 22(4): 328-335)] Address: <https://www.umweltbundesamt.de/publikationen/-gewaesserrelevanz-endokriner-stoffe-arzneimittel>

## 2008

**23184.** Grand, D.; Garcia, A. (2008): *Lestes sponsa* (Hansemann, 1823) et *Somatochlora flavomaculata* (Vander Linden, 1825) dans le Rhône (Zygoptera, Lestidae; Anisoptera, Corduliidae). *Martinia* 24(3): 88- (in French) ["Reported from Lyon since the beginning of the 20th century by a specimen appearing in a collection of the Conservation Center of the Natural History Museum of Lyon (Grand, 1998: *Martinia*, 14 (3): 85-93) recently renamed "Musée des Confluences», *L. sponsa* is known sporadically from the Rhône department, along the Saône valley, north of Villefranche-sur-Saône (Grand, 1992: *Martinia* 8 (1): 15-28; Grand, 2004 : *Muséum*, Lyon, 255 pp.; Despite fairly regular surveys in this area, reproduction of the species has never been confirmed there. The small populations of *L. sponsa* which are observed sporadically in the communes of Saint-Georges-de-Reneins and Arnas probably come from the neighboring Dombes where the species is well distributed without, however, being really abundant. Likewise, a ♂ erratic of *S. flavomaculata* had been seen on a swamp bordering the Rizan stream in Meyzieu in the Miribel-Jonage park. But since then, no other observations of this Corduliidae have been reported from the department (GRAND, 2004, op. cit.). During a visit carried out on June 13, 2007 to the Grands Vernes forest swamp in Vaulx-en-Velin, an eastern commune of the Lyon Urban Community, we observed a small population of *L. sponsa*, made up of a few adult individuals and freshly emerged imagos, as well as three ♂ territories of *S. flavomaculata* which flew over a flooded sedge, at the edge of the riparian forest. This swamp, which corresponds to what remains of an ancient arm of the Rhône, has a rich odonatalogical fauna which, in addition to the two aforementioned species, is composed of *Chalcolestes viridis*, *Sympetma fusca*, *Platycnemis pennipes*, *Coenagrion puella*, *Enallagma cyathigerum*, *Erythromma lindenii*, *E. viridulum*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Aeshna cyanea*, *A. mixta*, *Anax imperator*, *A. parthenope*, *Crocothemis erythraea*, *Libellula depressa*, *L. fulva*, *L. quadrimaculata*, *Orthemis albistylum*, *O. brunneum*, *O. cancellatum*, *Sympetrum fonscolombii*, *S. meridionale*, *S. sanguineum* and *S. striolatum*. It is probable that *L. sponsa* and *S. flavomaculata* are autochthonous in the Miribel-Jonage park, which will undoubtedly be confirmed by subsequent surveys. The odonatalogical procession recorded in the 57 municipalities of the Urban Community of Lyon, better known under the label "Le Grand Lyon", is 54 species, 50 of which have been observed at least once since 1985. Indeed, *Platycnemis latipes*,

*Gomphus flavipes*, *G. simillimus* and *Sympetrum depressiusculum* are considered to have disappeared from the Lyon metropolitan area since probably the first quarter of the 20th century, or even well before for some." (Authors/Google translate)] Address: Garcia, A., 2 Haute Giraudière, F-69690 Brussieu, France

**23185.** Stübing, S.; Roland, H.-J.; Cloos, T.; Gelpke, C.; Hill, B.T.; Korn, M.; Schroth, M. (2008): Jahresbericht Hessen 2006/07. Libellen in Hessen 1: 15-55. (in German) ["The first annual report on dragonflies in Hesse follows directly on from the summary data collection for the years 1995 to 2005. The presentation mainly refers to the years 2006/07, but notable observations from further back, from around 2000, are also described. In total, data from 20 small and 41 large dragonfly species are listed. The reports were provided by 55 employees. The first discoveries of *Leucorrhinia caudalis* in 2003 and *Aeshna subarctica elisabethae* in 2004 are outstanding, meaning that 64 species are now on the faunal list of our state. The positive development of many flowing water species is also very remarkable. *Gomphus flavipes* is particularly noteworthy here. In addition to numerous sightings of various Mediterranean species such as *Crocothemis erythraea* and *Orthetrum brunneum*, the arrival of *Aeshna affinis*, *Anax parthenope* and *Sympetrum fonscolombii* is particularly noteworthy. There have been unexpectedly many reports of some species previously classified as extremely rare, such as *Orthetrum coerulescens* and *Libellula fulva*. *Somatochlora arctica* and *S. flavomaculata* are each found in two areas. Other species, such as *Lestes dryas* and *Sympetrum danae*, have clearly declined in recent years. Another striking feature was the extremely early hatching of many species in April and May 2007 after the unusually mild winter of 2006/07." (Authors/Google translate)] Address: Stübing, S., Im Feldchen 1a, 61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

**23186.** Treiber, R. (2008): Libellen am nordelsässischen Oberrhein in vier Schutzgebieten bei Munchouse, Offendorf, Erstein und Rhinau. *Mercuriale* 8: 17-25. (in German, with French summary) ["During the study of the dragonfly fauna in four nature reserves (Réserves Naturelles Nationales) in the Upper Rhine Plain between Rhinau and Munchhausen in Alsace (Bas-Rhin department, France), 50 of the 52 dragonfly species known in the region were identified or confirmed. Habitats, care and development measures are presented for nine species of particular interest to nature conservation, including *Leucorrhinia pectoralis* and *L. caudalis*. The creation of new small bodies of water and the maintenance of the areas by the Conservatoire des Sites Alsaciens (C.S.A.) are essential for the preservation of biodiversity." (Author/Google translate)] Address: Treiber, R., Im Westengarten 12, 79241 Ihringen, Germany. E-mail: reinhold.treiber@gmx.de

## 2010

**23187.** Richter, O.; Eggert, T.O. (2010): Gewässerstruktur- und Gewässergüteuntersuchungen in Fließgewässern im Gebiet der Stadt Braunschweig. Auftraggeber: Stadtentwässerung Braunschweig GmbH Steinweg 26, 38100 Braunschweig; Auftragnehmer: Institut für Geoökologie - Umweltsystemanalyse -Langer Kamp 19c 38106 Braunschweig: 52 pp. (in German) [Tab. 3.16: Total species list 2010 of the surveys on biological water quality in stormwater receiving waters in the urban area of Braunschweig. The following taxa are listed: *Aeshna cyanea*, *Anax imperator*, *Calopteryx splendens*, *Coenagrionidae*, *Ischnura elegans*, *Ophiogomphus cecilia*, *Platycnemis pennipes*, *Somatochlora*

sp., and *Sympetrum* sp.] Address: Institut für Geoökologie - Umweltsystemanalyse -Langer Kamp 19c 38106 Braunschweig, Germany

## 2011

**23188.** Aurelien, C. (2011): Etat des lieux des connaissances des populations de trois libellules d'intérêt communautaire en Midi-Pyrénées: *Macromia splendens*, *Oxygastra curtisii* et *Gomphus graslinii*. Conservatoire d'espaces naturels Midi-Pyrénées. Rapport de stage 2011: 33 pp. (in French) ["Three dragonflies of community interest are dependent on the large waterways of the South of France. These three species are currently covered by the "National Odonata Action Plan". Although Midi-Pyrénées has a significant conservation responsibility for these species, their distribution is currently poorly known. Many actions should eventually be considered at the regional level for the preservation of these three species. First, it is necessary to draw up an inventory of their distribution. This report presents a summary of data collected from different structures and individuals in the Midi-Pyrénées natural landscape, supplemented by the results of a survey in 2011 on regional waterways in search of new sites favorable to the development of these three dragonflies. The aim is to update and strengthen knowledge on *Macromia splendens*, *Oxygastra curtisii* and *Gomphus graslinii* in Midi-Pyrénées." (Authors/Google translate)] Address: [https://cen-mp.org/wp-content/uploads/2018/07/rapport\\_odonates\\_Costes2011\\_cenmp.pdf](https://cen-mp.org/wp-content/uploads/2018/07/rapport_odonates_Costes2011_cenmp.pdf)

**23189.** Gütler, M.; Schindler, M.; Hill, J.; Berg, H.-M.; Werdnich, D. (2011): Naturnah gestaltete Feuchtbiootope Lebensräume bedrohter Arten. Projekt des Naturschutzbund Niederösterreich, Endbericht: 210 pp. (in German) ["As part of the project, 15 still waters in the Weinviertel, funded by the Lower Austrian Landscape Fund, were examined for their potential as habitats for aquatic flora and fauna. Very different types of water were examined. They differed primarily in terms of their size, age, shape and integration into the surrounding landscape. The diversity of the waters is also reflected in the range of species found. The vegetation and flora, the dragonfly fauna, amphibians and reptiles as well as the bird fauna were examined. Some of the ponds proved to be particularly rich in species, such as Loidesthal, Niederfellabrunn, Großkadolz. For example, 19 dragonfly species were found at the pioneer waters of Gunthersdorf. The waters in Gänserndorf are of particular interest for the amphibian fauna. The Groß-Kadolz landscape pond is particularly important for the water-related avifauna. The Ungerdorf water body is characterized by the presence of halophytes(!). The analysis of the current situation showed that the potential is unfortunately not always used. The general conditions responsible for this are very diverse. The location in the middle of intensively used agricultural land means that massive amounts of nutrients are introduced into the water bodies. This is exacerbated by the fact that drainage pipes flow directly into the water bodies here and there. Added to this are the local interests of hunting (wildlife feeding, tree stands and traps) and the importance of water bodies close to settlements for recreational use, which increase the "pressure" on the water bodies. The frequently observed succession of trees on the edges of the water bodies is not always advantageous from a nature conservation point of view. These general conditions become more effective the smaller a pond is, which applies to almost all of them with a few exceptions (Groß-Kadolz). As part of a literature study, considerations were made about model concepts for still water bodies in the Weinviertel, based on the possible

historical water features of the region. A total of four guiding principles were distinguished and defined in more detail: flood and groundwater-fed ponds, flood ponds, eyewater bodies, fish ponds. There are significant improvements that can be made to the design of still water bodies for species protection. For example, when creating a body of water, a specific objective is required that is appropriate for the respective location and is based on the four defined guiding principles. From a nature conservation perspective, it does not make sense to want to create a "standard pond" that has to fulfil all the functions of a body of water. When planning a body of water, a larger geographical reference area or a natural spatial unit (e.g. the Weinviertel) must be considered as a whole. The aim should be the mosaic-like distribution and networking of very different bodies of water in this area, the design of which is based on the four guiding principles. An artificial still water body usually requires regular maintenance if it is not to silt up in the long term and certain nature conservation aspects are to be maintained. Unfortunately, this is not provided for in the funding. It is therefore essential to consider this issue. Suggestions for "ecological improvement" are made for the water bodies specifically examined. .... 5.2. Dragonfly fauna: A total of 34 species were identified, of which 15 are sensitive species due to their habitat requirements and 17 species are on the Lower Austrian Red List. These are: *Sympetrum meridionale* (0), *Coenagrion scitulum* (1), *Lestes barbarus* (2), *L. virens* (2), *Coenagrion pulchellum* (2), *Ischnura pumilio* (2), *Orthetrum coerulescens* (2), *Sympetrum pedemonatanum* (2). (0 = extinct, 1 = threatened with extinction and 2 = critically endangered). The most species were found in Gunthersdorf, followed by Gänserndorf, Großkadolz and Ungerndorf. These wetlands also have the highest number of native species. However, when looking at the number of endangered species, the pond in Ungerndorf stands out in particular. With six species on the Red List, it tops the list of wetlands, followed by Niederfellabrunn and Gunthersdorf." (Authors/-Google Translate)] Address: [https://www.noe-naturschutzbund.at/files/noe\\_homepage/Anlagen/FB\\_Endbericht.pdf](https://www.noe-naturschutzbund.at/files/noe_homepage/Anlagen/FB_Endbericht.pdf)

**23190.** Nair, M.W. (2011): Dragonflies & Damselflies of Orissa and Eastern India. Wildlife Organisation, Forest & Environment Department, Government of Orissa: 254 pp. (in English) [App 250 photographs cover 101 taxa (app. 90% of the regional fauna). Information on male, female, habitat, behaviour, distribution and status are given] Address: [https://www.flutters.org/home/docs/Dragonflies%20of%20Orissa%20&%20E.India\\_%20Manoj%20Nair.pdf](https://www.flutters.org/home/docs/Dragonflies%20of%20Orissa%20&%20E.India_%20Manoj%20Nair.pdf)

**23191.** Rodrigues, M.E.; Azambuja R. (2011): Imaturos de Odonata e sua relação com o tamanho de poças temporária as margens do Rio Apa. Anais do Encontro de Iniciação Científica - ENIC 1(1)(3): 1 p. (in Portuguese) [Verbatim/Google translate: "The order Odonata plays an important role in ecosystems, as they are important predators and are also used as bioindicators of water quality. The distribution of immature Odonata in aquatic environments is primarily related to the adult, with oviposition sites possibly being chosen visually. The objective of this work was to verify which groups of Odonata immatures have their development associated with puddles on the slab on the banks of the Apa River and whether there is a relationship between the size of the puddle and the occurrence or not of immatures. The collections were carried out in the Cachoeira do Apa Municipal Natural Park, Porto Murinho, MS, in puddles on the slab on the banks of the Apa River. 23 puddles were sampled and the width, length and depth measurements were verified. The larvae were collected using an active search sieve. 94

individuals from two families and six genera were found, namely: *Pantala* and *Orthemis*, *Cyanogomphus*, *Phyllocycla*, *Archaeogomphus* and *Epigomphus*. The genus *Pantala* was the most abundant with 87 individuals. Of the 23 puddles sampled, larvae were present in 12, with the occurrence of larvae being greater in puddles with a rounded shape and width greater than 50 cm. It is concluded that the occurrence of Odonata immatures is related to the size of the flagstone pools, rounded-shaped pools possibly forming a more visible sheet of water for females to oviposit, which contributes to an increase in the presence of immatures." <https://anaisonline.uems.br/index.php/enic/article/view/1732/1694>] Address: Rodrigues, M.E., Estudante do Curso de Mestrado em Entomologia e Conservação da Biodiversidade da UFGD, Universidade Federal da Grande Dourados, Cidade Universitária, Rodovia Dourados/Itahum KM 12, Caixa postal 322, CEP: 79804-970, Dourados/MS, Brazil. E-mail: [marcielelio@uol.com.br](mailto:marcielelio@uol.com.br)

## 2012

**23192.** Cham, S. (2012): Field guide to the larvae and exuviae of British dragonflies: Damselflies (Zygoptera) & Dragonflies (Anisoptera). Editor: British Dragonfly Society: 152 pp. (in English) ["This publication combines for the first time the original Volume 1 on Dragonflies (2007) and Volume 2 on Damselflies (2009). Since the publication of these separate British Dragonfly Society (BDS) Field Guides, there has been increasing demand to combine them into a single book. In this volume, two new species, *Coenagrion scitulum* and *Aeshna affinis*, have been added. A new appendix for *Lestes viridis* shows extra features on the exuvia and the scars left by ovipositing females. There have also been revisions to other text, but the overall format of this book matches the earlier field guides. In these times of rapid change, it is increasingly important for us to map species distribution and record important areas for dragonflies. It is particularly vital to know where species are breeding, so that these sites can be highlighted and protected. This book, with its concise text and superb photographs by Steve Cham, will enable anyone to find and identify breeding evidence with a little practice. For these reasons this new publication is an important resource for both professional ecologists and amateur enthusiasts alike." (Publisher)] Address: <https://british-dragonflies.org.uk/product/larvae-guide/>

**23193.** Mikolajczuk, P. (2012): New sites of Dark Bluet *Coenagrion armatum* (Charpentier, 1840) (Odonata: Coenagrionidae) in the southern part of Podlasie and in the eastern Masovia. *Odonatrix* 8(2): 59-62. (in Polish, with English summary) ["*C. armatum* belongs to the critically endangered species in Poland. The main reasons for its regress are: drying out the habitats due to the climate and anthropopression as well as eutrophication and the changes of space structure and species composition of vegetation associated with this (Bernard et al. 2009). The number of sites of this species in Poland is underestimated (Buczyński et al. 2011). In this paper there are two new records of *C. armatum* from the southern Podlasie and the eastern Masovia, with giving co-occurring dragonfly species (\* – native species undergoing the whole development cycle, # – probably native species). The site nr. 3 is situated outside the presumed range of the occurrence (Bernard et al. 2009). This is the first record of the species after several years in Masovia (Tończyk et al. 1998) and the third record to the west of 22°E after 2002 (Buczyński et al. 2011; Samol'g 2002). In the light of the last records about Dark Bluet in Pulawy and Jabłonów (Buczyński et al. 2011), the record in Masovia shows that there are more sites outside

the presumed range of the occurrence and the lack of data is the result of not only the rarity of the occurrence itself but also the lack of directed searches. The sites 1–2 probably dry out in the periods of low level of ground waters. The records of this species in such water bodies shows its high mobility and ability to fast colonize of new habitats." (Author)] Address: Mikolajczuk, P., ul. Partyzantów 59c/26, 21-560 Międzyrzec Podlaski, Poland. E-mail: gugapm@wp.pl

**23194.** Prunier, F.; González, G.; Moreno, J.F.; Ripoll, J.; Nilsson, V.; Nieto, I.; Salamanca, J.C. (2012): Resúmen anual Rola 2011. Boletín Rola - Boletín de la Red de Observadores de Libélulas en Andalucía 1: 30-50. (in Spanish, with English summary) ["The results of the "ROLA en río" protocol corresponding to the year 2011 and other additional data from Andalusia are summarized. This annual report is the core of the journal and its main justification. We urge dragonflies' enthusiasts to share their observations and have them published. Currently every data is of interest, independently of the rarity of the specie or the date of observation, since it is better to include all the raw data to avoid bias." (Authors)] Address: aeaebosqueanimado.info@gmail.com

**23195.** ROLA. (2012): Red de observadores de libélulas de andalucía (ROLA). Boletín Rola - Boletín de la Red de Observadores de Libélulas en Andalucía 1: 6-20. (in Spanish, with English summary) [A methodology to record dragonflies' data for the 'Red de Observadores de Libélulas en Andalucía' (ROLA) recording scheme is presented.] Address: aeaebosqueanimado.info@gmail.com

**23196.** Roland, H.J. (2012): Libellen, Profiteure der Naturschutzarbeit im Wetteraukreis. Naturschutzbericht 2010/2011 für den Wetteraukreis: 5-8. (in German) ["Of the 81 species found in Germany and 65 in Hesse, 51 species live in the Wetterau district. Between 1960 and 1989, there were a total of 36 species, of which *Sympetrum pedemontanum* is the only species that has not been found since 1990. Without the creation of numerous small bodies of water in recent years, the creation of three large lakes and the improved water quality in the rivers, the southern species spreading due to global warming would not have found a suitable habitat in the Wetterau. Rare species that were already native to the Wetterau district before 1990 have also been able to spread." (Author/Google translate)] Address: [https://wetteraukreis.de/fileadmin/2\\_Service/natur\\_landschaft/Naturschutzbericht\\_2010\\_2011.pdf](https://wetteraukreis.de/fileadmin/2_Service/natur_landschaft/Naturschutzbericht_2010_2011.pdf)

## 2013

**23197.** Bouwman, J. (2013): Recensies: The dragonflies of Eastern Europe and Caucasus: an illustrated guide. V.E. Skvortsov, 2010. *Brachytron* 15(2): 142. (in Dutch) ["This field guide covers the European part of the former Soviet Union (except western Kazakhstan) and the Caucasus. With the guide, all species within the area can be named, both the adults and the larvae. This makes it a unique book that quickly aroused my interest. However, the first look is somewhat disappointing. In recent years we have been inundated with fancy books full of color photos. If not this book, this is pure Russian austerity. The only color in the book is found on the front cover. For the rest, there is no photo and all drawings are in black and white. Fortunately, the content is better cared for than the packaging. Actually it is not a field guide but a key of identification. All species within the area can be identified. Almost all species are also included in the larval key. Some species of which not enough is known and therefore cannot be named with certainty (such as *Coenagrion australocaspicum*)

have not been included. It is an enormous added value that species from the north such as *C. johansonii* can be named in the same book as a southern species such as *C. ornatum* and for us exotic species such as *C. ecomutum*. After the key, there is a short description per species with ecological facts and the identification characteristics. The data on the ecology is very thin; unfortunately little is known about habitat choice and lifestyle of a large number of species within this region. However, the identification characteristics and possible confusion with similar species are discussed in detail. The book closes with distribution maps per species. It is striking how few observations there are from the area. Even for general species such as *Enallagma cyathigerum* it is not possible to give a reliable picture and the probable distribution is shown (in addition to the dots). A pity is the lack of *C. glacial* in the book. In 2009, a very spectacular relict population was found in the north of European Russia (Bernard & Daraz, 2010) and would therefore certainly deserve a place in the book. The *Aeshna serrata* and *C. hylas* found at the same location are also missing as a dot on the maps. Although the book is not very sparkling, it provides a lot of nice information. The cards invite you to comb the region, but where do you start? In the south with *Calliaeshna microstigma*, *Lindenia tetraphylla* and *Onychogomphus assimilis* or in the central part with *C. johansonii*, *Nehalennia speciosa* and *C. armatum*? With this book you have at least enough to name the species. Personally, I think € 59 is a bit expensive for a book without photos, but if you visit the region I would definitely buy it." This book was initiated and financed by the International Dragonfly Fund e.V.. Probably, it is out of print, but may be downloaded using the following link: [https://www.phantastike.com/biology/strekozy\\_vostочноy\\_evropy\\_i\\_ka-vkaza/pdf/](https://www.phantastike.com/biology/strekozy_vostочноy_evropy_i_ka-vkaza/pdf/)

**23198.** Grand, D. (2013): Les Libellules de la plaine alluviale du Rhône, en particuliers, en amont de Lyon (départements de l'Ain et du Rhône). *Sympetrum* 16: 5-16. (in French) ["Northeast of Lyon, the island of Miribel-Jonage is located in the wide alluvial valley of the Rhône. Over the past 200 years, the site has suffered considerable damage which has transformed its landscape. The 35 species cited at the beginning of the 20th century have become 51 species today. This clear strengthening of the odonatofauna of the site is to be correlated with the creation of bodies of water bathing in the alluvial water table which have been colonized by regional species, and global warming which has favored the arrival of certain southern species. Finally, numerous exchanges of fauna occur between Miribel-Jonage and neighboring wetlands such as Dombes, the Grand Gravier and Chaumes lônes, the Charvas marsh, the Rhône in Lyon 6th and downstream of the city." (Author/Google translate)] Address: Author deceased

**23199.** Install, C. (2013): An overview of the management requirements of the Southern Damselfly (*Coenagrion mercuriale* - Charpentier) with recommendations and suggested methodology for habitat improvement within and near to the Preseli SAC. British Dragonfly Society. Original March 2012 – last revision 24.09.12; 04.12.13: 37 pp. (in English) [<https://british-dragonflies.org.uk/sites/british-dragonflies.org.uk/files/images/Management%20Requirements%20of%20the%20Southern%20Damselfly%20in%20the%20Preselis%20-%20FINAL%2004.12.13.pdf>]

**23200.** Klymko, J.; Robinson, S.L. (2013): *Neurocordulia michaeli* (Broad-tailed Shadowdragon), a new genus and species for Nova Scotia. *Argia* 25(4): 8-9. (in English) [West River St. Marys and the St. Marys River below the confluence

of the West River St. Marys and the East River St. Marys (45.2557°N, 62.0635°W at confluence, St. Mary's Municipality, Guys-borough County). On 8 June 2012, exuviae were found and three male and three female adult *N. micbaeli* were collected (specimens to be deposited at NBM and CNCI). The adults were found foraging over the head of a riffle, and several were observed taking Plecoptera (stoneflies).] Address: Klymko, J., Atlantic Canada Conservation Data Centre, RO. Box 6416, New Brunswick, Canada, E4L 1G6. Email: jldymko@mta.ca

**23201.** Wasscher, M. (2013): Recensies: Fotogids Larvenhuidjes van Libellen. C. Brochard, D. Groenendijk, E. van der Ploeg & T. Termaat, 2012. KNNV-uitgeverij, Zeist. 320 pagina's. ISBN 9789050114097. Prijs €49,95. *Brachytron* 15(2): 140-141. (in Dutch) [review] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

#### 2014

**23202.** Baeta, R. (2014): Animation de la déclinaison régionale du Plan National d'Actions en faveur des Odonates en Région Centre. Rapport d'activités 2013. Association Naturaliste d'Etude et de Protection des Ecosystèmes Caudalis – Direction Régionale de l'Environnement, de l'Aménagement et du Logement Centre, Janvier 2014: 24 pp. (in French) [[http://www.anepe-caudalis.fr/wa\\_files/Rapport\\_Animation-PRAO\\_2013.pdf](http://www.anepe-caudalis.fr/wa_files/Rapport_Animation-PRAO_2013.pdf)] Address: Baeta, R., Animateur du Plan régional d'actions en faveur des Odonates en Centre-Val de Loire, association naturaliste d'étude et de protection des écosystèmes "Caudalis", 1 rue de la Mairie 37520 La Riche - Courriel, France. E-mail: renaud.baeta@anepe-caudalis.fr

**23203.** Kazenas, V.L.; Malikova, E.I.; Borisov, S.N. (2014): [Animals of Kazakhstan in photos. Dragonflies (type Arthropods, class Insects)]. Achmaty: 175 pp. (in Russian) ["The book tells about one of the most ancient and biologically interesting orders of insects - dragonflies. These insects are characterized by a peculiar aquatic and terrestrial development. The larvae live in water, while the adults live on land and have mastered the air environment, becoming excellent flyers. The book is illustrated with numerous color photographs. For each insect depicted, information about the area where the photo was taken and the date of shooting are provided. The book is intended for schoolchildren - to expand their horizons - and all nature lovers. Reviewers: Doctor of Biology sciences, prof. I.D. Mityaev Doctor of Biology Sciences K. A. Dzhankmen" (Google translate) This very interesting paper presents a lot of specimens not fully matured, or species rarely figured as *Sympetma gobica*.] Address: [https://zool.kz/wp-content/uploads/2020/04/kazenas2014\\_strekozy\\_kz.pdf](https://zool.kz/wp-content/uploads/2020/04/kazenas2014_strekozy_kz.pdf)

**23204.** Tait, N. (2014): Whitley Awards 2013. *Australian Zoologist* 36(4) (2013): 478-479. (in English) [Verbatim: A Field Guide to the Damselflies of New Guinea by Vincent Kalkman and Albert Orr: published in *Brachytron*, the Journal of the Dutch Dragonfly Society Vol 16 Supplement June 2013. A Field Guide to the Damselflies New is the very first entry to the Whitley Awards on the fauna of New Guinea. It is even more remarkable that it was judged a joint winner of the Whitley Medal for its authors Vincent Kalkman from the Naturalis Biodiversity Centre, Leiden The Netherlands and Albert Orr from Griffith University, Brisbane» The extraordinary clarity of the text by the authors is matched by the taxonomically detailed and yet exquisitely beautiful illustrations by Albert Orr.

**23205.** Noel Tait, On behalf of the Whitley Awards Committee. For the complete paper see: <https://meridian.allenpress.com/australian-zoologist/article/36/4/478/135064/Whitley-Awards-2013>. A special thanks to A.G. Orr who outlines the impact of IDF members on making possible this fine book.] Address: <https://meridian.allenpress.com/australian-zoologist/article/36/4/478/135064/Whitley-Awards-2013>.

#### 2016

**23206.** Bernal Sanchez, A. (2016): Distribución actual de *Paragomphus genei* (Selys, 1841) (Odonata: Gomphidae) en la provincia de Cádiz y pautas para la localización y reconocimiento de sus larvas en los últimos estadios. *Rev. Soc. Gad. Hist. Nat.* 11: 7-12. (in Spanish, with English summary) ["New records of the distribution of *Paragomphus genei* (Selys, 1841) in the province of Cadiz are given between 2011 and 2016. Information about the behaviour and habitat selection of larvae, as well as data that allow their location in natural habitats is provided. Finally, morphologically they described briefly the four last larval instars for this species." (Author)] Address: E-mail: [arturo.libelula@gmail.com](mailto:arturo.libelula@gmail.com)

**23207.** Duong, M.T. (2016): Response of adult dragonflies to prey of different size and colour in the context of anti-predator defences. M.Sc thesis, Biology, Carleton University, Ottawa, Ontario: VII + 62 pp. (in English) ["Warning coloration is used by many prey species to advertise their unpalatability to potential predators and the evolution of such signals is strongly influenced by predator behaviour. I begin by reviewing the past literature on the potential role of invertebrates in shaping the evolution of warning signals in aposematism and mimicry. I then describe an investigation of the behaviour adult dragonflies in response to artificial prey of varying shape and colour, to determine the role of these traits in influencing foraging decisions. In two experiments, dragonfly species and sex, and prey size, influenced prey selection. However, neither prey colour, nor its interaction with prey size, affected the rate of attack of dragonflies. Through a feeding experiment, I also found that dragonflies preferred to feed on insects with softer exoskeletons. The implications of these findings for the evolution of warning signals and mimicry in small aerial insects are discussed." (Author)] Address: <https://repository.library.carleton.ca/downloads/z603-qz24s>

**23208.** Gaurav, S. (2016): Investigation of fluid flow and aerodynamic performance of a corrugated dragonfly wing section: A review. *International Journal of Research in Aeronautical and Mechanical Engineering* 4(12): 1-9. (in English) ["This review paper describes the aerodynamic performance of dragonfly wing during flapping flight and gliding flight for micro air vehicle. Scientist have been intrigued by them and have carried out research for biomimetic application. Relative to the large number of works on its flight aerodynamics, few researchers have focused on the insect wing structure and its aerodynamics performance. Dragonfly demonstrate unique and superior flight performance than most of the other insect species. They are equipped with two pairs of independently controlled wings. The high level of dexterity in wing motion of the dragonfly allows it to hover, fly fast forward make turn rapidly, fly sideways and even glide. This review paper explain the past worked related to aerodynamic performance, mechanical properties and morphology of dragonfly." (Author)] Address: Gaurav, S., Department of Mechanical Engineering, Meerut Institute of Technology, Meerut, India

**23209.** Patel, R.K.; Ghetiya, L.V. (2016): Photographic Catalogue of odonates in south Gujarat. *Advances in Life Sciences* 5(21): 9982-9996. (in English) ["A study on biodiversity of odonates in south Gujarat, India was carried out in south Gujarat by the Department of Entomology, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India. ... Total 37 species of odonates ... were recorded from different localities of south Gujarat. ... along with photographic catalogue prepared with the help of digital camera. Out of total record, 20 species were reported for first time from south Gujarat. However, *Rhodothemis rufa*, *Tramea limbata*, *Zyxomma petiolatum* and *Gynacantha dravida* were reported for the first time from Gujarat state." (Authors)] Address: Patel, R.K., Dept of Agricultural Entomology, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India. E-mail: patelrk1692@gmail.com

## 2017

**23210.** Carvajalino Fernandez, J.M.; Tavares de Oliveira, M.Z. (2017): Predation and schooling influence on the primary response of individuals of *Rhinella ornata* (Spix, 1824) (Anura: Bunonidae): An experimental assessment of habitat selection. *South American Journal of Herpetology* 12(1): 57-60. (in English, with Portuguese summary) ["A limiting factor in habitat selection is the presence of predators in the environment. Schooling behaviour is one of the strategies that allows organisms to become established in specific habitats, even when predators are present. Although numerous reports about schooling behaviour in tadpoles of Bufonidae exist, few experimental results on the subject are available. We conducted an experiment to study anti-predatory schooling behaviour in tadpoles of *Rhinella ornata*. A subject (only one tadpole per experiment) got to choose among treatments with other tadpoles (promoting grouping), places with only water, places with dead tadpoles and dead dragonflies larvae chemical cues (simulating predators), and a mixture of all treatments. We found that individual tadpoles of *R. ornata* detected the chemical cues and tended to flee. The initial preference of escaping to places without aggregations of other tadpoles has not been reported for Bufonidae. Our results do not rule out schooling in *R. ornata*, but highlight the occurrence of an initial behaviour under stressful predatory contexts." (Authors)] Address: Carvajalino Fernandez, J.M., Programa de Pós-Graduação em Ciências (Fisiologia Geral), Departamento de Fisiologia, Instituto de Biociências, Universidade de São Paulo. CEP 05508-090, São Paulo, SP, Brazil. Email: juanmacarvajalino3@gmail.com

**23211.** Chiththaka, C.D.B.I.M. (2017): Evaluation of the bactericidal activity of natural nano topography to control surface contamination. PhD thesis, Queensland University of Technology: 287 pp. (in English) ["Bacterial infection is major challenge in surgery and medicine. This research proposed a new approach to the elimination and control of bacteria without applying chemicals, based on the understanding of how the dragonfly keeps its wings clean and bacteria-free. Cell culture, Helium ion microscopy, atomic force microscopy, and other advanced microscopy techniques were employed to characterize the wings' nano-structures and obtain insight into the unconventional bactericidal mechanisms in nature. It is proposed that these nanostructures could be copied onto the surfaces of implants and prosthetics for protection against bacterial infection in medical and surgical applications without impairing their conventional functions." (Author)] Address: [https://web.archive.org/web/20190427152920/https://eprints.qut.edu.au/106746/1/Chiththaka%20Chaturanga%20Devapriya%20Bandara\\_Iimihami%20Mudiyanselage\\_Thesis.pdf](https://web.archive.org/web/20190427152920/https://eprints.qut.edu.au/106746/1/Chiththaka%20Chaturanga%20Devapriya%20Bandara_Iimihami%20Mudiyanselage_Thesis.pdf)

**23212.** Dantas, T.A.V. (2017): Diversidade de libélulas (Odonata: Libellulidae) em sistemas lênticos do Brejo Paraibano area. Universidade Federal da Paraíba, UFPB, Centro de ciências agrárias, Department: Ciências Biológicas: 38 pp. (in Portuguese, with English summary) ["... the objective of this research was to characterize the diversity of dragonflies in springs present in Campus II of the Federal University of Paraíba (UFPB). The capture of the insects was carried out in four freshwater lakes with the aid of aerial insect nets, through random walks on the lakes' banks. Sampling was carried out biweekly from September 2015 to June 2016, covering two seasonal periods (rain and drought), between the hours of nine in the morning and five in the afternoon. The diversity of insects was calculated through the application of faunal indexes and population fluctuation. The individuals captured ... comprising a total of 12 genera. In view of this, it is concluded that the UFPB Campus II sources present a relevant diversity of insects of the family Libellulidae, which contributes to the knowledge of Odonata fauna for the region." (Author) Taxa are treated at genus level.] Address: <https://repositorio.ufpb.br/jspui/bitstream/123456789/2290/1/TAVD07-082017.pdf>

**23213.** Gillespie, C. (2017): Behavioral and Survival Responses of Dragonflies to Drying Cues in Temporary Ponds: Implications for Effects of Climate Change. Senior Thesis, Department of Environmental Science, Allegheny College, Meadville, Pennsylvania: 21 pp. (in English) ["Aquatic organisms living in temporary habitats are especially vulnerable to climate change as increasing global temperatures lead to earlier spring melts and summer drying. Temporary-habitat specialists that rely on pond hydroperiods to complete their life cycles must adapt to these seasonal shifts to survive. The purpose of this study was to examine how drying and crowding affect aggression and cannibalism in the predatory dragonfly *Anax junius*. I conducted a microcosm experiment in which I manipulated water level and tank size to determine if the threat of drying and/or crowding, respectively, increased the frequency of cannibalism among *A. junius* larvae. I hypothesized that 1) combative interactions and cannibalism would increase with crowding as microcosm size decreases under both permanent and temporary conditions, 2) the most aggression and cannibalism would occur in the smallest microcosms due to higher encounter rates, and 3) the lowest levels of aggression and cannibalism would be observed in the largest microcosms as a result of lower encounter rates. I found that hydroperiod, pool size, and larval size all had a significant effect on dragonfly survivorship, but these factors had no significant impacts on behavior. Cannibalism on small larvae by large conspecifics increased with the acceleration of drying conditions across all microcosm sizes. These findings provide evidence that climate warming could cause changes in population interactions and size structures, potentially leading to gaps in age cohorts. As top predators, fluctuations in dragonfly populations could have cascading top-down and bottom-up effects on community structure." (Author) See also: Gillespie, C.M.; Mumme, R.L.; Wissinger, S.A. (2020): Pond drying cues promote cannibalism in larval *Anax junius* dragonflies. *Freshwater Science* 39(3): 576-583.] Address: Gillespie, Catherine, Departments of Biology and Environmental Science, Allegheny College, 520 North Main Street, Meadville, Pennsylvania 16335 USA. Email [catherinengillespiem@gmail.com](mailto:catherinengillespiem@gmail.com)

**23214.** Makino, A. (2017): Mortonagrion hirosei and *Lestes japonicus* after the 2011 Tohoku Earthquake in Miyagi Prefecture, Japan. *Tombo* 59: 11-15. (in Japanese, with English summary) ["The inhabitation status of *Mortonagrion hirosei*



and *Lestes japonicus* after the 2011 Tohoku Earthquake in Miyagi Prefecture is reported. Unless both species are urgently protected, they will become extinct. Whereas the big tsunami causes the verge of extinction for *M. hirosei*, the reconstruction after the big disaster is the main cause for that of *L. japonicus*." (Author)] Address: not stated in English

**23215.** Nagel, P.-B. (2017): Diskussionsbeitrag: Populations-erhaltende Maßnahmen im artenschutzrechtlichen Ausnahmeverfahren. ANLiegen Natur 39(1): 79-81. (in German) ["If, for example, an infrastructure project complies with species protection law, the project can only be approved by way of an exception under Section 45 Paragraph 7 of the Federal Nature Conservation Act. One of the things to be checked is whether the conservation status of the populations of a species is not deteriorating. In practice, it is difficult to make a statement on this. The approach discussed here offers approaches for a simplified examination of this question." (Author/Google translate) The publication is illustrated using a photograph of *Ophiogomphus cecilia*. Address: Nagel, P.-B., Bayerische Akademie für Naturschutz und Landschaftspflege (ANL), Seethalerstr. 6, 83410 Laufen, Germany. Email: paul-bastian.nagel@anl.bayern.de

**23216.** Neptune, T.C.; Bouchard, S.S. (2017): Nutritional plasticity In Gray Treefrogs: Interactions Between Competition And Predation Threat. Honors Thesis Projects. 49. <http://digitalcommons.otterbein.edu/stuhonor/49>; Otterbein University, Department of Biology and Earth Science, Westerville, OH 43081, USA: 37 pp. (in English) ["Anurans utilize digestive tradeoffs to best survive in their environment, often in response to competition and predation pressure. In some larval anurans, intraspecific competition induces longer guts, providing a digestive advantage under limiting resources. However, predation threat can induce deeper tails and associated shorter guts in larvae. The purpose of this study was to describe nutritionally plastic responses of larval eastern gray treefrogs, *Hyla versicolor*, reared with simultaneous environmental stressors: predation and competition. Specifically, we asked if larval guts lengthen to increase digestive efficiency or will tail morphology change to better evade predators? *H. versicolor* larvae were reared in 410 L mesocosms with and without a caged dragonfly nymph (*Anax* sp.) predator. *Anax* sp. predators were fed five *H. versicolor* hatchlings daily to generate kairomones (chemical cues) in the larval environment. Larvae were maintained at 10 individuals and 60 individuals per tank to provide varying levels of competition. Larvae reared at high-density developed longer guts than those reared at low density. Predation threat did not influence gut length. Predation did induce smaller livers and deeper tails in larvae, but did not hinder growth. These differences suggest that larvae have lower fat stores when they grow larger tails, or they could also forage less in the presence of a predator. These effects in the larval stage may have important consequences post-metamorphosis and should be a focus of future research." (Authors)] Address: [https://digitalcommons.otterbein.edu/cgi/viewcontent.cgi?article=1047&context=stu\\_honor](https://digitalcommons.otterbein.edu/cgi/viewcontent.cgi?article=1047&context=stu_honor)

**23217.** Pinto, A.P. (2017): Taxonomia, evolução morfológica, molecular e espacial de libélulas neotropicais (Insecta: Odonata): identificando padrões e inferindo processos. Universidade Federal do Paraná, Setor de Ciências Biológicas, Departamento de Zoologia, Laboratório de Sistemática de Insetos Aquáticos (LABIA). Projeto de pesquisa apresentado ao Departamento de Zoologia da UFPR para fins de cadastro das atividades de pesquisa coordenadas pelo docente conforme exigência do regime de trabalho de 40h

com Dedicção Exclusiva (DE) especificada na Resolução CEPE Nº 34/12. Curitiba: 16 pp. (in Portuguese, with English summary) ["Odonata is one of the oldest lineages of Pterygota, it comprises the insects commonly known as dragonflies. They are important predators in aquatic environments. Comparatively is a small group with about 6000 species, divided into three suborders of which Anisoptera is the greatest in diversity. Although the Odonata fauna of Latin America stands out with one of the more species-rich, it is also one of the least known. Brazilian dragonfly fauna is the higher in number of species in the entire biosphere, with 860 species in 14 families. Due to the Biodiversity Crisis, coupled with the phenomenon known as Impediment Taxonomic, faunal studies has been highlighted in recent years and currently occupy a central role in the biological sciences. The present work plan is inserted in this context and aims to promote the projects under supervision of the teacher research group, which aim understand and characterize all diversity of Odonata in the Neotropical region and thus promote the consolidation of a knowledge network with the training of human resources that help in the elaboration of mitigating actions the inherent loss of biodiversity. The present project has some of its main short and long term objectives, as follows: (1) to inventory and characterize the fauna of insects of the order Odonata (dragonflies) of the Atlantic Forest domain, as well as to carry out integrative taxonomic analyzes of selected endemic groups and thus to foment several subprojects, some of which are currently in elaboration by the project team; (2) to present taxonomic revisions of at least seven genera of the families Heteragrionidae, Aeshnidae, Corduliidae s.l. and Libellulidae; (3) Identify biotic components (areas of endemism) for Latin American species and correlate existing regionalizations (areas of endemism) and discuss their possible causal processes in relation to major historical events; (4) perform integrative phylogenetic analyzes with different data sources including morphological and molecular data." (Author)] Address: [https://www.iat.pr.gov.br/sites/agua-terra/arquivos\\_restritos/files\\_documento/2020-11/projet\\_04\\_18\\_appinto.pdf](https://www.iat.pr.gov.br/sites/agua-terra/arquivos_restritos/files_documento/2020-11/projet_04_18_appinto.pdf)

**23218.** Quante, U. (2017): Blinder Passagier! Mitteilungen Nr. 3 der AG Libellen in Niedersachsen und Bremen: 30. (in German) [Niedersachsen, Germany. *Ischnura elegans* is sitting on the abdomen of *Anax imperator*.] Address: [https://www.ag-libellen-nds-hb.de/wp-content/uploads/2017/02/mitteilungen\\_nr3\\_ag\\_libellen.pdf](https://www.ag-libellen-nds-hb.de/wp-content/uploads/2017/02/mitteilungen_nr3_ag_libellen.pdf)

**23219.** Truong, V.K.; Geeganagamage, N.M.; Baulin, V.A.; Vongsvivut, J.; Tobin, M.J.; Luque, P.; Crawford, R.J.; Ivanova, E.P. (2017): The susceptibility of *Staphylococcus aureus* CIP 65.8 and *Pseudomonas aeruginosa* ATCC 9721 cells to the bactericidal action of nanostructured *Calopteryx haemorrhoidalis* damselfly wing surfaces. *Applied Microbiology and Biotechnology* 101: 4683-4690. (in English) ["Nanostructured insect wing surfaces have been reported to possess the ability to resist bacterial colonization through the mechanical rupture of bacterial cells coming into contact with the surface. In this work, the susceptibility of physiologically young, mature and old *Staphylococcus aureus* CIP 65.8 and *Pseudomonas aeruginosa* ATCC 9721 bacterial cells, to the action of the bactericidal nano-pattern of damselfly *Calopteryx haemorrhoidalis* wing surfaces, was investigated. The results were obtained using several surface characterization techniques including optical profilometry, scanning electron microscopy, synchrotron-sourced Fourier transform infrared microspectroscopy, water contact angle measurements and antibacterial assays. The data indicated that the attachment propensity of physiologically young *S.*

aureus CIP 65.8T and mature *P. aeruginosa* ATCC 9721 bacterial cells was greater than that of the cells at other stages of growth. Both the *S. aureus* CIP 65.8T and *P. aeruginosa* ATCC 9721 cells, grown at the early (1 h) and late stationary phase (24 h), were found to be most susceptible to the action of the wings, with up to 89.7 and 61.3% as well as 97.9 and 97.1% dead cells resulting from contact with the wing surface, respectively. (Authors)] Address: Truong, V.K., School of Science, Faculty of Science, Engineering & Technology, Swinburne University of Technology, Hawthorn, Australia

**23220.** von Blanckenhagen, B. (2017): Landesmonitoring 2016 zur Erfassung der Großen Moosjungfer (*Leucorrhinia pectoralis*, Art der Anhänge II und IV der FFH-Richtlinie) in Hessen. Büro für ökologische Gutachten, Marburg. Im Auftrag des Landes Hessen vertreten durch das Hessische Landesamt für Naturschutz, Umwelt und Geologie überarbeitete Fassung, Stand: Februar 2017: 39 pp. (in German) ["As part of the FFH state monitoring, the current occurrence of *Leucorrhinia pectoralis* in Hesse (Germany) was recorded. The focus was on checking the nativeness and monitoring bodies of water with initial evidence from 2012, after the first reproductive success was recorded in 2014. 131 exuviae were detected in the examination of 25 bodies of water across the country. This represents a significant decrease compared to the previous peak in the dragonfly population in 2014. The number of bodies of water with successful reproduction also decreased from 19 to 12. However, exuviae were still detected in the Reinhardswald, Lahnberge, Söhre and Stöckig-Ruppershöhe nature reserve areas, so that *L. pectoralis* is still native there. The population in the Mönchbruch area (including heathland) in southern Hesse is particularly noteworthy, as it also produced lower hatching numbers but still has a good population level. The water bodies MB4 and MB6 are currently of outstanding importance for Hesse. Using the nationwide assessment framework, seven occurrences achieve a good (B) and five a poor value (C) of the population parameter; two water bodies achieve conservation status A, ten conservation status B. A prerequisite for the conservation of *L. pectoralis* in Hesse is the implementation of conservation measures at selected water bodies and the improvement of the habitat offer. The threat situation is assessed as critical due to the small population size of most occurrences and the sensitivity to adverse habitat changes." (Author/Google translate)] Address: von Blanckenhagen, B., Kaffweg 8, 35039 Marburg, Germany. Email: oekologische-gutachten-bvb@gmx.de

**23221.** Willigalla, C. (2017): Bundesstichprobenmonitoring 2016 zur Erfassung der Libellenart *Gomphus flavipes* (Art des Anhangs IV der FFH-Richtlinie) in Hessen. Im Auftrag: Hessisches Landesamt für Naturschutz, Umwelt und Geologie, Abteilung Naturschutz, Europastr. 10, 35394 Gießen: 11 pp. (in German) ["As part of the implementation of the FFH monitoring in Hesse, five monitoring areas were assessed in 2016 in accordance with the requirements of the nationwide sampling procedure. In 2016, only the population size was recorded; information on habitat quality and impairments was taken from the previous year's report. Over 50 exuviae were found at one sampling site, between 17 and 35 at three sites and, as in 2015, none at one sampling site. Based on the results, the conservation status of the species at the Langenau monitoring site must now be rated "B" good, the other ratings remain the same. The species now has a medium to poor conservation status at three sampling sites and a good conservation status at two sampling sites." (Author/Google translate)] Address: Willigalla, C., Am Großen Sand 22, 55124 Mainz, Germany. Email: www.willigalla.de

**23222.** Baeta, R.; Bard, D.; Chantereau, M.; Fritsch, B., Herbrecht, F.; Hudin, S.; Itrac-Bruneau, R.; Multeau, D.; Paillat, R.; Rambourdin, M.; Ruffoni, A.; Sansault, E. (2018): Protocole de suivi diachronique des populations ligériennes de *Gomphus flavipes* et d'*Ophiogomphus cecilia*. Groupe de travail sur les populations ligériennes de Gomphidae: 6 pp. +annexes- (in French) [[https://odonates.pnaopie.fr/wp-content/uploads/2015/02/GomphesdeLoire\\_Protocole\\_avril20-15.pdf](https://odonates.pnaopie.fr/wp-content/uploads/2015/02/GomphesdeLoire_Protocole_avril20-15.pdf)] Address: Baeta, R., Animateur du Plan régional d'actions en faveur des Odonates en Centre-Val de Loire, association naturaliste d'étude et de protection des écosystèmes "Caudalis", 1 rue de la Mairie 37520 La Riche - Courriel, France. E-mail: renaud.baeta@anepe-caudalis.fr

## 2018

**23223.** Palacino-Rodríguez, F.; Palacino, D.A.; Rache-Rodríguez, L.; Cordero-Rivera, A.; Penagos, A.C.; Lamelas-López, L. (2018): Larval development and behavior of *Rhionaeschna marchali* Rambur (Anisoptera: Aeshnidae) under captivity conditions. *International Journal of Odonatology* 21(1): 55-70. (in English) ["Very little is known about the biology of larval odonates from the Neotropical region, and in particular there are no data on behavioral changes during ontogeny and growth ratios, though both are crucial to understanding the dynamics of Odonata communities. Here we study growth ratio, development patterns and behavior of *Rhionaeschna marchali* larvae. We characterized larval instars using morphometric variables and describe their general behavior. Larvae were obtained from eggs laid by two females in the laboratory. They were maintained in individual containers until their emergence or death. Larvae hatched between 26 and 30 days after laying, and total development time was 340.5 (±5.9) days, with 15 instars. Growth ratios between successive instars averaged 1.12 for head width, 1.25 for head length, 1.20 for antenna length, 1.76 for forewing-pad length, 1.74 for hind wing-pad length, 1.19 for metafemur length and 1.22 for total length. *R. marchali* larvae spent most time "resting" and "grooming". As size increased, larvae became more active and time "resting" decreased. The behavior "upwards abdomen bend" showed a decreasing trend with size, while "body bend downwards" became more common with increasing size. The high altitude (2600 m) of the region acts as a limiting factor for growth, and therefore this species completes one generation per year, similar to many temperate species." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Biología (GRIB), Depto de Biología, Univ. El Bosque, Bogotá, Colombia. Email: odonata17@hotmail.com

**23224.** Richards, S.; Toko, P.; Theischinger, G. (2018): Chapter 2.3. Dragonflies and damselflies (Odonata) of the Uro Creek catchment, Gulf Province, Papua New Guinea. In: Richards, S.J. (Editor) 2018. Rapid biological assessments of Wau Creek, Uro Creek and Lake Kutubu: documenting biodiversity values to promote forest conservation in the Kikori River basin, Papua New Guinea. ExxonMobil PNG Limited. Port Moresby: 192-201. (in English) ["We report the results of a survey of dragonflies and damselflies at Uro Creek in Gulf Province, Papua New Guinea (PNG). 25 species of odonates were encountered in five days, including 10 species of Zygoptera and 15 species of Anisoptera. Three species, including one in the argiolestid genus *Metagrion*, one in the coenagrionid genus *Pseudagrion* and one in the platycnemidid genus *Idiocnemis*, are undescribed. These species were previously known from several other sites in Gulf Province but remain unnamed. All are associated with clear-flowing streams in forest. Although less diverse than the odonate community at Wau Creek, the Uro Creek area

provides important habitat for a moderately diverse and poorly known fauna that includes several undescribed species. Small streams isolated from the tidal influence of the main Uro Creek channel are particularly important habitats for this odonate assemblage." (Authors)] Address: [https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Rapid-biological-assessments-of-Wau-Creek,-Uro-Creek-and-Lake-Kutubu\\_FINAL.pdf](https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Rapid-biological-assessments-of-Wau-Creek,-Uro-Creek-and-Lake-Kutubu_FINAL.pdf)

**23225.** Richards, S.; Theischinger, G.; Toko, P. (2018): Chapter 1.3. Dragonflies and damselflies (Odonata) of the Wau Creek proposed Wildlife Management Area, Gulf Province, Papua New Guinea. In: S.J. Richards (ed.), Rapid biological assessments of Wau Creek, Uro Creek and Lake Kutubu: documenting biodiversity values to promote forest conservation in the Kikori River basin, Papua New Guinea. ExxonMobil PNG Limited, Port Moresby.: 71-82. (in English) ["We report the results of a survey of dragonflies and damselflies in the Wau Creek proposed Wildlife Management Area (WMA) in Gulf Province, Papua New Guinea (PNG). Forty-six species of odonates were encountered in five days, including 23 species of damselflies (Zygoptera) and 23 species of dragonflies (Anisoptera). Another six species are known from the adjacent Dark End Lumber site, bringing the total number of species from this small area to 52. Two species from Wau Creek (one in the libellulid genus *Nannophlebia* and one in the platycnemidid genus *Nososticta*) are new to science. They were discovered for the first time during this survey, are currently known only from Wau Creek, and were formally described during preparation of this report. At least two additional species (in the genera *Bironides* and *Idiocnemis*) are undescribed, but they were each previously known from other sites in south-central PNG. The *Bironides* species was also formally described during preparation of this report. All four of these species are associated with clear-flowing streams in forest. Two species in the taxonomically difficult coenagrionid genus *Teinobasis* may also be new to science but additional studies are required before this can be confirmed. Two species, the damselfly *Nososticta nigrifrons* and the dragonfly *Nannophya paulsoni* are listed as Data Deficient by the IUCN. The diversity of odonates documented around Wau Creek is among the highest reported for any site of similar size in New Guinea, and reflects the wide range of high-quality aquatic habitat types available for Odonata there." (Authors)] Address: [https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Rapid-biological-assessments-of-Wau-Creek,-Uro-Creek-and-Lake-Kutubu\\_FINAL.pdf](https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Rapid-biological-assessments-of-Wau-Creek,-Uro-Creek-and-Lake-Kutubu_FINAL.pdf)

**23226.** Richards, S.; Toko, P.; Theischinger, G. (2018): Chapter 3.3. Dragonflies and damselflies (Odonata) of the Lake Kutubu Wildlife Management Area, Southern Highlands Province, Papua New Guinea. In: Richards, S.J. (Editor) 2018. Rapid biological assessments of Wau Creek, Uro Creek and Lake Kutubu: documenting biodiversity values to promote forest conservation in the Kikori River basin, Papua New Guinea. ExxonMobil PNG Limited. Port Moresby: 296-306. (in English) ["We report the results of a survey of dragonflies and damselflies in the Lake Kutubu Wildlife Management Area (WMA) in Southern Highlands Province, Papua New Guinea (PNG). Twenty-nine species of odonates were encountered in five days, including 14 species of Zygoptera and 15 species of Anisoptera. Two species, one in the argiolestid genus *Wahnesia* and one in the platystictid genus *Drepanosticta*, are new to science. They were discovered for the first time during this survey and are currently known only from forest adjacent to Lake Kutubu. One additional species in the coenagrionid genus *Pseudagrion* is undescribed, but

was previously known from other sites in south-central PNG and was also collected at Uro Creek during the 2017 surveys. All three of these species are associated with clear-flowing streams in forest. One species, the platycnemidid *Nososticta finisterrae*, that was found along small streams near the lake is listed as Data Deficient by the IUCN. Another species of *Nososticta*, *N. conifera*, was previously known only from the type locality in the Lakekamu Basin ~390 km to the southeast. The Lake Kutubu record represents a significant range extension and only the second known locality for this poorly-known damselfly." (Authors)] Address: [https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Rapid-biological-assessments-of-Wau-Creek,-Uro-Creek-and-Lake-Kutubu\\_FINAL.pdf](https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Rapid-biological-assessments-of-Wau-Creek,-Uro-Creek-and-Lake-Kutubu_FINAL.pdf)

## 2019

**23227.** Azar, D.; Garrouste, R.; Arillo, A. (2019): André Nel sixtieth anniversary Festschrift. *Palaeoentomology* 2(6): 534-555. ["During the last "International Congress on Fossil Insects, Arthropods and Amber" held this year in the Dominican Republic, we unanimously agreed—in the International Palaeoentomological Society (IPS)—to honor our great colleagues who have given us and the science (and still) significant knowledge on the evolution of fossil insects and terrestrial arthropods over the years. Sure there have been some efforts before in this purpose, undertaken mainly by our esteemed Russian colleagues, and where several of our members in the IPS contributed in edited volumes honoring some of our great scientists. This issue is a Festschrift to celebrate the 60th birthday of Professor André Nel (from the 'Muséum national d'Histoire naturelle', Paris) and constitutes a tribute to him for his great ongoing, prolific and his manifold contributions to the palaeontology, diversity, and evolution of insects." (Authors)] Address: Azar, D, Lebanese Univ., Faculty of Sciences II, Dept of Natural Sciences, P.O. Box: 26110217, Fanar, Matn, Lebanon. Email: [danyazar@ul.edu.lb](mailto:danyazar@ul.edu.lb)

**23228.** Gathman, J.P. (2019): Do predators structure wetland macroinvertebrate assemblages? Different effects of mudminnows and dragonfly nymphs in field experiments. *Wetlands* 40: 143-152. (in English) ["Predation by small fish and invertebrates has been shown to influence wetland macroinvertebrates in various ways and to various degrees in different types of wetlands. I sought to determine whether predation could be a significant factor causing invertebrate-community variation along an elevation gradient in a Lake Huron coastal wetland. I conducted three month-long predator exclusion/inclusion field experiments in the wet-meadow portion of the wetland, where the water was shallow (20–30 cm) and hypoxic, and mudminnows and dragonfly nymphs were the most-abundant predators. Experiment results showed that mudminnows caused a significant decrease in abundance and diversity, but did not substantially alter relative proportions of different macroinvertebrate taxa. NMDS ordination confirmed this result. Meanwhile, dragonfly nymphs, even at high density, had no significant effects on macroinvertebrate abundance, diversity, or relative abundances of different taxa. These results suggest that, while fish are capable of reducing prey abundance, neither they nor dragonfly nymphs played a significant role in causing the wet-meadow macroinvertebrate assemblage to differ from others in this wetland." (Author)] Address: Gathman, J.P., Dept of Biology, Univ. of Wisconsin River Falls, River Falls, WI 54022, USA. E-mail: [joseph.gathman@uwrf.edu](mailto:joseph.gathman@uwrf.edu)

**23229.** Potabgy, G. (2019): Faunistische Erhebungen der Libellen und Heuschrecken im FFH-Gebiet „Große Aue“,

Kreis Minden-Lübbecke. Berichte Naturwiss. Verein für Bielefeld und Umgegend 56: 154-190. (in German) ["In this report, the results of the surveys of dragonflies and grasshoppers in the construction sections 1, 4 and 6 in the "Gewässerlandschaft Große Aue" near Rahden are presented and compared with an earlier survey from 2002. In 2015/2016, 33 dragonfly species were detected, of which 8 species were newly detected compared to 2002. One species could no longer be detected compared to the 2002 survey. Overall, a species-rich typical dragonfly fauna of eutrophic, mature waters with well-developed aquatic vegetation prevails in the study areas. Stillwaters that are grazed by cattle have the highest species numbers. Waterbodies with a visibly high fish population had the lowest species numbers. Except for a single male of *Gomphus vulgatissimus* at the ford in BA1 and the common *Calopteryx splendens* as well as a specimen of *C. virgo*, typical flowing water species were not detected. In 2016/2017, 14 species of grasshoppers were recorded in construction sections 1, 4 and 6. Two species were newly detected compared to 2002 and two species were no longer encountered. ... For both orders, dragonflies and grasshoppers, extensive management and development measures were discussed and proposed on the basis of value-determining criteria. The species spectrum of both orders is strongly dependent on optimal maintenance and water levels in the polder areas." (Author/DeepL)] Address: Potabgy, Gabriele, Biologische Station Minden-Lübbecke, Nordholz 5, 32425 Minden, Germany. E-mail: [www.biostation-ml.de](http://www.biostation-ml.de)

**23230.** Sommer, R.; Ziarnetzky, V.; Messlinger, U.; Zahner, V. (2019): Der Einfluss des Bibers auf die Artenvielfalt semi-aquatischer Lebensräume Sachstand und Metaanalyse für Europa und Nordamerika. *Naturschutz und Landschaftsplanung* 51(3): 108-115. (in German, with English summary) ["The influence of beaver on the biodiversity of semi-aquatic habitats – Current situation and meta-analysis for Europe and North America During recent decades scientists have found increasing evidence that the impact of beavers on semi-aquatic ecosystems has led to increasing biodiversity. Here we summarize worldwide knowledge of the impact of beavers on biodiversity and give many demonstrative examples of the effect of landscape transforming by beavers on different animal groups. We assessed data from 53 scientific studies with a comparable experimental approach, mainly from North America and Northern Europe, in a meta-analysis and focused on the effects of beavers on species richness of animals and plants, as well as on single taxonomic groups of animal species. The results show that in 83% of studies the effect of beavers led to an increasing species richness in animals and in 79% to an increasing species richness in plants at a landscape level. The data show that the transformation of wetlands by beavers effect an increasing species richness at a landscape level and induce a unique habitat heterogeneity. This offers the perspective for using the influence of beavers on wetlands as instruments for achieving the goals of the EU Water Framework Directive and for the restoration of wetlands, increasingly suggested by scientists in international scientific studies" (Authors) The paper includes two references to Odonata.] Address: Sommer, R. Email: [robert.sommer@uni-rostock.de](mailto:robert.sommer@uni-rostock.de)

**23231.** Tokárová, V.; Cerný, M.; Knejzlík, Z.; Kašpar, O.; Janská, P.; Selenica, S. (2019): Development of biomimetic surfaces with an antibacterial effect based on the structure of dragonfly wings. *Nature-Inspired Engineering*, Marc-Olivier Coppens, University College London, United Kingdom Bharat Bhushan, Ohio State University, USA Eds, ECI Symposium Series, (2019). <https://dc.engconfintl.org/natureinspired/8/>

1 p. (in English) ["Verbatim: Antibiotics, in the past so effective against wide spectra of infections, are nowadays omnipresent and their widespread availability, misuse and gradual accumulation over time in the environment is the main reason behind the sudden increase of bacterial resistance. However, it has been shown that some natural surfaces (e.g., cicada wing) possess topography which renders their surface antibacterial and resistant to bacterial colonization without any active chemical substance. The mode of action is such, that adhered bacterium is exposed to shear stress between the cell wall and surface topography (e.g., an array of nanopillars) resulting in cell deformation, wall rupture, lysis, and death. Moreover, the mechanical nature of bacteria-surface interaction virtually eliminates the risk of the sudden emergence of bacterial resistance since the whole process depends solely on surface topography and mechanical properties of the bacterial cell. In this work, we propose to examine topographies of Czech domestic insects (e.g. dragonflies, damselflies, moths), test their antibacterial properties against model Gram-positive and Gram-negative bacteria and replicate their topology using suitable techniques allowing the transfer of antibacterial topology into a larger scale. We believe that such materials have the potential to be the answer to increasing number of MDR bacteria and secondary infections.] Address: [https://dc.engconfintl.org/nature\\_inspired/8/](https://dc.engconfintl.org/nature_inspired/8/)

## 2020

**23232.** Cardoso, P.; Barton, P.S.; Birkhofer, K.; Chichorro, F.; Deacon, C.; Fartmann, T.; Fukushima, C.S.; Gaigher, R.; Habel, J.H.; Hallmann, C.A.; Hill, M.J.; Hochkirch, A.; Kwak, M.L.; Mammola, S.; Noriegam, J.A.; Orfingern, A.B.; Pedrazap, F.; Pryke, J.S.; Roque, F.O.; Settele, J.; Simaika, J.P.; Stork, N.E.; Suhling, F.; Vorster, C.; Samways, M.J. (2020): Scientists' warning to humanity on insect extinctions. *Biological Conservation* 242 (2020) 108426: 12 pp. (in English) ["Here we build on the manifesto 'World Scientists' Warning to Humanity, issued by the Alliance of World Scientists. As a group of conservation biologists deeply concerned about the decline of insect populations, we here review what we know about the drivers of insect extinctions, their consequences, and how extinctions can negatively impact humanity. We are causing insect extinctions by driving habitat loss, degradation, and fragmentation, use of polluting and harmful substances, the spread of invasive species, global climate change, direct overexploitation, and co-extinction of species dependent on other species. With insect extinctions, we lose much more than species. We lose abundance and biomass of insects, diversity across space and time with consequent homogenization, large parts of the tree of life, unique ecological functions and traits, and fundamental parts of extensive networks of biotic interactions. Such losses lead to the decline of key ecosystem services on which humanity depends. From pollination and decomposition, to being resources for new medicines, habitat quality indication and many others, insects provide essential and irreplaceable services. We appeal for urgent action to close key knowledge gaps and curb insect extinctions. An investment in research programs that generate local, regional and global strategies that counter this trend is essential. Solutions are available and implementable, but urgent action is needed now to match our intentions." (Authors) The paper includes references to Odonata.] Address: Cardoso, P., Finnish Museum of Natural History, PO17 (Pohjoinen Rautatiekatu 13), 00014, Univ. of Helsinki, Finland. E-mail: [pedro.cardoso@helsinki.fi](mailto:pedro.cardoso@helsinki.fi)

**23233.** Dalala, J.; Sharma, S.; Bhardwaja, T.; Dhatarwal, S.K.; Verma, K. (2020): Seasonal study of the decomposition pattern and insects on a submerged pig cadaver. *Journal of*

Forensic and Legal Medicine 74, 102023: 14 pp. (in English) ["Highlights: • The study was conducted on pig carcasses to study the decomposition pattern during different seasons. • The post-mortem submersion interval (PMSI) varied from 25 to 78 days, depending upon various seasons. • Five stages of decomposition were observed i.e., submerged fresh, early floating, floating decay, advanced floating decay, and sunken remains. • A total of 2385 insects were found to be associated with different decomposition stages throughout all seasons. • The PMSI was calculated by studying decomposition pattern and accumulated degree days (ADD). Abstract: Research on studying the decomposition pattern in aquatic habitat is very sparse worldwide. Due to this void, assessment of the postmortem submersion interval (PMSI) of drowned and submerged cadavers is still inaccurate and imprecise. The current work focused on studying the decomposition pattern and insects associated with submerged pig (*Sus scrofa*) carcasses during various seasons (winter, spring, summer, and rainy) for two years. The total postmortem submersion interval (PMSI) from the fresh stage till the sunken remains stage varied from 25 days for rainy season (624.5 ADD) to 78 days (1890.5 ADD) for winter season. The spring season at 44 days (1067.5 ADD) and summer season at 31 days (763.5 ADD) had moderate PMSI. During this time interval, five stages of decomposition were studied: submerged fresh, early floating, floating decay, advanced floating decay, and sunken remains. A total of 2385 insect specimens were found to be associated with different decomposition stages. The terrestrial activity during the first stage (submerged fresh) was almost nil as the carcasses were submerged. During the early floating stage (2nd stage), various terrestrial insect species visited the carcass and laid their eggs along with the presence of Chironomidae, Coenagrionidae, Lestidae, Aeshnidae were also found associated with this stage. In the floating decay (3rd stage), the insects visiting and colonizing the carcass were from Coenagrionidae, Gomphidae, Aeshnidae, Gomphidae, Libellulidae along with Chironomidae, Calliphoridae (Diptera). Species from the group of scavenging aquatic beetles (Hydrophilidae), Enochrus esuriens (Walker), Regimbartia attenuata (Fab), Helochares sp. and burrowing water beetles, Canthydrus laetabilis (Family: Noteridae) and some terrestrial species of beetles, i.e. Saprinus sp., Saprinus pensylvanicus and Necrobia rufipes (Family: Histeridae) were also present during the 3rd, 4th and 5th stages. During advanced floating decay (4th stage) and sunken remains (5th stage), many hemipteran species such as Ranatra digitata and Ranatra filiformis (Fab) along with many coleopterans were found visiting the corpse." (Authors)] Address: Sharma, S., Dept of Genetics, Maharshi Dayanand Univ., Rohtak, Haryana, India

**23234.** Gómez Vadillo, M. (2020): Mapas de distribución geográfica de Odonatos de Europa a partir de Atlas de distribución y bases de datos online. <https://digital.csic.es/handle/10261/214771>: 147 pp. (in Spanish) ["Distribution maps of European odonate species at the scale of 50 x 50 km grids, synthesized from the information available in three specialized publications, a monograph (Askew 2004), a field guide (Dijkstra & Lewington 2006), and an atlas of distribution and conservation status (Boudot & Kalkman 2015). This information was complemented with the distribution records available at the Global Biodiversity Information Facility (GBIF, URL <http://www.gbif.org/>). Maps are presented for all species, and synthesis maps with the total richness of odonates, and the species richness of Zygoptera and Anisoptera separately." (Authors/Google translate)] Address: Kalfayan, M., Dept of Environmental Protection, Faculty of Civil & Environmental Engineering, Warsaw Univ. of Life Sciences, Warsaw, Poland. E-mail: mathias.kalfayan@netc.eu

**23235.** Michalczyk, M.; Buczynski, P.; Buczynska, E.; Czechowski, P.; Cymbala, R.; Dlugosz, I.; Domagala, M.; Dumanski, J.; Galan, M.; et al. (2020): Vagrant Emperor Anax ephippiger (BURMEISTER, 1839) (Odonata: Aeshnidae) in Poland: the unprecedented influx of 2019. *Odonatrix* 1610 (2020): 24 pp. ["In 2019, there was a very large, unprecedented influx of *A. ephippiger* into Poland, where it was recorded at 61 localities. Together with unpublished records from two localities in 2009 and one in 2015, this makes a total of 64, which is more than three times as many as were recorded previously in this country. The data from 2019 is analysed in detail in the context of the species' habitat preferences, behaviour and biology. The results of this analysis are compared with older data." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**23236.** Pail, V. (2020): Wildschweinsuhlen als Habitat für Libellen im Lainzer Tiergarten. MSc thesis, Naturschutz und Biodiversitätsmanagement, Universität Wien: 59 pp. (in German, with English summary) ["In literature, wild boar wallows are mentioned as a possible reproductive habitat of *Libellula depressa* and *L. quadrimaculata*. For other pioneer species, such as *Orthetrum brunneum*, no information is available. This study evaluates the role of wild boar wallows as a habitat for dragonflies and determines the species diversity in this habitat, which is strongly influenced by the disturbance by wild boars (*Sus scrofa*). At five study sites in the Lainzer Tiergarten (Vienna, Austria), surveys were carried out from March to October 2018 and a total of seven autochthonous species were detected: *L. depressa*, *L. quadrimaculata*, *O. brunneum*, *O. coerulescens*, *Aeshna cyanea*, *A. mixta* and *Sympetrum striolatum*. In order to distinguish the sites with respect to their wild boar impact (low or high wild boar impact), an index was developed. The sites Aumüllerwiese and Schattenwiese belong to the group with low wild boar impact, Hochwiese, Scheibenwiese and Große Auhofer Stockwiese belong to the group with high wild boar impact. There were differences in species composition between the two groups, probably due to the changes in vegetation in and around the wallow-ponds caused by the activity of wild boars and the different sensitivity of dragonfly larvae to disturbance. Furthermore, the predator-prey relationship between larvae of *L. depressa* and tadpoles of *Bombina variegata* was investigated. Exuviae, large larvae of *L. depressa* (larval stages F3 – F0 according to ROBERT 1959), as well as tadpoles of *B. variegata* were counted in the field and their behaviour was observed in the laboratory (larval stages F2 – F0 according to ROBERT 1959). There were clear predator-prey cycles in the wallow-ponds and it was possible to detect that larvae of *L. depressa* are able to capture and feed tadpoles of the yellow-bellied toad and have a verified impact on the population of *B. variegata*. In ponds with many larvae the number of tadpoles of *B. variegata* increased after the majority of the larvae had emerged. In ponds where large larvae were present during the whole year tadpole-abundances were low and no metamorphlings were found. Due to the activity of the wild boars the ponds are kept in an early succession stage and it can be assumed that the autochthonous species will dominate this habitat furthermore if the wild boar population will not be drastically reduced or abandoned. A regulation of the wild boar population in the next few years could lead to changes in the species composition at the study sites." (Author)] Address: unknown.

**23237.** Palacio, A.; Muzon, J.; Juen, L.; Santos Ferreira, V.R.; Batista, J.D. (2020): *Erythrodiplax nataliae* sp. nov., a new species for the state of Mato Grosso, Brazil. *Anais da*

Academia Brasileira de Ciências 92 supl.2 Rio de Janeiro 2020 Epub Oct 19, 2020: 7 pp. (in English) ["*E. nataliae* sp. nov. (5 males), collected in Vereda wetlands (a unique Neotropical savanna environment) in Mato Grosso, Brazil is described and illustrated. The new species fits in Borrór's Juliana Group, and can be distinguished from other species by the combination of the following traits: blue pruinosity on thorax (more dense dorsally); sides of the pterothorax yellowish, darkening dorsally; face ivory, dorsally black with a metallic blue reflection; wings hyaline with a small basal brown spot; vesica spermalis with long lateral lobes, enclosing the median process and median process elongated with a pair of conspicuous rectangular and elongated lateral lobes, with a middle dorso-ventral furrow." (Authors)] Address: Palacio, A, Laboratorio de Biodiversidad y Genética Ambiental (BioGeA), Universidad Nacional de Avellaneda, Mario Bravo 1460, CP 1870 Piñeyro, Avellaneda, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com

**23238.** Samways, M.J.; Barton, P.S.; Birkhofer, K.; Chichorro, F.; Deacon, C.; Fartmann, T.; Fukushima, C.S.; Gaigher, R.; Habel, J.C.; Hallmann, C.A.; Hill, M.J.; Hochkirch, A.; Kaila, L.; Kwak, M.L.; Maes, D.; Mammola, S.; Noriega, J.; Orfinger, A.B.; Pedrazas, F.; Pryke, J.S.; Roquet, F.O.; Settele, J.; Simaika, J.P.; Storka, N.E.; Suhling, F.; Vorster, C.; Cardoso, P. (2020): Solutions for humanity on how to conserve insects. *Biological Conservation* 242 (2020) 108427: 15 pp. (in English) ["The fate of humans and insects intertwine, especially through the medium of plants. Global environmental change, including land transformation and contamination, is causing concern concerning insect diversity loss, articulated in the companion review Scientists' warning to humanity on insect extinctions. Yet, despite a sound philosophical foundation, recognized ethical values, and scientific evidence, globally we are performing poorly at instigating effective insect conservation. As insects are a major component of the tapestry of life, insect conservation would do well to integrate better with overall biodiversity conservation and climate change mitigation. This also involves popularizing insects, especially through use of iconic species, through more media coverage, and more inclusive education. Insect conservationists need to liaise better with decision makers, stakeholders, and land managers, especially at the conceptually familiar scale of the landscape. Enough evidence is now available, and synthesized here, which illustrates that multiple strategies work at local levels towards saving insects. We now need to expand these locally-crafted strategies globally. Tangible actions include ensuring maintenance of biotic complexity, especially through improving temporal and spatial heterogeneity, functional connectivity, and metapopulation dynamics, while maintaining unique habitats, across landscape mosaics, as well as instigating better communication. Key is to have more expansive sustainable agriculture and forestry, improved regulation and prevention of environmental risks, and greater recognition of protected areas alongside agro-ecology in novel landscapes. Future-proofing insect diversity is now critical, with the benefits far reaching, including continued provision of valuable ecosystem services and the conservation of a rich and impressive component of Earth's biodiversity." (Authors) The paper includes references to dragonflies.] Address: Cardoso, P., Finnish Museum of Natural History, PO17 (Pohjoinen Rautatiekatu 13), 00014, Univ. of Helsinki, Finland. E-mail: pedro.cardoso@helsinki.fi

**23239.** Tsalkatis, A.; Tsalkatis, P.; Pyrkosch, U. (2020): *Diplacodes lefebvrei* in Lésvos, Greece (Odonata: Libellulidae). *Libellula* 39(3/4): 193-198. (in English, with German and Greek summary) ["We report the first record and breeding

record of *Diplacodes lefebvrei* (Rambur) for Lésvos, Greece. On 20-V-2018, a female specimen was photographed and on 9 June 2018, a male captured at a small pond close to the Kriónéri riverbed 1.5 km northeast of the Gulf of Kalloní in Lésvos. Exuviae were collected and reproductive behaviour could be observed in the following weeks at the same site." (Authors)] Address: Tsalkatis, Annika, Reinachstr. 30, 79112 Freiburg, Germany. Email: tsalkatis@posteo.de

## 2021

**23240.** Fierimonte, B.; Vanappelghem, C. (coord.) (2021): Plan régional d'actions Hauts-de-France en faveur des «libellules menacées» 2022-2031 - Agir pour la préservation des odonates menacés et de leurs habitats. Conservatoire d'espaces naturels Hauts-de-France & DREAL Hauts-de-France: 80 pp. (in French) [Hauts-de-France comprises five departments in the northwest of France: Aisne, Nord, Oise, Pas-de-Calais, and Somme. The following species are treated monographically: *Anaciaeschna isoceles*, *Coenagrion mercuriale*, *C. pulchellum*, *Epitheca bimaculata*, *Lestes dryas*, *L. sponsa*, *L. virens vestalis*, *Leucorrhinia caudalis*, *L. pectoralis*, *L. rubicunda*, *Onychogomphus forcipatus*, *Oxygastra curtisii*, *Somatochlora arctica*, *S. flavomaculata*, *S. metallica*, *Sympetrum danae*, *S. vulgatum*.] Address: [https://irpn.drealnord.fr/wp-content/uploads/2023/04/PRA\\_20230420\\_D-OC\\_PRA\\_Libellules\\_HdF.pdf](https://irpn.drealnord.fr/wp-content/uploads/2023/04/PRA_20230420_D-OC_PRA_Libellules_HdF.pdf)

**23241.** Gvoždík, L.; Boukal, D.S. (2021): Impacts of predator-induced behavioural plasticity on the temperature dependence of predator-prey activity and population dynamics. *Journal of Animal Ecology* 90(2): 503-514. (in English) ["1. Predation is a key ecological interaction affecting populations and communities. Climate warming can modify this interaction both directly by the kinetic effects of temperature on biological rates and indirectly through integrated behavioural and physiological responses of the predators and prey. Temperature dependence of predation rates can further be altered by predator-induced plasticity of prey locomotor activity, but empirical data about this effect are lacking. 2. We propose a general framework to understand the influence of predator-induced developmental plasticity on behavioural thermal reaction norms in prey and their consequences for predator-prey dynamics. Using a mesocosm experiment with dragonfly larvae (predator, *Aeshna cyanea*) and newt larvae (prey), we tested if the predator-induced plasticity alters the elevation or the slope of the thermal reaction norms for locomotor activity metrics in prey. We also estimated the joint predator-prey thermal response in mean locomotor speed, which determines prey encounter rate, and modelled the effect of both phenomena on predator-prey population dynamics. 3. Thermal reaction norms for locomotor activity in prey were affected by predation risk cues but with minor influence on the joint predator-prey behavioural response. We found that predation risk cues significantly decreased the intercept of thermal reaction norm for total activity rate (i.e., all body movements) but not the other locomotor activity metrics in the prey, and that prey locomotor activity rate and locomotor speed increased with prey density. 4. Temperature had opposite effects on the mean relative speed of predator and prey as individual speed increased with temperature in predators but decreased in prey. This led to a negligible effect of body temperature on predicted prey encounter rates and predator-prey dynamics. The behavioural component of predator-prey interaction varied much more between individuals than with temperature and the presence of predation risk cues in our system. 5. We conclude that within-population variation in

locomotor activity can buffer the influence of body temperature and predation risk cues on predator-prey interactions, and further research should focus on the magnitude and sources of behavioural variation in interacting species to predict the impact of climate change on predator-prey interactions and food web dynamics." (Authors)] Address: Gvozdík, L., Czech Academy of Sciences, Institute of Vertebrate Biology, Brno, Czech Republic. Email: gvozdik@brno.cas.cz

**23242.** Kastner, F.; Weise, J.; Buchwald, R. (2021): Hochmoorschutz in NW-Deutschland unter besonderer Berücksichtigung ausgewählter Insektenordnungen (Libellen und Tagfalter). Abschlussbericht zum gleichnamigen DBU-Projekt. Oldenburg: 85 pp. (in German, with English summary) ["7.3 Conclusion dragonfly fauna: As part of the project, a total of 32 dragonfly species were detected as imago and/or exuvia in the raised bogs of the Diepholz Moor lowlands. The results show that typical raised bog species (target species) occur; however, *Aeshna juncea* (RL D: V, Nds.: 2 BAUMANN et al. 2021d, OTT et al. 2015) only in the Goldenstedter Moor, Rehdeener Geestmoor and the Große Renzeler Moor with a total of three exuviae, which corresponds to the decline of the species in Lower Saxony as a whole (PIX et al. 2021). The species *Leucorrhinia pectoralis* (RL D: 3, Nds.: not endangered BAUMANN et al. 2021d, OTT et al. 2015), which is listed in the FFH Directive, was detected in five raised bogs in the Diepholz Moor lowlands. The occurrence of the species within the raised bogs indicates a gradual eutrophication of these (BAUMANN & JÖDICKE 2021). The three target species *Coenagrion hastulatum*, *Nehalennia speciosa* and *Somatochlora arctica* are absent in the area. *Libellula quadrimaculata*, *Enallagma cyathigerum* and *Leucorrhinia rubicunda* were classified as the three most widespread and dominant species. The highest number of species was found in the Neustädter Moor (27), followed by the Northern Wietingsmoor (26). There are significant differences in the number of species (total), the number of target species and the number of red list species between the areas Rehdeener Geestmoor and Großes Renzeler Moor, Nördliches Wietingsmoor, Neustädter Moor and Diepholzer Moor. The comparison with historical data on the dragonfly fauna of the Diepholzer Moor lowlands shows that a large part of the species spectrum could be confirmed; eight species have not currently been detected. These species are not typical raised bog species, which may only occur as guests or in the peripheral areas. The waters examined can be classified as acidic to almost neutral and oligotrophic to mesotrophic, with a wide amplitude of the coverage of peat mosses and emersed vegetation. There are no significant differences in the coverage of aquatic vegetation between the two "mining methods" of hand-cutting peat and industrial peat extraction. The drying out of some waters in connection with the extremely dry and hot summers of recent years can be mentioned as a cause for concern. A total of 31% of the waters examined dried out during the study season; the water sand fluctuated in all waters, with a maximum of -38 cm. The waters examined are not grouped according to the different surface types ("mining method" and time of restoration/rewetting) within the framework of the environmental variable evaluation (PCA). There are significant differences in the number of target species between the two "mining methods" of hand-cutting peat and industrial peat extraction, as well as in the number of species between the rewetting period from 2000 to 2009 and no active rewetting. Four dragonfly species clusters were identified based on the exuvia abundances, which are characterized by the following indicator species: *Libellula quadrimaculata* (cluster 1); *Aeshna subarctica* (cluster 2); *Leucorrhinia rubicunda*, L.

*dubia*, *Coenagrion lunulatum* and *Lestes sponsa* (cluster 3) and *Enallagma cyathigerum* and *Coenagrion puella* (cluster 4). With the exception of *C. puella*, these are all target species of the raised bogs of the Diepholz Moor lowlands. Differences between the sample areas of the four species clusters exist in the degree of coverage of the peat mosses; this parameter therefore plays an important role in the presence or absence of the species. The area types "type of mining" and time of restoration/rewetting show no grouping within the species clusters. The dragonfly fauna was assessed using two methods. The results show that the majority of the areas can be classified in the middle value category (yellow or 3, 4, 5). The 56 areas (80%) in the "yellow" category with 6 points in assessment procedure I are characterized by evidence of *Coenagrion lunulatum*, *Aeshna juncea*, *A. subarctica* or *Leucorrhinia dubia*. The "green" category was not awarded. In assessment procedure II, a total of 6 sample areas (9%) achieved value level 6 (level of fulfillment 32 to < 64%); value level 7 was not awarded. The highest proportion of points in this procedure were awarded to *Coenagrion lunulatum*, *Aeshna subarctica* and *Leucorrhinia dubia*. The highest value levels were achieved by the Nördliche Wietingsmoor, Mittleres Wietingsmoor, Neustädter Moor, Goldenstedter Moor, Diepholzer Moor and Großes Renzeler Moor." (Authors/Google translate)] Address: [https://www.dbu.de/OPAC/ab/DBU-Abschlussbericht-AZ-32685\\_01-Hauptbericht.pdf](https://www.dbu.de/OPAC/ab/DBU-Abschlussbericht-AZ-32685_01-Hauptbericht.pdf)

## 2022

**23243.** Aissaoui, N.; Kaour, D.; Benmare, B. (2022): Contribution à l'étude des odonates et macroinvertébrés des mares de la moyenne et haute Seybouse. MSc. thesis, Faculté des Sciences de la Nature et de la Vie, Sciences de la Terre et de l'Univers, Université 8 Mai 1945 Guelma: 15 + 127 pp. (in French, with English and Arabian summaries) ["Our study focused on the inventory of benthic macroinvertebrates, Odonata and the analysis of the physical quality of the water of ponds in the wilaya of Guelma, which is characterised by a semi-arid Mediterranean climate. To do this, we monitored 6 ponds located in the Middle and Upper Seybouse during a three-month period between 22 February and 29 May 2022. The various indicators used, such as species richness, Shannon's diversity index and Jaccard's similarity, showed that the ponds studied have a high level of diversity... The complementary biological approach through the analysis of macroinvertebrate populations enabled us to identify 1010 individuals divided into eight classes: Insects with the main orders (Ephemeroptera, Diptera, Hemiptera, Coleoptera, Odonata, Crustacea and Molluscs and Annelids). In addition, the odonatological inventory of these ponds enabled us to identify 187 individuals, including 6 Anisoptera and 10 Zygoptera ..." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version) *Anax imperator*, *Coenagrion scitulum*, *C. mercuriale*, *Ceriagrion tenellum*, *Crocothemis erythraea*, *Erythromma lindenii*, *E. viridulum*, *Ischnura graellsii*, *I. pumilio*, *Lestes viridis*, *Orthetrum chrysostigma*, *O. nitidiverve*, *Platycnemis subdilata*, *Sympetrum fonscolombii*, *Sympecma fusca*, *Trithemis kirbyi*] Address: [https://dspace.univ-guelma.dz/xmlui/bitstream/handle/12345678-9/13408/AISSAOUI\\_NEMCHA\\_F4.pdf?sequence=1&isAllowed=1](https://dspace.univ-guelma.dz/xmlui/bitstream/handle/12345678-9/13408/AISSAOUI_NEMCHA_F4.pdf?sequence=1&isAllowed=1)

**23244.** Bedjanic, M. (2022): Prof. dr. Boštjan Kiauta (1937 – 2022). *Erjavecija* 37: 1-8. (in Slovene and English) [<https://www.dlib.si/stream/URN:NBN:SI:doc-ZLXPNYLC/a20807-90-281a-4414-bb09-13c6b86dd83b/PDF>] Address: Bedjanic, M., M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. Email: [matjaz.bedjanic@nib.si](mailto:matjaz.bedjanic@nib.si)



**23245.** Bedjanic, M. (2022): Izbrana "Sovenska" bibliografija (1953-2021) Prof. Dr. Boštjana Kiaute. Erjavecia 37: 8-14. (in Slovene) [Selected Slovene bibliography (1953-2021) Prof. Dr. Boštjan Kiauta] Address: Bedjanic, M., M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. Email: matjaz.bedjanic@nib.si

**23246.** Ilyina, V.; Onishko, V.; Kosterin, E. (2022): Dragonflies (Odonata) of the Samura delta cluster Samursky National Park. Proceedings of Dagestan State Nature Reserves 18: 31-50. (in Russian) [Introduction The cluster area is located in the delta of one of the largest rivers in the Republic of Dagestan - the Samur, which flows from the slopes of the Vodorzdelny and Samursky mountain ranges, and flows into the Caspian Sea as two branches - the Big and Small Samur - in the Primorskaya Lowland. Climatically the area is arid and belongs to the natural zone of deserts. However, owing to the unique natural system of filtration and redistribution of the above-ground and underground river water runoff, the only large area of relict liana forests with the elements of the Hirkian Tertiary flora is preserved here (Specially Protected Natural Resources..., 2020). On the territory of the national park there are groundwater outlets located in several groups. They form a network of forest rivers, known as karasu, with crystal clear water flowing through the entire forest and flowing into the Caspian Sea with several branches. They are also the sources of water that fill several fishponds and lagoons; the whole system corresponds to wetlands of international importance protected under the Ramsar Convention. The Samur River Delta has also been declared a Key Ornithological Site (KOTR) of international importance. The Samur Reserve was created in this area in 1982, on the basis of which the Samur River Delta cluster of the Samursky National Park was created in 2019. The Samur forest is a unique natural object, a complex complex of oak groves, poplar and alder forests, as well as high-level hornbeam forests, which previously covered practically the entire river delta in a solid massif. There are many original and interesting plant communities with a large number of rare and endemic species (Specially Protected..., 2020). A large number of diverse water sources have also contributed to the formation of very interesting aquatic and semi-aquatic communities, one of the components of which is the odontofauna. Information on dragonflies of the Samurskii Forest has only been published in three papers in the Proceedings of the Dagestan State Reserve. Ilyina et al. (2014) mention the presence of 10 dragonfly species in the Samurskii Reserve, including *Calopteryx splendens intermedia* Sélys, 1887. Ilyina and Aliiev (2017) report four species, including *Epallage fatime* for the first time in the Samurskiy Reserve. Onishko & Dunayev (2017) mention the Samursky Reserve for six dragonfly species, of which *Calopteryx virgo* and *Sympetma paedisca* were erroneously listed. The following annotated list of dragonflies of the Samurskii forest (Samur Delta cluster of Samurskii National Park) is based on the following data: - E. V. Ilyina's collections from 1986 to 2020, with collections up to and including 2017 handled by A. F. Medvedev, who kindly provided his definitions; - Collections and photographs of dragonflies made by the expedition of the Young Naturalists' Circle at the Zoological Museum of Moscow State University in 2015-2021. - Observations, collections and photographs made on 23-27 June 2021 by the purpose-oriented odontological expedition of E.V. Ilyina, V.V. Onishko and O.E. Kosterin. Studies of dragonflies in the Samursky Forest were conducted in the vicinity of the Samursky Nature Reserve (now National Park), 1.5-3 km to the north-west of the village of Primorsky (in the interval between the villages of Primorsky and Balkhash). The survey was conducted in

the vicinity of the bordering lakes and forest streams (coordinates 41.852-41.867 N, 48.549-48.567 E) which are representative of the natural environment of the area, as well as in the vicinity of villages Bilibil-Kazmalyar (now National Park). Bilibil-Kazmalyar (41.803-41.818 N, 48.544-48.549 E), Primorsky and in the valley of the forest stream between them (41.834-41.840 N, 48.562-48.571 E). Dragonflies were captured with an entomological net for hand detection or for collecting a limited number of specimens; collected specimens were either preserved in 75% ethanol or treated overnight with acetone (to preserve colouration and DNA fixation) and then dried. Photographic fixation of the dragonflies was performed using a Canon EOS 350D camera with a Sigma 50 Macro lens, an Olympus C8080WZ or an Apple iPhone 7. During the expedition of 2021 all species of dragonflies were photographed, either in the hand or in the wild, for each point and date. Almost all photographic observations made are available on the iNaturalist platform (2021), in particular in the Dragonflies of Dagestan project (2021) and in the Global Biodiversity Information Facility (GBIF) (Ueda, 2021). Discussion The list of 37 dragonfly species known from the Samurian Forest is quite impressive for this species-poor insect order. Most species can be regarded as expected for the area. The Samur forest is the northern border of the range of *Epallage fatime*, while the presence of the species in our country before its discovery in Dagestan (Ilyina et al., 2014) was questionable. *Caliaeschna microstigma* is known to inhabit forest streams and small rivers in the narrow valleys of the foothills (Ilyina et al., 2014; Onishko & Kosterin, 2021). The abundance of this species in the Samurian Forest, i.e. in the plain below the sea level, can be easily explained retrospectively, as the rivers through the forest on which it inhabits are characterized by cold water, fast flow and are shaded by forest, i.e. have the same environmental conditions as those of foothill forest rivers. However, the presence of the species could hardly have been anticipated beforehand. It would seem that the same logic can be applied to representatives of the genus *Cordulegaster* which often inhabits together with *C. microstigma*, but they have not been found in the Samurian Forest, despite of thorough search. Quite unexpected was the finding in the Samurian Forest, only five kilometres apart, of populations of two good species of the group *C. puella*. Also quite unexpected was the finding of *Somatochlora flavomaculata* which is so local in the Caucasus. It is difficult to explain the absence of findings of such widespread, including Dagestan, eurytopic dragonflies as *Enallagma cyathigerum* and *Sympetrum fonscolombii* in the Samur forest. These are likely to be found in the future. The occurrence of some species local to Dagestan, *Coenagrion ornatum*, *C. scitulum*, *Sympetrum depressiusculum* is not excluded (our unpublished data). Almost certainly, *Lestes macrostigma*, prone to such habitats, will also be found in one of the brackish coastal estuaries. The presence on the Samur River of populations of one of two possible representatives of the *Stylurus* (flavipes) group of species that inhabit large rivers cannot be ruled out. Tellingly absent from the Samursk Forest are such fairly northern species known from other, mountainous and/or northern areas of Dagestan (our unpublished data) as *Lestes dryas*, *L. sponsa*, *L. virens*, *Sympetma paedisca*, *Coenagrion pulchellum*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. flaveolum*, *S. pedemontanum*. However, it cannot be ruled out that local populations of some of them will still be found in the Samurskii Forest. In fact, the Samur forest is the northwest extremity of the famous Hirkian forest covering northern slopes of the Elburz Range and the southern coast of the Caspian Sea in Iran and Azerbaijan. Theoretically, one would also expect to find here such Girkian endemics as *Aeshna vercanica* and *Cordulegaster vanbrinkae* (Schneider & Ikemeyer, 2019), known from Azerbaijan (Skvortsov,



Snegovaya, 2015)." Annotation from Oleg Kosterin: „How wierd! We thought it might be published soon but did not know it has already been, and did not hear from Elena. There was a deadline of the New Year, after which we revealed/confirmed that *Coenagrion (puella)* sp1 is *C. puella* and *Coenagrion (puella)* sp2 is *C. australocaspicum*, new for Russia, but it was too late to include. I envy your being outside and feel a big depression too, but have to do many things necessary while there is still communication. Oleg" Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**23247.** Lai, Y.-H.; Chang, S.-K.; Lan, B.; Hsu, K.-L.; Yang, J.-T. (2022): Optimal thrust efficiency for a tandem wing in forward flight using varied hindwing kinematics of a damselfly. *Physics of Fluids* 34(6): 22 pp. (in English) ["We reveal the hindwing kinematics of a damselfly that are optimal for the thrust efficiency, which is a major concern of a bio-inspired micro-aerial vehicle. The parameters of the hindwing kinematics include stroke-plane angle, rotational duration, and wing phase. We developed a numerical self-propulsion model to investigate the thrust efficiency. The correlation analysis and optimal analysis were used to investigate the relation between varied hindwing kinematics and thrust efficiency. The results show that the optimal wing kinematics of the hindwing occur at a large stroke-plane angle and a small rotational duration, in which the thrust efficiency might increase up to 22 % compared with the original motion of the hindwing. The stroke-plane angle is highly positively correlated with thrust efficiency, whereas the rotational duration is moderately negatively correlated; the wing phase has the least correlation. The flow-field analysis indicates that a large stroke-plane angle combined with a small rotational duration has a weak forewing-hindwing interaction, generating a small resulting force on the hindwing, but the force comprises a small negative horizontal force, which hence increases the thrust efficiency. In a flight strategy for a micro-aerial vehicle, a large stroke-plane angle combined with a small rotational duration yields an optimal thrust efficiency, which is suitable for a flight of long duration. A small stroke-plane angle combined with a large rotation is suitable for hovering flight because it leads to a large negative horizontal force and a small vertical force. This work provides insight into the design of a tandem-wing micro-aerial vehicle." (Authors)] Address: Lai, Y.-H., Dept of Mechanical Engineering, National Taiwan Univ., Taipei, Taiwan. Email: jtyang@ntu.edu.tw

**23248.** Offenberger, M. (2022): Streitfall Bti: Die gängige Stechmückenbekämpfung ist nicht naturschutzkonform. *Anliegen Natur* 44(1): 99-100. (in German) ["A biocide called Bti is used worldwide for the biological control of mosquitoes, including on the Upper Rhine and at Lake Chiemsee. The preparation has so far been categorised as ecologically safe due to its alleged toxic effect on only a few species. Extensive laboratory and field studies at the University of Koblenz-Landau question the environmental compatibility of Bti. The amendment to the Federal Nature Conservation Act further restricts the use of the insecticide in protected areas." (Author/DeepL)] Address: [https://www.anl.bayern.de/publikationen/anliegen/doc/an44100notizen\\_2022\\_artenschutz.pdf](https://www.anl.bayern.de/publikationen/anliegen/doc/an44100notizen_2022_artenschutz.pdf)

**23249.** Payra, A.; Deshpande, A.; Koparde, P. (2022): Northernmost records of two endemic odonates *Protosticta sanguinostigma* Fraser, 1922 and *Idionyx saffronatus* Fraser, 1924 from the northern Western Ghats, Maharashtra, India (Odonata, Platystictidae). *Spixiana* 45(2): 249-253. (in English) ["The present communication deals with new spatial

records of two endemic odonates of Western Ghats *Protosticta sanguinostigma* Fraser, 1922 and *Idionyx saffronatus* Fraser, 1924 for the State of Maharashtra, based on the materials collected from the Thoseghar Waterfall of Satara district, Maharashtra, India. Both records represent northernmost localities of the species. Detailed diagnostic characters and photographs are provided." (Authors)] Address: Payra, A., School of Ecology & Environmental Management, Faculty of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Kothrud, Pune, Maharashtra, 411038 India. Email: arapayra@gmail.com

**23250.** Shirey, V.; Khelifa, R.; M'Gonigle, L.K.; Guzman, L.M. (2022): Occupancy-detection models with museum specimen data: promise and pitfalls. *Methods in Ecology and Evolution* 14(6): 13 pp. (in English) ["1. Historical museum records provide potentially useful data for identifying drivers of change in species occupancy. However, because museum records are typically obtained via many collection methods, methodological developments are needed in order to enable robust inferences. Occupancy-detection models, a relatively new and powerful suite of statistical methods, are a potentially promising avenue because they can account for changes in collection effort through space and time. 2. We use simulated datasets to identify how and when patterns in data and/or modelling decisions can bias inference. We focus primarily on the consequences of contrasting methodological approaches for dealing with species' ranges and inferring species' non-detections in both space and time. 3. We find that not all datasets are suitable for occupancy-detection analysis but, under the right conditions (namely, datasets that are broken into more time periods for occupancy inference and that contain a high fraction of community-wide collections, or collection events that focus on communities of organisms), models can accurately estimate trends. Finally, we present a case-study on eastern North American odonates where we calculate long-term trends of occupancy by using our most robust workflow. 4. These results indicate that occupancy-detection models are a suitable framework for some research cases and expand the suite of available tools for macroecological analysis available to researchers, especially where structured datasets are unavailable." (Authors)] Address: Shirey, V., Dept of Biology, Georgetown University, Washington, DC, USA. Email: vms55@georgetown.edu

**23251.** Trepels, K.; Kunz, W. (2022): Die Libellenfauna der Teverener Heide (Nordrhein-Westfalen) – Vergleich von Erhebungen der Zeiträume 1982-2005 und 2020 (Insecta: Odonata). *Entomologie heute* 33: 61-76. (in German, with English summary) ["In the period from June to October 2020, 30 dragonfly species were detected at seven ponds in the Teverener Heide nature reserve and Special Area of Conservation (SAC) in the Heinsberg district, western North Rhine-Westphalia. These results show that the number of species has not changed compared to the number of species that was determined there between 1982 and 2005. However, four of the former detected species could no longer be observed in 2020, while five species were newly discovered. These changes in species composition were also observed for most species in the neighboring areas to the Teverener Heide (Brunssumer Heide and Roode Beek, Netherlands). Three of the four species that have disappeared are Nordic species and four of the five newly recorded species are Mediterranean species, so the changes in species composition appear to reflect climate change over the past few decades." (Authors)] Address: Trepels, Kristin, Dr.-von-den-Driesch-Straße 5, 52538 Gangelt, Germany. Email: kristin.trepels@gmail.com

**23252.** Vercruyse, B. (2022): Transitions in boreal wetland macroinvertebrate community composition across a natural salinity gradient. M.Sc. thesis University of Calgary, Calgary, AB: 193 pp. (in English) ["Nearly 65% of Alberta's northern boreal landscape is comprised of wetlands (primarily peatlands), which are lost in the process of open pit mining for oil sands. Demonstration wetlands recently created in reclaimed postmining watersheds are productive and support diverse biota. However, their water tends to be sodic due to the presence of salts in the soils used in their construction and residual sodium from the bitumen extraction process. Saline wetland systems occur in northern Alberta in areas where deep aquifer upwellings contribute significantly to a wetland's water budget. I sampled the water chemistry and aquatic invertebrates in a suite of 52 pools ranging in specific conductance from 3,757 to 20,170  $\mu\text{S}/\text{cm}$  in a patterned fen southeast of Fort McMurray, Alberta, to identify patterns of community composition along the salinity gradient. Sodium, chloride, magnesium, and calcium were the dominant ions present in the saline fen. Pools with relatively low salinity supported abundant densities of gastropods and odonates whereas the most saline pools were dominated by Diptera larvae, especially genera of mosquitos. Threshold Indicator Taxon Analysis (TITAN) identified a set of 11 sensitive and 9 tolerant taxa diagnostic of specific conductivity. Community composition changed markedly at a threshold of 6,335-9,385  $\mu\text{S}/\text{cm}$ , equivalent to chloride concentrations of 1,579-2,535 mg/L. These findings may provide a useful frame of reference for anticipating community composition in wetlands forming in sodic areas of the reclaimed postmining landscape of the AOS. ... Four genera of dragonflies and one family of damselflies [Aeshna, Nehalennia, Coenagrionidae <0.5 mm, Pachydiplax longipennis] were abundant in lower salinity wetlands but were absent at locations where specific conductance was 10,000  $\mu\text{S}/\text{cm}$  or greater. So, it is possible, although unstudied in this analysis, that Aedes is exploiting unused resources and minimizing competition by avoiding pools with (or being extirpated by) predatory species such as Odonata, thereby associating with more saline sites. ... I observed a loss of salt-sensitive taxa including snails, dragonflies, damselflies, and caddisflies between specific conductance values of 6,335 and 9,385  $\mu\text{S}/\text{cm}$  (95% CI), corresponding to chloride ion concentrations of roughly 1,500 mg/L and 2,500 mg/L." (Author) Table 3.9 lists the following odonate taxa: Nehalennia, Aeshna, Sympetrum, Somatochlora, Pachydiplax longipennis, Libellulidae.] Address: <https://prism.ucalgary.ca/server/api/core/bitstreams/7dface96-6e4f-406a-9228-5164f26e6b9a/content>

**23253.** Veseli, M.; Rožman, M.; Vilenic, M.; Petrovic, M.; Previšić, A. (2022): Bioaccumulation and bioamplification of pharmaceuticals and endocrine disruptors in aquatic insects. Science of The Total Environment 838, Part 2, 10 September 2022, 156208: (in English) ["Highlights: • Uptake of PhACs & EDCs in Odonata differs between Anisoptera and Zygoptera. • Zygoptera had higher concentrations of contaminants in both larvae and adults. • Bioamplification across metamorphosis was inferred for seven compounds. • Taxonomic resolution impacts inferences on environmental fate of PhACs & EDCs. Abstract: Environmental fate of emerging contaminants such as pharmaceuticals and endocrine disrupting compounds at the aquatic terrestrial boundary are largely unexplored. Aquatic insects connect aquatic and terrestrial food webs as their life cycle includes aquatic and terrestrial life stages, thus they represent an important inter-habitat linkage not only for energy and nutrient flow, but also for contaminant transfer to terrestrial environments. We measured the concentrations of pharmaceuticals and endocrine

disrupting compounds in the larval and adult tissues (last larval stages and teneral adults) of five Odonata species sampled in a wastewater-impacted river, in order to examine their bioaccumulation and bioamplification at different taxonomic levels. 20 different compounds were bioaccumulated in insect tissues, with majority having higher concentrations (up to 90% higher) in aquatic larvae compared to terrestrial adults (reaching 88 ng/g for 1H-benzotriazole). However, increased concentration in adults was observed in seven compounds in at least one suborder (41% of the accumulated), confirming contaminants bioamplification across the metamorphosis. Both, bioaccumulation and bioamplification differed at various taxa levels; the order (Odonata), suborder (Anisoptera and Zygoptera) and species level. Highest variability was observed between Anisoptera and Zygoptera, due to the underlying differences in their ecology. Generally, Zygoptera had higher concentrations of contaminants in both larvae and adults. Additionally, we aimed at predicting effects of contaminant properties on bioaccumulation and bioamplification patterns using the commonly used physicochemical and pharmacokinetic descriptors on both order and suborder levels, however, neither of the two processes could be consistently predicted with simple linear models. Our study highlights the importance of taxonomy in studies aiming at advancing the understanding of contaminant exchange between aquatic and terrestrial food webs, as higher taxonomic categories include ecologically diverse groups, whose contribution to "the dark side of subsidies" could substantially differ." (Authors)] Address: Veseli, Marina, Dept of Biology, Zoology, Faculty of Science, Univ. of Zagreb, Rooseveltov trg 6, 10000 Zagreb, Croatia

**23254.** Yamasaki, S.; Watanabe, K.; Ohba, S.-y. (2022): Larval feeding habits of the large-bodied diving beetle *Cybister rugosus* (Coleoptera: Dytiscidae) under laboratory conditions. Entomological Science 25(2) e12510: ["The population of the diving beetle *Cybister rugosus* (Macleay, 1825) has been declining in recent years, and it is designated as "Vulnerable" (VU) in the Red List of Japan. However, there have been no quantitative studies on the feeding habits of the larval stage of this beetle. Revealing the feeding habits is indispensable for understanding the life history of *C. rugosus*. In the current study, we reared *C. rugosus* larvae on different prey taxa (Odonata nymph, fish, tadpole, and shrimp) and evaluated their growth and survival rates. Previous studies have shown that three congeneric *Cybister* species larvae feed mainly on invertebrates. However, all larval instars of *C. rugosus* were able to feed on invertebrates and vertebrates and grow. Thus, we considered *C. rugosus* to be a generalist compared to the other *Cybister* species. The larval periods were shorter for *C. rugosus* that fed on Odonata nymphs than on any other prey. Feeding different prey taxa had no significant effect on the body length of newly emerged adult males. However, the body length of newly emerged adult females was larger when the larvae fed on Odonata nymphs than when the larvae fed on fish. As in other *Cybister* species, we concluded that the Odonata nymph is an appropriate food from the viewpoint of increased growth rate in *C. rugosus*." (Authors)] Address: Yamasaki, S., Graduate School of Agricultural and Life Sciences, The University of Tokyo 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. Email: s.yamasaki142@gmail.com

**23255.** Yáñez Álvarez, A.T. (2022): Análisis de la comunidad de macroinvertebrados bentónicos de la Zona Lacustre de Xochimilco y su relación con la calidad del agua durante los años 2017-2019. Universidad Autónoma Metropolitana Unidad Xochimilco, División de Ciencias Biológicas

y de la Salud, Departamento el Hombre y su Ambiente, Licenciatura en Biología, Informe Final de Servicio Social por investigación para obtener el Grado de Licenciado en Biología: 69 pp. (in Spanish) ["The Xochimilco Lake Zone (LZX) is home to numerous endemic species and provides ecosystem services. However, it has been affected by the introduction of exotic species, habitat reduction, loss of land use vocation and deterioration of its water quality, resulting in an impact on the health of the ecosystem and native species. Given the above, the aim of the present work was to evaluate the water quality of canals in Xochimilco and San Gregorio Atlapulco Conservation Lake, during the years 2017 to 2019, based on data analysis of abundance and diversity of benthic macroinvertebrates that inhabit these water bodies. The study was carried out in two areas, the San Gregorio Atlapulco Conservation Lake (LCSGA) and the Xochimilco Canals. Macroinvertebrate species were identified by photographic recording. The alpha and beta diversity indices, the Biological Monitoring Working (BMWP) and Biotic Index of Families (IBF) were calculated to estimate the degree of water pollution and the trophic guilds were determined. A total of 1,804 macroinvertebrates were identified in the Xochimilco Lake Zone, with the order Odonata [Aeshna multicolor, Ischnura denticollis, Erpetogomphus crotalinus, Archilestes grandis, Erythemis sp.] and Hemiptera being the most diverse in the LCSGA and in the Xochimilco Canals. The predominant guild was predators and to a lesser extent collectors. The physicochemical parameters recorded suggest that the water quality of the LCSGA and the Xochimilco Canales is generally acceptable to good. However, the biotic indices used BMWP and IBF indicate that the LCSGA has water pollution. The Xochimilco Canals, on the other hand, show moderate pollution. The use of macroinvertebrates is a viable and economical tool that complements the information obtained from physicochemical parameters in order to make a more complete diagnosis of water quality in the Xochimilco Lake Zone and to know the state of the habitat for the different native species of the Zone." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: <https://repositorio.xoc.uam.mx/jspui/bitstream/123-456789/26480/1/250092.pdf>

## 2023

**23256.** Albaji, L.; Abolfazl Askary, S.; Payandeh, P.; Mohammadi Rouzbahani, M. (2023): Evaluation of heavy metal pollution in sediments, water and macrobenthos of Hur Al-Azim wetland (Khuzestan). *Journal of Oceanography* 13(52): 29-47. (in English) ["Background and Objectives: Chemical storage of water cannot provide complete information about the extent of bioavailability of metals in the environment, while the study of this storage in the chain of water, sediment and macrobenthos can make the rate of rotation and storage risk more visible in ecosystems. Hur Al-Azim wetland is located in the west of Khuzestan Province. Large parts of it have dried up due to the development of Azadegan oil field and the spread of heavy metal pollution in its environment, which can provide serious risks to this ecosystem and the people around it. Therefore, the present study aimed to evaluate the concentrations of heavy metals cadmium, nickel, lead and vanadium in water, sediments and macrobenthos of Hur Al-Azim wetland, as a region with high oil activity. Methods: This study was conducted in winter 2017 to investigate the concentrations of heavy metals cadmium, nickel, lead and vanadium in 8 stations in Hur Al-Azim wetland. The statistical population for measuring heavy metals with three replications included 24 water samples, 24 sediment samples and 24 macrobenthos samples. Among them, the species in macrobenthos

samples were identified after washing in a 0.5-micron sieve. After digestion of the samples, the concentration of the elements was measured by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) model Vista Pro Axial. Comparison of heavy metal data from water and sediment samples was performed using SPSS23 software. Shapiro-Wilk test was also used to investigate the normal distribution of results. One-way analysis of variance was used for general comparisons and Tukey test was used for multiple comparisons and differences were significant at 95% level. Findings: The concentration of heavy metals in sediments was higher than that of water and macrobenthos, While the concentration of these metals in macrobenthos was higher compared to water ( $P < 0.05$ ). Heavy metals had the lowest concentration in station 1 (Chazabeh) as a station without oil activity and the highest level in station 4 (between pad 3 to pad 12) as a station with high oil activity ( $P < 0.05$ ). Pad 3 to Pad 12, along with Pad 9 to Pad 12, had the highest enrichment index for all metals. The lowest index of nickel, vanadium and cadmium enrichment index was measured in Chazabeh station and the lowest level of lead enrichment index was measured in Shatt Ali station. Regarding the index of heavy metal pollution factor, the distance station of Pad 3 to Pad 12 with values of 4, 1.16, 0.86 and 3.41 for cadmium, nickel, lead and vanadium had the highest value of this index. Also, Chazabeh station with values of 3.25, 0.18 and 0.54 for cadmium, nickel and vanadium metals and Shatt Ali station with values of 0.58 for lead metal showed the lowest value of this index. The distance between Pad 3 and Pad 12 with a value of 1.92 also had the highest PLI index. In the studied stations in Hur Al-Azim wetland, 10 macrobenthos families (Valvatidae, Vnionidae, Thiaridae, Hydrobiidae, Physidae, Chironomidae, Ceratopogonidae, Simuliidae, Gomphidae and Tipulidae) and 11 genera were identified. Among them, Chazabeh station with 43.8 showed the highest bio-index of BMWP and with 4.86 the highest bio-index of ASPT. Conclusion: Finally, it was found that due to the continuation of oil extraction activities and discharge of toxic pollutants into Hur Al-Azim wetland, there is great potential for rapid and cumulative increase in the concentration of metals, especially vanadium and cadmium and their crossing the critical limit. Indicators for measuring the severity of sediment pollution showed the station between Pad 3 and Pad 12 as the most polluted station in Hur al-Azim wetland compared to Chazabeh station. The correlation between the concentration of heavy metals in sediment and macrobenthos, in addition to emphasizing the uptake and transport of metals along the food chain, showed that macrobenthos can be used as the best biological indicators." (Authors)] Address: Sabzalipour, Sima, Dept of Environment, Ahvaz Branch, Islamic Azad Univ., Ahvaz, Iran. Email: [Shadi582@yahoo.com](mailto:Shadi582@yahoo.com)

**23257.** 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 1: The Nearctic species of *Saropogon* Loew, 1847 north of Mexico are reviewed, with 19 species recognized and one described as new: *Saropogon pyrodes* sp. nov. from Arizona. This previously recognized new species has awaited description since its first collection in 1964. Only after a community scientist posted photographs taken in nature to an online database did its description become a priority. All species of *Saropogon* occurring in the Nearctic Region north of the Mexican border have been reexamined. Photographs and diagnoses of all species are provided with a distribution map of the included specimens studied. An updated key to the Nearctic species north of Mexico is provided. Finally, the

need for a review of the diverse Mexican fauna is expressed. 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. Asilidae genera with sufficient data to warrant special attention are: Asilinae (Efferia, Mallophora, Megaphorus, Proctacanthus, Promachus, and Trioria), Brachyrhopalinae (Ceraturus, Cyrtopogon, Heteropogon, Holopogon, and Nicocles), Dasypogoninae (Diogmites and Saropogon), Dioctriinae (Dioctria), Laphriinae (Atomosia and Laphria), Leptogastrinae (Leptogaster), Ommatiinae (Ommatius), Stenopogoninae (Callinicus, Microstylum, Ospricerus, Scleropogon, and Stenopogon), Stichopogoninae (Stichopogon), and Trigonimiminae (Holcocephala). Most Asilidae prefer a generalist or polyphagous diet consisting of only arthropod prey. However, several genera appear oligophagous – Ceraturus on Coleoptera, Diogmites on Hymenoptera, Laphria on Lampyridae, Mallophora on Apidae, Megaphorus on Hymenoptera, Nicocles on Diptera, Ospricerus on Meloidae, Promachus on Apidae, Saropogon on Hymenoptera, and Stichopogon on Diptera. This dataset also supports previous findings that female asilid predators outnumbered males in a 1.5 to 1 ratio. 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. ... (Author)] Address: <https://escholarship.org/uc/item/6996w9tb>

**23258.** Andrade, A.M.B. de (2023): Riqueza, abundância e diversidade de ninfas de Odonata no Riacho Poço da Laje – Canãa – Triunfo – Pernambuco. Trabalho de Conclusão de Curso (Superior em Ciências Biológicas) – Instituto Federal de Educação, Ciência e Tecnologia da Paraíba, Princesa Isabel: 37 pp. (in Portuguese, with English summary) [Richness, abundance and diversity of Odonata nymphs in the Poço da Laje river - Canãa - Triunfo - Pernambuco] "It is of utmost importance that studies on the structure of ecological communities are carried out. Of exploratory Character. They help in the recognition of biodiversity in understudied areas. With this, they can assist in the development of strategies for the conservation of species and ecosystems. The main objective of this work was to survey the abundance, richness and diversity of dragonfly nymphs (Order Odonata) in a stream located in a semi-arid region. The study was conducted in the Poço da Laje Creek (municipality of Triunfo, backlands of Pernambuco – Brazil), Pajeú River basin. Odonata samples were collected with D net in seven wells and seven stretches of current. In the laboratory were washed, screened and identified, for further evaluation of richness, abundance and diversity. In this context, the total richness of Odonata genera was 5, the abundance was 32 in the wells and 39 in the current areas. The diversity in the wells was 0.54 ( $\pm 0.52$ ) and in the current 0.76 ( $\pm 0.44$ ). The data collected allow the recognition of the local fauna of Odonata, allowing future conservation actions to be carried out in the locality." (Author) <https://repositorio.ifpb.edu.br/jspui/handle/177683/3189>] Address: Andrade, Alane, Instituto Federal de Educação, Ciência e Tecnologia da Paraíba, Campus Princesa Isabel, Rodovia PB 426, Sítio Barro Vermelho, Princesa Isabel, PB, Brasil. Email: [alane.andradeifpb@gmail.com](mailto:alane.andradeifpb@gmail.com)

**23259.** Billqvist, M.; Andersson, D.; Bergendorff, C. (2023): Nordens trollsländor. 2. edition. Publisher: Avium förlag AB: 368 pp. (in Swedish) [• Detailed introduction to the fascinating life of dragonflies. • More than 2000 photos and illustrations.

• Educational tables, comparative species photos and keys. • Detailed photos of species characters. • Monthly chart of flight times. • Distribution maps. • Species names also in Danish, English, Finnish, Norwegian and German. • Photos of the larvae of the Nordic species. Nordic Dragonflies is the only one of its kind, a must for anyone who wants to learn more about the fascinating world of dragonflies. Detailed descriptions for species determination, life and distribution areas. A handbook to all dragonflies in the Nordics and some more. The book contains: • Detailed introduction to the fascinating life of dragonflies • More than 2000 photos and illustrations • Educational tables, comparative species photos and keys • Detailed photos of species characters • Monthly chart of flight times • Distribution maps • Species names also in Danish, English, Finnish, Norwegian and German • Photos of the larvae of the Nordic species In this second edition, the number of pages has been increased and maps, find images, phenology records and texts have been updated. Detailed images and keys have been clarified, more comparative tables and over 300 images have been added. Three new species have been added and five more potential species as well as threats and protection of dragonflies are briefly presented.] (Publisher)

**23260.** 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, "Emil Racovita" Institute of Speleology, 5-7 Clinicilor Street, 400006 Cluj-Napoca, Romania

**23261.** Boucenna, H. (2023): Les macroinvertébrés benthiques de la région de Collo. PhD thesis, Sciences de la nature et de la vie et sciences de la terre et de l'univers, Département: Ecologie et génie de l'environnement, Université 8 Mai 1945 Guelma: 134 pp. (in French, with English and Arabian summaries) ["Wetlands, including rivers, are among the most diverse and productive ecosystems in the world, and are also the most threatened. Their diversity has declined in recent decades due to anthropogenic actions,

and this situation will get worse in the future with climate change. Like the rest of the world's rivers, and more specifically in Algeria, the watercourses of Collo are under the experience of increasingly important anthropogenic impacts. In Algeria, many efforts are made for the conservation of biodiversity. In this context, many studies have been carried out during the last decades to assess the benthic fauna. But these efforts are still insufficient, and many areas remain totally unexplored or very little studied as the region of Collo. This work is devoted to the study of benthic macroinvertebrates of the Collo massif. In this work, we carried out a systematic sampling of benthic macroinvertebrates of the Collo area. The sampling was conducted over two periods, between June 2019 and May 2021. This work has allowed the identification of 12733 individuals, distributed on 6 zoological groups: Molluscs, Crustaceans, Annelids, Platyhelminthes, Nematodes and insects. Of which, the insects is the zoological group that dominates the community, with more than 96% of the total number. Insects are divided into 7 orders and more than 50 families, of which Diptera and Coleoptera are the most represented, they have 12 and 11 families, respectively. In terms of abundance, Diptera is the most abundant order, with 4680 individuals, or 38.13% of all insects. The study of the Odonata community shows that the family of Gomphidae represented by the species *Onychogomphus uncatatus* dominates the community, it covers (83.68%) of Odonata. This species dominates the population at the majority of the study sites. The study allows the collection of 990 caddisflies, divided into 11 taxa belonging to 7 families, 8 genera, ... The results obtained will be useful for the evaluation, monitoring, and conservation of Collo's running water ecosystems." (Author) Boyeria irene, *Onychogomphus uncatatus*, *Calopteryx haemorrhoidalis*, *Platynemis subdilata*, *Ischnura graellsii*, *Orthetrum coerulescens*, *Triethemis annulata*, *Chalcolestes viridis*] Address: <https://dspace.univ-guelma.dz/xmlui/bitstream/handle/123456789/14507/Th%c3%a8se%20Boucenna%20H%20ayat.pdf?sequence=1&isAllowed=y>

**23262.** 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 magnetoelectric 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 mWavg 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., Inst. for Advanced Study, Shenzhen Univ., Shenzhen 518060, China. Email: [sxdong@szu.edu.cn](mailto:sxdong@szu.edu.cn)

**23263.** Cicala, D.; Guerra, M.T.; Bardelli, R.; Di Muri, C.; Ludovisi, A.; Vizzini, S.; Mancinelli, G. (2023): Isotopic overlap of invasive and native consumers in the food web of lake

Trasimeno (Central Italy). *Biology* 2023, 12, 1270. <https://doi.org/10.3390/biology12091270>: 22 pp. (in English) ["Simple Summary: An in-depth study of the feeding habits characterizing bioinvaders may provide key information on the magnitude of their impacts on recipient communities. Specifically, if invaders' trophic niche is superimposed on that of native species, interspecific competition may increase, resulting in negative consequences for the competing species; alternatively, trophic niche divergence may occur, facilitating the invaders' integration into the community. In the present study, the analysis of carbon and nitrogen stable isotopes was used to investigate the trophic overlap of native and nonindigenous consumers. We found a generally low degree of isotopic overlap in both the invertebrate and fish assemblage, a condition that may facilitate coexistence and, in turn, limit the strength of invaders' impact. The only exception was the Louisiana crayfish *Procambarus clarkii*, which was demonstrated to interact with a wide spectrum of native invertebrate species, confirming the necessity of guaranteeing appropriate measures of control and mitigation of its ecological impacts. Abstract: An advanced characterization of the trophic niche of non-indigenous species (NIS) may provide useful information on their ecological impact on invaded communities. Here, we used carbon and nitrogen stable isotopes to estimate pairwise niche overlaps between non-indigenous and native consumers in the winter food web of Lake Trasimeno (central Italy). Overall, a relatively low pairwise overlap of isotopic niches was observed between NIS and native species. The only exception was *P. clarkii*, which showed a relatively high and diffuse overlap with other native invertebrates. Our findings highlighted a high niche divergence between non-indigenous and native species in Lake Trasimeno, suggesting a potentially low degree of interspecific competition that may facilitate coexistence and, in turn, limit the strength of impacts. The divergent results obtained for *P. clarkii* indicate that additional control measures for this invasive species are needed to mitigate its impact on the Lake Trasimeno system." (Authors) The study includes *Ischnura* sp. and *Erythromma* sp.] Address: Mancinelli, G., Department of Biological and Environmental Sciences and Technologies—DiSTeBA, University of Salento, SP Lecce-Monteroni, 73100 Lecce, Italy. Email: [giorgio.mancinelli@unisalento.it](mailto:giorgio.mancinelli@unisalento.it)

**23264.** Da Silva Junior, W.F.; Calvão, L.B.; Carvalho, F.G.; Medina-Espinoza, E.F.; Brasil, L.S. (2023): Use of the Zygoptera/Anisoptera ratio (Insecta: Odonata) for habitat alteration assessment in Cerrado streams. *International Journal of Odonatology* 26: 124-131. (in English) ["Natural landscapes of Latin America, such as the Cerrado biome, are increasingly changing due to conflicting development models between economic growth and biodiversity conservation. In cases of total or partial suppression of natural vegetation, more sunlight reaches the streams, leading to changes in Odonata assemblages. Due to their thermoregulation characteristics, the proportion of the suborder Anisoptera tends to increase whereas the suborder Zygoptera will decrease, as this suborder is more sensitive to habitat loss. We assessed whether the proportions of individuals and species richness of Zygoptera and Anisoptera changed due to environmental quality loss in Cerrado stream habitats. Also, we assessed the performance of ratios using genus and family level. We conducted our study at 18 streams in Mato Grosso State, Brazil. We sampled Odonata communities and measured the environmental quality of each stream using the Habitat Integrity Index. To assess the relationship between the environmental quality of the streams and the Odonata ratios, we performed generalized linear models with the beta distribution family. The models showed that the loss of

environmental integrity caused Zygoptera to decrease and Anisoptera to increase. In addition, we found that Acanthagrion/Zygoptera and Argia/Zygoptera ratios showed a strong relationship with habitat integrity, being plausible alternatives for use in monitoring programs. We conclude that the Zygoptera/Anisoptera ratio is a good indicator of environmental quality for the Cerrado biome and therefore makes for a suitable tool for citizen science programs in which no taxonomic expertise is required." (Authors)] Address: Calvão, Lenize, Laboratório de Ecologia e Conservação (LABECO), Universidade Federal do Pará, Belém, Pará, Brazil. Email: lenizecalvao@gmail.com

**23265.** Das, B.; Choudhury, M.A.R.; Dash, C.K.; Al-Habib, M.J. (2023): Abundance and fluctuation and insect pests and natural enemies in winter Brinjal plant in Sylhet. Bangladesh j. entomol. 31(1): 43-55. (in English) ["A field experiment was conducted to study the seasonal incidence and fluctuation pattern of different insect pests and their natural enemies in winter brinjal grown in the experimental farm of Department of Entomology, Sylhet Agricultural University, Sylhet during October 2019 to March 2020. Observation was made in natural condition i.e.; no plant protection measures was taken. The counting of individual arthropod was performed by using visual searching. Eleven arthropod species were observed out of which 6 were insect pests (7 families under 3 orders) and 5 were natural enemies ... dragonflies (*Crocothemis servilia*) were common. The total number of phytophagous insect was 2508 and their relative abundance was observed as aphid (15.31%) > epilachna beetle (10.06%) > leaf roller (7.39%) > jassid (6.30%) > whitefly (5.05%) > brinjal shoot and fruit borer (0.64%). On the other hand, the total number of all beneficial arthropods were 3093 and their relative abundance was found as ladybird beetle (40.22%) > black ant (10.65%) > dragonfly (1.55%) > spider (1.42%) > preying mantid (1.35%). Consequently, the highest number of Aphid (5.80), epilachna beetle (6.60), leaf roller (3.50), jassid (3.40) and whitefly (3.40) was found at 140 days after transplanting (DAT) on 170 days after sowing (DAS) while binjal shoot and fruit borer (0.45) was found at 130 DAT on 160 DAS. Subsequently, the highest number of ladybird beetle (13.85), black ant (4.0), dragonfly (1.15), spider (0.9) and preying mantid (0.95) was observed at 140 DAT on 170 DAS. Proper knowledge and monitoring of seasonal incidence and fluctuation of pest population and status of natural enemies are essential to manage the insect pest of brinjal." (Authors)] Address: Choudhury, M.A.R., Dept of Entomology, Sylhet Agricultural University, Sylhet 3100, Bangladesh. Email: choudhurymar.entom@sau.ac.bd

**23266.** Dutta, M.; Chandra, G. (2023): Octadecadienoate derivatives from *Michelia champaca* seed extract as potential larvicide and pupicide against Dengue vector *Aedes albopictus*. BMC Research Notes volume 16( 212) (2023): 11 pp. (in English) ["The present study was designed aiming at finding novel botanicals for controlling the vector population. Objective was to evaluate the larvicidal and pupicidal efficacies of crude and solvent extracts of *M. champaca* seed against the notorious dengue vector *A. albopictus*. 0.5% concentration of the crude extractive and 40 ppm concentration of ethyl acetate extractive were enough to execute 100% of larval mortality of all the instars after 72 h of exposure and the LC50 and LC90 values (95% confidence level) of ethyl acetate extractive were 0.9880 ppm and 36.0491 ppm. In case of pupicidal bioassay, 100% mortality was observed at 200 ppm of ethyl acetate extract. Through TLC techniques, the bioactive compounds were isolated, which caused remarkable larval toxicity at 15 ppm concentration. Three-way

factorial ANOVA analysis showed different concentrations, time intervals, and instars revealed a significant difference in larval death. FT-IR analysis revealed the presence several important functional groups. Presence of methyl 5,12-octadecadienoate and ethyl 9cis,11trans-octadecadienoate were ascertained by GC-MS analysis. The said bioactive compounds showed very low toxicity in non-target organisms such as damselfly (*Ischnura* sp.) and water bug (*Diplonychus* sp.) Thus, proclaiming the potentialities of *M. champaca* seed extracts as larvicidal and pupicidal agents against *Ae. albopictus*." (Authors)] Address: Chandra, G., Mosquito, Microbiology and Nanotechnology Research Units, Parasitology Laboratory, Department of Zoology, The University of Burdwan, Burdwan, West Bengal 713104, India. Email: goutamchandra63@yahoo.co.in

**23267.** Evelyn, I.G.; Morse, J.C.; Peoples, B.K. (2023): Facilitation of benthic assemblages by Bluehead Chubs: Testing the stress-gradient hypothesis in streams. Ecology of Freshwater Fishes 33(2), e12748: 14 pp. (in English) ["Ecosystem engineers facilitate beneficiary species by ameliorating physical habitat. The stress-gradient hypothesis (SGH) predicts the importance of facilitation in communities should increase with physical stress but has rarely been tested in freshwater. Bluehead Chubs (*Nocomis leptoccephalus*) build gravel nests for spawning, which can reduce negative effects of sedimentation for lithophilic species including invertebrates and other taxa. Our goal was to test the SGH using chubs and benthic assemblages as a model system. We surveyed assemblages in chub nests, paired unmodified substrate and reach-wide samples in 10 Piedmont streams in South Carolina, USA, placed across a gradient of sedimentation. Based on the SGH, we predicted benthic assemblage diversity in chub nests would show no relationship to increasing embeddedness but that diversity in unmodified substrate should decrease with embeddedness. We found that taxa counts, richness and Shannon diversity were higher in chub nests than unmodified substrate but were lower than reach-wide samples. Canonical correspondence analyses indicated benthic assemblages differed between nests and unmodified substrate, but assemblages in both microhabitats were nested subsets of the more diverse reach-wide assemblage. Contrary to our hypotheses, diversity in both microhabitats decreased significantly with substrate embeddedness but was consistently higher in nests. While substrate modification by chubs clearly facilitated benthic diversity at the microhabitat scale, it was not sufficient to overcome the worst effects of sedimentation. This study provides mixed evidence for SGH in streams; chub nesting appears to be facilitative at the microhabitat scale but may not have reach-wide effects on benthic assemblages in this system." (Authors) Odonata are treated at genus level.] Address: Evelyn, Isabel G., Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Gainesville, Florida, USA

**23268.** George, B.S.; Kumar, C.S. (2023): Report of the Nature Camp conducted at Kattilapara, Shendurney Wildlife Sanctuary, Kollam on 14 & 15 October 2023. Warblers & Waders, Trivandrum: 13 pp. (in English) ["The current study was conducted to enumerate the biodiversity (birds, butterfly & dragonflies) at Kattilapara, Shendurney WLS and to prepare a checklist of the birds, butterflies and dragonflies of the Wildlife sanctuary. Shendurney Wildlife Sanctuary is located in the Pathanapuram Taluk, Kollam District (between 8°44' and 9°14' N latitude, and 76°59' and 77°16' E longitude) and is designated as one among the Important Bird Areas (IBAs) in India (Source: BirdLife International (2023) Important Bird Area factsheet). Kattilapara is located in the

Kalluvarambu section of the wildlife sanctuary. " (Authors) A total of 21 odonate species was recorded on 14th and 15th October 2023.] Address: [https://www.researchgate.net/publication/376228549\\_Warblers\\_Waders\\_Report\\_Kattila-para\\_14\\_15\\_Oct\\_2023](https://www.researchgate.net/publication/376228549_Warblers_Waders_Report_Kattila-para_14_15_Oct_2023)

**23269.** Gil-Tapetado, D.; Lopez-Collar, D.; Gomez, J.F.; Mañani-Perez, J.; Cabrero-Sañudo, F.J.; Muñoz, J. (2023): Climate change as a driver of insect invasions: Dispersal patterns of a dragonfly species colonizing a new region. *PLoS ONE* 18(9): e0291270. <https://doi.org/10.1371/journal.pone.0291270>: 17 pp. (in English) ["*Trithemis kirbyi* recently colonized Western Europe from North Africa. Since its first record in the Iberian Peninsula in 2007, the species has been spreading northward and has become naturally established in the central and eastern Iberian Peninsula, the Balearic Islands and southern France. Despite its worldwide distribution, its rapid colonization of the western Mediterranean area occurred only very recently. The aims of this study were to evaluate (1) whether the species' colonization of the western Mediterranean is related to climate change and rising temperatures, specifically the summer warming peaks that have occurred in the last decade, (2) which climatic variables have most influenced its distribution and dispersal, and (3) its potential future dispersal and colonization capacity towards the eastern Mediterranean. We found that the dispersal and recent establishment of *T. kirbyi* in southwestern Europe strongly depends on increasing temperatures, particularly summer temperature peaks, which has allowed this species to disperse farther and more effectively than during years with average summer temperatures. The most important variable in the suitability models is the minimum temperature of the coldest month, which, in recent decades, has become less of a limiting factor for ectotherms. According to the models, suitable areas for the species are currently found throughout the eastern Mediterranean parts of Europe, and it is likely that it can naturally colonize these areas as it did in the Iberian Peninsula. *T. kirbyi* is a model of how climate change and observed rising temperatures have turned previously inhospitable regions into suitable areas for exotic species, which may successfully colonize them naturally if they can reach these promising lands on their own. However, this study serves as a warning that such species can also colonize these new regions with a little help from unsuspecting means, which are often responsible for the increasingly common presence of invasive, noxious taxa in Europe" (Authors)] Address: Gil-Tapetado, D., Fac. Ciencias Biológicas, Depto de Biodiversidad, Ecología y Evolución, Univ. Complutense de Madrid, Madrid, Spain. Email: [diego.gil@ucm.es](mailto:diego.gil@ucm.es)

**23270.** Girgente, G.S.; McIntyre, N.E. (2023): Watershed-mediated ecomorphological variation: A case study with the twin-striped clubtail dragonfly (*Hylogomphus geminatus*). *Insects* 2023, 14, 754. <https://doi.org/10.3390/insects14090754>: 24 pp. (in English) ["Simple Summary: Changes in the size of aquatic or amphibious organisms can signal environmental alterations. *H. geminatus* is a dragonfly in the southeastern US with known variation in total body length. Our objective was to characterize the significance and extent of size differences in the species and determine whether those differences are associated with watersheds across the species' limited range. In this species, total body length varied by watershed. Significant differences in length were noted in many watershed comparisons, most notably in adjacent watersheds on either side of the Apalachicola River, FL, which differed in land-cover types; smaller individuals were associated with more disturbed forms of land cover. Our results suggest there are watershed-level differences in body

length across the range of the species that should be examined more closely with respect to different potential environmental stressors, such as poor water quality from changing land cover associated with agriculture and urbanization. Abstract: Anthropogenic land-cover change is modifying ecosystems at an accelerating rate. Changes to ecomorphologically variable taxa within those ecosystems serve as early-warning signs that resources on which humans and other animals depend are being altered. One known ecomorphologically variable taxon is *H. geminatus*, a species of dragonfly in the southeastern United States that shows pronounced variation in total body length across its limited geographic range. We measured total length of live as well as preserved museum specimens of *H. geminatus* and the sympatric species *Progomphus obscurus* (as a means for comparison). Both species showed significant size differences linked to HUC-8 watersheds in which they occur. *H. geminatus* showed additional significant differences on either side of the Apalachicola River, Florida, for all comparisons by sex. In overlapping watersheds, the species tended to show the same trends in length relative to their respective averages. Smaller body length was associated with more urban and agricultural land cover. These findings indicate that ecomorphological variation is tied to the watershed scale and point to significant variations on either side of the Apalachicola River. More thorough future analyses would be needed to verify trends in body length and identify the drivers behind them." (Authors)] Address: McIntyre, Nancy, Dept of Biological Scien., Texas Tech Univ., Lubbock, TX 79409, USA

**23271.** 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 University, 901 W. State Street, West Lafayette, IN, 47907, USA

**23272.** 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 *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., Laboratory of Conservation Ecology, Graduate school of Science & Technology, University of Tsukuba, 1-1-1 Tennoudai, Tsukuba 305-8572, Japan. Email: yokoi.tomoyuki.gp@u.tsukuba.ac.jp

**23273.** Higashikawa, W.; Yoshimura, M.; Nagano, A.J.; Maeto, K. (2023): Conservation genomics of an endangered floodplain dragonfly, *Sympetrum pedemontanum elatum* (Selys), in Japan. *Conservation Genetics* 25(3): 663-675. (in English) ["Except for fish whose migration is barriered by weirs and dams, there have been inadequate investigation on the population genetic structure of endangered animal species depending on riverside pools connecting to river channels (called "wando" in Japanese) in floodplains. We focused on the endangered floodplain dragonfly, *S. pedemontanum elatum*, which is known to live in the riverside pools during its larval stage and migrate only several kilometers by flight during adulthood. The population genetic structure in and around the central region of Japan was analyzed using approximately 20,000 SNPs obtained using double-digest restriction site-associated DNA sequencing (ddRAD-seq). Our results revealed small genetic differences over a wide area (global  $F_{st} < 0.05$ ). However, a few genetically unique populations that might be associated with paleo-basins segregated during ancient tectonic events were detected. These populations are considered to be important conservation units. We also found a very weak gene flow among the studied populations, implying that population isolation occurs widely. While recent migrations were scarce, and detected within a direct distance of approximately 5 km, there were also some cases without migration, even at shorter distances. Genetic diversity was positively correlated with the amount of grassland within a 1 km buffer, suggesting that the preservation of grasslands surrounding aquatic habitats enhances the immigration and colonization of adult dragonflies of this endangered species. Understanding the effects of historical tectonism and terrestrial environments on the genetic diversity of semi-aquatic organisms, such as insects and amphibians, is crucial for the conservation of floodplain habitat connectivity." (Authors)] Address: Higashikawa, W., Aqua Restoration Research Center, Public Works Res. Institute, Kawashimakasada, Kakamigahara, Gifu, 501-6021, Japan

**23274.** Jödicke, R. (2023): Übermachten von *Lestes sponsa* und *L. virens* im Rad oder Tandem (Odonata: Lestidae). *Mitteilungen der AG Libellen in Niedersachsen und Bremen* 5: 53-58. (in German, with English summary) ["Nocturnal roosting

of *Lestes sponsa* and *L. virens* in wheel or tandem position (Odonata: Lestidae): A compilation of several hitherto unpublished early-morning encounters with roosting lestid pairs is presented. It is suggested that nocturnal roosting is a rare but not uncommon and mainly overlooked behaviour in dragonflies." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

**23275.** 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, Univ.Leuven, Charles Deberiotstraat 32, 3000, Leuven, Belgium. Email: sarah.jorissen@kuleuven.be

**23276.** Juhász, E.; Németh, Z.; Gó, A.; Végvári, Z. (2023): Multilevel climatic responses in migratory insects. *Ecological Entomology* 48(6): 755-764. (in English) ["Evidence is mounting that migration in ectotherms is more widespread than formerly believed. Thus, a number of insects living in temperate climates, including locusts, butterflies, moths and dragonflies, following seasonal migration strategies show high responsiveness to alterations in climatic processes, similar to a broad taxonomic range of birds. On global scales, migratory insects include iconic large butterflies, dragonflies and also a number of crop pests. However, insect migrations are ecologically distinct from those of vertebrates, often relying heavily on seasonal winds and multiple generations to complete a full annual cycle, due to short insect life spans. Here, we review publicly available online resources to identify key patterns of spatial, taxonomic scales and complexity of climatic responsiveness to environmental predictors in migratory insects. We found that migratory insects respond to various levels of complexity in climatic patterns, and these responses are predicted by life history and ecological traits: (i) responses to climatic effect type were predicted by climate zone(s) of the distribution area, whereas (ii) response to climatic complexity was predicted by body size. In conclusion, migratory insects respond to various levels of complexity in climatic processes, and this responsiveness is



governed by a substantially wider array of environmental predictors than demonstrated in vertebrates." (Authors)] Address: Juhász, Edit, Department of Evolutionary Zoology & Human Biology, Univ. of Debrecen, Debrecen, Hungary. Email: juhasz.edit@science.unideb.hu

**23277.** Keetapithchayakul, T.S.; Makbun, N.; Rattanachan, K.; Tungpairjwong, N. (2023): Contribution to the knowledge of the Odonata fauna of Khao Yai National Park and the adjacent regions in Thailand. *Faunistic Studies in South-east Asian and Pacific Island Odonata* 42: 1-45. (in English) ["The diversity and distribution of Odonata were investigated at Khao Yai National Park (KYNP) during January 2019 – March 2022. Adults and larvae of 78 species were collected from 26 sampling sites including lotic and lentic habitats. The updated odonate checklist of KYNP and adjacent areas brings the total number of species from 109 to 142 species, of which 33 species are new records. The Libellulidae account for more than one third of the regional fauna with the highest number of species, followed by Coenagrionidae, Gomphidae, and Platynemidae, respectively. Differences between the numbers of Odonata species recorded using larval records, adult records, and observational and photographic records are discussed. Multivariate analyses were performed which revealed a strong correlation between the habitat types (lotic, lentic and "mixed" water bodies) and odonate species present. Species richness between those three habitat types was similar. Two-way cluster analysis showed a strong association between three groups of odonate species and three groups of microhabitats (rocky-lotic, debris-riparian-lotic, lentic habitats)."] (Authors)] Address: Keetapithchayakul, T.S., 225 Moo 1, Viangkum Sub-district, Kum-pawapi District, Udonthani Province, Thailand 41110 Email: Keetapithchayakul.TS@gmail.com

**23278.** Kumar, S.; Gupta, P.; Mehdi, H. (2023): Numerical analysis of aerodynamic performance and fluid flow of dragonfly wing section at low Reynold numbers. *International Conference on Thermo-Fluids and System Design. AIP Conference Proceedings* 2863, 020026 (2023): 9 pp. (in English) ["In this study, the CFD simulation of fluid flow and aerodynamic performance of the dragonfly (*Aeshna Cyanea*) wing section at low Reynolds numbers (500, 750, and 1000) with various angles of attack (AOA) (0°, 5°, 10°) was analyzed through FLUENT software. The numerical solver employed was based on the SIMPLE algorithm, velocity pressure coupling with the Green-Gauss Node scheme. The triangular unstructured mesh simulation was employed as per finite volume discretization and observed that the mean coefficient of lift increased as the AOA increased, while the drag coefficient decreased, resulting in an enhanced propulsive performance with increasing AOA. The gliding ratio, increases monotonically as the AOA increases. The drag formation yields some intriguing results. The average drag coefficient in each case decreases as the AOA increases, as expected, because viscous effects are more prevalent at lower Re numbers, causing skin friction to be the predominant contributor to drag reduction."] (Authors)] Address: Mehdi, H., Mechanical Engineering Dept, Meerut Inst. of Engineering & Technology, Meerut, India. Email: husain.mehdi@miet.ac.in

**23279.** Lahondère, C.; (2023): Recent advances in insect thermoregulation. *Journal of Experimental Biology* (2023) 226, jeb245751. doi:10.1242/jeb.245751: 12 pp. (in English) ["Ambient temperature (Ta) is a critical abiotic factor for insects that cannot maintain a constant body temperature (Tb). Interestingly, Ta varies during the day, between seasons and habitats; insects must constantly cope with these

variations to avoid reaching the deleterious effects of thermal stress. To minimize these risks, insects have evolved a set of physiological and behavioral thermoregulatory processes as well as molecular responses that allow them to survive and perform under various thermal conditions. These strategies range from actively seeking an adequate environment, to cooling down through the evaporation of body fluids and synthesizing heat shock proteins to prevent damage at the cellular level after heat exposure. In contrast, endothermy may allow an insect to fight parasitic infections, fly within a large range of Ta and facilitate nest defense. Since May (1979), Casey (1988) and Heinrich (1993) reviewed the literature on insect thermoregulation, hundreds of scientific articles have been published on the subject and new insights in several insect groups have emerged. In particular, technical advancements have provided a better understanding of the mechanisms underlying thermoregulatory processes. This present Review aims to provide an overview of these findings with a focus on various insect groups, including blood-feeding arthropods, as well as to explore the impact of thermoregulation and heat exposure on insect immunity and pathogen development. Finally, it provides insights into current knowledge gaps in the field and discusses insect thermoregulation in the context of climate change."] (Authors)] Address: Lahondère, Chloé, Dept of Biochemistry, The Franklin Life Science Institute, The Global Change Center, Dept of Entomology, Center of Emerging, Zoonotic & Arthropod-borne Pathogens, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, USA.

**23280.** Lebeau, L.; Almeida-Streveler, N. (2023): Les mares de Préaux: Recensement, inventaire et sensibilisation Lien entre la végétation et la richesse spécifique en amphibiens et en odonates sur les mares. *L3EBO, Écologie et Biologie Des Organismes, Université de Rouen*: 38 pp. (in French) ["A study was carried out in the commune of Préaux to assess the influence of vegetation on the species richness of amphibians and odonates in ponds in the region. The aim was to determine whether the presence of certain plant species had a positive impact on the biological diversity of these aquatic habitats. A sub-hypothesis was also formulated to study the influence of connectivity between ponds on this species richness. An inventory of the odonates, amphibians and flora present in the ponds in the municipality was carried out. The results showed that the species richness of amphibians and odonates was indeed positively influenced by the presence of two specific plant species, namely *Juncus effusus* and *Callitriche* sp. for odonates and *Juncus effusus* for amphibians. However, it was found that biological diversity was not affected by the distance between the ponds. Thus, connectivity between the various bodies of water in the municipality did not appear to play a significant role in the species richness of amphibians and odonates. On the other hand, the ecological conditions of the ponds were identified as a determining factor. The specific characteristics of each pond, such as water quality, the availability of food resources and the structure of the surrounding vegetation, have been shown to influence the presence and abundance of amphibian and odonate species."] (Authors/-DeepL.)] Address: <http://www.preaux76.fr/wp-content/uploads/2023/07/Rapport-de-stage-ALMEIDA-STREVELER-LEBEAU.pdf>

**23281.** Lestari, P.; Triatmanto (2023): The android-based e-module development about dragonfly diversity around Sri Gethuk waterfall as biodiversity teaching material for Xth Grade of Senior High School. *Journal Collaboration of Social Environment and Education* 1(1): 25-30. (in English)

["The aim of the study is to determine the feasibility of an android-based e-Module from dragonfly diversity data at Sri Gethuk Waterfall as biodiversity teaching material for Xth grade of Senior High School based on the results of expert assessment and readability test of biology teachers and students. This Research and Development (R&D) with the ADDIE model (Robert Maribe Branch, 2009) which is limited up to the ADD stage. The study subjects consisted of two material experts, three media experts, two high school biology teachers, and 25 Natural Science students of Xth grade. The object of the study was a prototype of android-based e-module about Dragonfly Diversity at Sri Gethuk Waterfall. The data collection assessment instruments for the material experts, the media experts, the biology teachers, and the students. The results show that some BSNP standard assessment criterias have not yet identified in the e-Module. The criterias that have not yet identified are then corrected according to expert advice and verified with credible academic sources, so that the criteria of e-module can be suitable with the standards. All of the criterias of e-Module that suitable with the standards are identified, so the e-Module can be used as teaching material in learning activities." (Author)] Address: Lestari, P., Biology Education, Yogyakarta Satate Univ., Indonesia. Email: puji.lestari2016@student.uny.ac.id

**23282.** Liaqat, I.; Noor, V.; Nazish, M.A. (2023): Recent advances in evaluating insects as bioindicators of heavy metal pollution. In: Basim Almayyahi (ed.): Heavy Metals - Recent Advances. DOI: <http://dx.doi.org/10.5772/intechopen.1102-12>: 17 pp. (in English) ["Natural ecosystems are adversely affected by man-made interventions. Among living organisms, insects are regarded as susceptible to environment disruption as delicate body confirms the presence or absence of polluted environment thus found as suitable indicators of the aquatic and terrestrial ecosystem. Insects are being considered indicators of environmental pollution because different taxa of different localities provide robust information, provide a comparison of various communities, and quantitative data associated with indicators etc. Most of them present the quick reliable influence to heavy metal accumulation as pronounced disruptions were observed at molecular and biochemical level hence considered as best opted indicators of environmental pollution." (Authors) The paper includes references to Odonata.] Address: [https://www.researchgate.net/publication/374830597\\_Recent\\_Advances\\_in\\_Evaluating\\_Insects\\_as\\_Bioindicators\\_of\\_Heavy\\_Metal\\_Pollution](https://www.researchgate.net/publication/374830597_Recent_Advances_in_Evaluating_Insects_as_Bioindicators_of_Heavy_Metal_Pollution)

**23283.** Machado Giraladin, M.; Bernardy, J.V.; Brito, P.V.; De Marco Júnior, P. (2023): Egg morphology of two Neotropical dragonflies: *Micrathya hesperis* and *Miathyria simplex* (Odonata: Libellulidae). *Neotropical Entomology* 52: 1109-1118. (in English) ["Odonata species live through their immature development in aquatic habitats, where the eggs are adapted to survive the initial stages. The survival of the eggs is linked to the layers that make up the eggshell. These layers are common to all odonate species, but show variations among them, depending on the oviposition method. For example, endophytic eggs (laid in plant tissues) and exophytic eggs (laid on the water surface) have different morphologies, which may reveal egg adaptations to environmental conditions and stresses. The differences in the egg morphologies could be shown in the length of the egg layers, their histochemical composition, and in the ultrastructure. The histochemical composition can reveal several features that could lead us to a better understanding of its function, for example, how glycoproteins and total proteins could regulate the humidity and water retention in the eggs according to the environments in which the eggs are placed." (Authors)] Address: Machado

Giraladin, Maíra, Lab de Teoria, Metacomunidades e Ecologia de Paisagens, Depto. de Ecologia, ICB, Campus Samambaia, Univ. Federal de Goiás, Goiânia, GO, Brazil

**23284.** Maillot, M.; Roucaute, M.; Jaeger, C.; Aubin, J. (2023): Aquatic macroinvertebrate abundance in French experimental polyculture fishponds. *Ecological Solutions and Evidence*, 4, e12279. <https://doi.org/10.1002/2688-8319.12279>: 6 pp. (in English) ["Ponds host a variety of invertebrate species and contribute greatly to global biodiversity. Aquaculture influences macroinvertebrate diversity and productivity in ponds through several practices, such as macrophyte and water management. Fish stocking is also considered controversial for preserving biodiversity through the direct predation upon natural species and changes induced on the biotope. An experiment examined whether compartmentalized ponds with temporarily fish-free areas had higher fish productivity and macroinvertebrate abundance and diversity than open ponds. The experimental design consisted of two treatments—compartmentalized (C) or open (O)—each applied to three ponds. Roach (*Rutilus rutilus*), tench (*Tinca tinca*) and common carp (*Cyprinus carpio*) were stocked in the ponds in March 2021. Juvenile pikeperch (*Sander lucioperca*) were stocked in the ponds in June. In the C ponds, three areas were created and opened successively: (C1) corresponding to ¼ of the pond surface to host roach, tench and common carp from March to May; (C2) ¼ of the pond surface restricted to fish from March to May; and (C3) ½ of the surface restricted to fish from March to July, except for juveniles of pikeperch which were stocked in June. We investigated patterns in abundance, dry biomass and productivity of macroinvertebrates four times from March to October. This article presents observed macroinvertebrate [including "Odonata" abundances and weighted dry biomass, and productivity estimated from them. Overall, 77,749 individuals were identified, of which one-third were Chironomina and another one-third were Oligochaeta. The invasive red swamp crayfish (*Procambarus clarkii*) was found in one pond in October. The two highest taxonomic richness values were found in C ponds (71 and 69 taxa). The lowest taxonomic richness (61 taxa) was in an O pond. Although dry biomass was clearly higher in the C ponds in March, no tendency could be seen between C and O ponds throughout the experiment. No difference in productivity was found between the C and O ponds among the experiment. By reporting macroinvertebrate abundance, biomass, productivity, size classes, developmental stages and high-resolution taxonomic identification in a freshwater polyculture system, this dataset is one of the first of its kind." (Authors)] Address: Maillot, Marie, INRAE, UMR Sol Agro et Hydrosystème Spatialisation, Rennes, France. Email: mariemaillot-290492@gmail.com

**23285.** Manenti, R.; Forlani, M.; Lapadula, S.; Galbiati, M.; Barzaghi, B.; Ficetola, G.F.; Melotto, A. (2023): Landscape of fear in freshwater ecotones: How predation risk and light conditions affect mesopredator activity and foraging in springs. *Freshwater Biology* 68(10): 1716-1725. (in English) ["Springs are environments that can provide general insights into factors favouring diversity in ecotones, but they are often neglected in freshwater studies. One of the challenging processes acting in ecotones is the landscape of fear (LOF), the space-time variation of perceived predation risk. Spring exploitation often involves species that are mesopredators in surface fresh water and that can become apex predators in ground water, as in the case of the fire salamander larvae (*Salamandra salamandra*). Here, we aim to determine whether the activity and foraging patterns of the fire salamander in springs are affected by LOF. We surveyed the night- and

daytime abundance of fire salamander larvae in 15 springs to assess predator occurrence. We also reared 48 salamander larvae with and without non-lethal exposure to predators [larvae of *Cordulegaster boltonii* are acting as the top predators] within tanks simulating groundwater or surface freshwater light features. Before and after a month of rearing, we tested larva efficiency in catching prey when exposed to predator chemical cues, both in light and dark conditions. In the field, the number of active fire salamander larvae was significantly higher during the night. At night, the number of active larvae across the transition area between ground water and surface water was higher in plots closer to the surface. Testing and rearing conditions significantly affected larva behaviour, and prey capture was significantly more effective in light conditions. It was less successful in larvae reared with predator chemical cues and in the presence of predators. Moreover, larvae reared with predators under light conditions were slower than those raised with predators in dark conditions. Our results show that LOF can interact with extant environmental features and constitute a significant behavioural pressure for mesopredator species living in freshwater ecotones." (Authors)] Address: Manenti, R., Dept Environmental Science & Policy, Univ. degli Studi di Milano, Via Celoria, 26, Milano 20133, Italy. Email: raoul.manenti@unimi.it

**23286.** Martens, K. (2023): Preface: Homage to Henri J. F. Dumont: a life in science. *Hydrobiologia* 850: 4689-4691. (in English) [<https://link.springer.com/article/10.1007/s10750-023-05402-4>] Address: Martens, K., Freshwater Biology, Royal Belgian Institute of Natural Sciences, Natural Environments, Brussels, Belgium. Email: kmartens@naturalsciences.be

**23287.** Miralles Núñez, A.; Lockwood, M.; Olmo Vidal, J.M.; Franch, M.; Cabana, M. (2023): Actualització de la distribució de *Sympetrum vulgatum* ibericum Ocharan, 1985 a Catalunya (Odonata: Libellulidae). *Butlletí de la Institució Catalana d'Història Natural* 87(2): 113-118. (in Catalan) ["The observations of *S. vulgatum* from the citizen science platforms Inaturalist.org, Observation.org, Biodiversidadvirtual.org and Ornitho.cat have been reviewed. The information obtained has been added to several unpublished data from several people from 2009 to 2022. All observations are shown in the Annex. Only those observations have been taken into account for which complete and detailed information is available, and which have been able to be confirmed, either from photographs, by the reliability and experience of the observer or by contrasting the identification with the authors. In addition, all the observations compiled by the Odonatus Study Group of Catalonia (Oxygastra-GEOC) that were included in the book *Les Libèl·lules de Catalunya* (Martín et al. 2016) have also been verified. Old records of the species from the late 19th and early 20th centuries have not been taken into account, as it cannot be ruled out that they are misidentifications and confusions with other species (Martín, 2004). These doubtful records were no longer considered in Martín et al. (2016). According to the data obtained, *S. vulgatum* (Figure 1) has been observed in Catalonia in 10 UTM grids of 10 x 10 km distributed in five counties, from east to west, from Ripollès, passing through Cerdanya, Pallars Jussà, the Alta Ribagorça to the Vall d'Aran, being the Cerdanya, and especially around the Segre River, where the largest number of records is concentrated (Figure 2). The previous data published by Martín et al. (2016) also show that most of the records are in Cerdanya, and especially around the Segre River. *Sympetrum pedemontanum* is also present in this area, a species that in the Iberian Peninsula is only found in a small area of less than 6 km<sup>3</sup> around the Segre River. Many naturalists and enthusiasts visit this area to observe and

photograph *S. pedemontanum*, which has also favored the collection of observations of *S. vulgatum*. Regarding the phenology of the species, it has been observed in Catalonia from mid-July to mid-October. August and September are the months with the largest number of records by far. In France, the nominal subspecies, *S. v. vulgatum*, has been cited from early June to mid-October. There, August is the month with the most records (Kalkman et al. 2015). Although the species is usually found above 1,000 m.a.s.l., it has been observed from 393 m in Talam, in Pallars Jussà, to more than 2,000 m in Meranges, in Cerdanya (2,266 m), and from Naut Aran, in the Aran Valley (2,204 m). Regarding the habitat, the species has been observed in Cerdanya in lentic and lotic environments, from high mountain bogs, ponds and gravel pits with vegetation, to ditches (Martín et al. 2016). The new localities outside Cerdanya where the species has been located are a mountain lake in Pardines, a swampy area that forms on the side of the Noguera de Tor river as it passes through the Vall de Boí, some nearby wetlands in the Noguera Pallaresa river as it passes through Talam and Tremp, and near the high mountain lakes of Naut Aran. Taking into account the new localities of Ripollès, Alta Ribagorça and Vall d'Aran, we consider that it is possible that the species is more widespread in these regions, as there are many areas with potentially favorable habitat that should be explored. The great similarity of *S. vulgatum* with other species of its same genus with which it shares habitat, such as *S. striolatum*, has surely caused its distribution to be underestimated. However, with the exception of Cerdanya, in Catalonia the species has sparse populations and is restricted to the Pyrenees area, with very few records. Better survey of favorable habitats outside known localities is likely to reveal wider distribution, but not greater abundance. Consequently, we hope that this better knowledge reflects a lower risk of extinction in Catalonia than what is currently considered to be, which could lead to recommending a review of its threat status." (Authors/Google translate)] Address: Miralles Núñez, Adrià, Servei de Fauna i Flora. Dept d'Acció Climàtica, Alimentació i Agenda Rural. Generalitat de Catalunya. C/ Foc, 57. 08038. Barcelona, Catalunya, Spain. Email: amiralles10@gmail.com

**23288.** Müller, O.; Petzold, F.; Brauner, O.; Knopf, G. (2023): Entwicklungsnachweise von *Onychogomphus forcipatus* forcipatus (Linnaeus, 1758) an der Oder in Brandenburg. *Libellula* 42(3/4): 151-162. (in German, with English summary) ["Between June and July 2023, exuviae of *O. forcipatus* forcipatus were found at different river sections of the River Odra in Brandenburg during a gomphid monitoring. This is the first published evidence of reproduction of this species in a lowland river for Brandenburg and the second for the entire North German Lowlands. The larval development of *O. forcipatus* forcipatus is discussed with regard to possible habitat use in the river; research needs are identified." (Authors)] Address: Müller, O., Birkenweg 6d, 15306 Libbenichen, Germany. Email: mueller.ole@gmail.com

**23289.** Muñoz Hermitaño, J.Z.; Quispe Briceño, E.D.; Matta Flores, F.J.; Crispin Abregu, L. (2023): Primer listado taxonómico de libélulas (Insecta: Odonata) en la laguna Fortaleza, Pichanaqui (Perú). *Yotantsipanko* 3(2): 51-62. (in Spanish, with English summary) ["The aim of this study is to identify dragonfly species in Fortaleza Lagoon, Pichanaki, located in the central jungle of Peru. Fieldwork was conducted during the months of June and July 2023. The research was descriptive and carried out in situ for the identification and classification of dragonflies. The result was the identification of 5 species in Fortaleza Lagoon: *Erythrodiplax umbrata*, *Perrithemis tenera*, *Uracis imbuta*, *Ischnura elegans* (sic), and

*Erythrodiplax fusca*, considered biological controllers of mosquitoes and other insects. Additionally, odonates are regarded as bioindicators of the health of aquatic ecosystems. The diversity of species in Fortaleza Lagoon is still unknown, suggesting the need for further studies." (Authors)] Address: Muñoz Hermitaño, Jessica, Universidad Nacional Mayor de San Marco, Lima, Perú. E-mail: jessicazaida1@gmail.com

**23290.** Nel, A.; Garroute, 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 case-neuensis* 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

**23291.** Persoglio, M. (2023): Monitoring the seasonal dynamics of benthic organisms in two mountain lakes in the Julian Alps. *Magistrsko delo, Fakulteta za znanosti o okolju, Nova Gorica*. [Dostopano 27 julij 2024]. Pridobljeno s: <https://repozitorij.ung.si/lzpisGradiva.php?lang=slv&id=8247>: 45 pp. (in Slovene, with English summary) ["The aim of project was to determined the similarities/differences and seasonal dynamics of benthic organisms in two high mountain lakes in the Julian Alps, which are located at different altitudes: Predil lake (969 m) - Italy and Km lake (1391 m) - Slovenia. Sampling was carried out according to the »kick sampling« technique with a hand net for collecting aquatic invertebrates in the water to a depth of about half a meter and about two meters from the shore of the lake, depending on the shape and composition of the bottom. Sampling took place on different substrates, to cover as many microhabitats as possible. The final goal of the project was to show the dynamics of aquatic animals according to the season. At the same time, we looked for differences in the species composition and frequency of animals between the two lakes. In five sampling periods between 2021 and 2022 we collected 40 samples at eight different locations. In total, we found 330 specimens from eleven groups, which were classified into eight higher taxa: Diptera, Ephemeroptera, Gastropoda, Megaloptera, Odonata [Gomphidae], Oligochaeta, Plecoptera and Trichoptera. The most abundant groups were true flies and freshwater worms." (Authors)] Address: <https://repozitorij.ung.si/lzpisGradiva.php?id=8247>

**23292.** Qu, Y.; Keller, V.; Bachiller-Jareno, N.; Eastman, M.; Edwards, F.; Jürgens, M.D.; Sumpter, J.P.; Johnson, A.C. (2023): Significant improvement in freshwater invertebrate biodiversity in all types of English rivers over the past 30 years. *Science of The Total Environment* 905, 20 December 2023, 167144: 13 pp. (in English) ["Highlights: • River macroinvertebrate richness has increased throughout England over the past 30 years. • The recovery of pollution sensitive invertebrates has now reached the reference condition. • Improvement seen across all regions, river types, land covers and wastewater exposures. Abstract: There remains a persistent concern that freshwater biodiversity is in decline and being

threatened by pollution. As the UK, and particularly England, is a densely populated nation with rivers of modest dilution capacity, this location is very suitable to examine how freshwater biodiversity has responded to human pressures over the past 30 years. A long-term dataset of 223,325 freshwater macroinvertebrate records from 1989 to 2018 for England was retrieved and examined. A sub-set of approximately 200 sites per English Region (1515 sites in total with 62,514 samples), with the longest and most consistent records were matched with predicted wastewater exposure, upstream land cover and terrain characteristics (latitude, altitude, slope gradient and flow discharge). To understand changes in macroinvertebrate diversity and sensitivity with respect to these parameters, the biotic indices of (i) overall family richness, (ii) Ephemeroptera, Plecoptera, Trichoptera (EPT) family richness, and (iii) the Biological Monitoring Working Party (BMWP) scores of NTAXA (number of scoring taxa) and (iv) ASPT (average score per taxon) were selected. A review of how close the BMWP scores come to those expected at minimally impacted reference sites was included. For all latitudes, altitudes, channel slope, river size, wastewater exposure levels, and differing proportions of upstream woodland, seminatural, arable and urban land cover, all diversity or sensitivity indices examined improved over this period, although this improvement has slowed in some cases post 2003. Mean overall family richness has increased from 15 to 25 family groups, a 66% improvement. The improvement in mean EPT family richness (3 to 10 families, >300% improvement), which are considered to be particularly sensitive to pollution, implies macroinvertebrate diversity has benefited from a national improvement in critical components of water quality." (Authors) The paper includes references to Odonata.] Address: Johnson, A.C., UK Centre for Ecology and Hydrology, Wallingford OX10 8BB, UK. Email: ajo@ceh.ac.uk

**23293.** 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

**23294.** Ranjan, K.S.; Pawar, A.A.; Roy, A.; Saha, S. (2023): Experimental force measurement study of *Pantala flavescens* in tailwind flight. *Bulletin of the American Physical Society*, 76th Annual Meeting of the Division of Fluid Dynamics, Sunday–Tuesday, November 19–21, 2023; Washington, DC, Session T06: Aerodynamics: Folding, Flapping,

Twisting and Rotating Wings, 4:25 PM–6:09 PM, Monday, November 20, 2023, Room: 102B; Abstract: T06.00005: (in English) [Verbatim: Wind compensation is vital in insects migrating under the influence of tailwinds and crosswinds. An insect requires tailwind compensation to cover large distances and crosswind drift compensation to stay on course. The aerodynamic force measurements can provide insight into the mechanism involved in the migration in tailwind and crosswind configurations. We conducted a tethered flight experiment in a wind tunnel at a wind speed of 2.7 m/s on the dragonfly species *Pantala flavescens*, a long-distance migrant migrating between India and Africa. We positioned a dragonfly in a tailwind and three crosswind-tailwind configurations at 5°, 10°, and 15°. On average, the dragonfly generates thrust three times its weight at all orientations. Our results show that the dragonfly employs a new flapping mode for high lift generation and generates a mean lift equal to its weight. It produces side force approximately 0.5 times its weight, opposing crosswind to compensate for wind drift. Wind drift compensation becomes increasingly difficult with an increase in crosswind angles. In tailwind and crosswind flights, the strategy is to generate large amounts of thrust to propel itself and lift to sustain a level flight while compensating for wind drift by generating an opposing side force.] Address: not stated

**23295.** Reindl, S.; McLean, K.I.; Kneitel, J.M.; Bell, D.A.; Batzer, D.P. (2023): Doing the same thing over and over again and getting the same result: Assessing variance in wetland invertebrate assemblages. *Wetlands* 43, 84. <https://doi.org/10.1007/s13157-023-01734-y>: (in English) ["Past efforts to explain variation of invertebrate assemblages in freshwater wetlands have been less productive than anticipated. To explore why efforts are disappointing, we assembled large invertebrate data sets from North Dakota prairie potholes, California rock pools, and Georgia Carolina bay wetlands that addressed spatial (among wetlands) and temporal (among seasons and years) variation. We anticipated that these large data-set sizes would enable robust conclusions to be drawn, and each place had unique environmental conditions that might contribute to greater explanatory power. We used statistical techniques that partitioned variation in invertebrate assemblages into spatial and/or temporal components, and that also yielded a measure of the amount of unexplained variation; Permutational Multivariate Analysis of Variation and Principal Coordinates Analysis assessed whole assemblage variation, and Analysis of Variance or Analysis of Covariance assessed variation in taxon richness, total abundances, and abundances of wide-spread individual taxa. Across all locations, variation explained by spatial and temporal factors, and unexplained variation were of comparable magnitudes (i.e., similar R2 values of ~ 50%). Review of other published studies indicate that this pattern is widespread. The 50% or more unexplained variation is typically ignored by researchers, who instead focus on explained fractions. We argue that, besides addressing explained spatial and temporal variation in invertebrate assemblages (e.g., control by hydrology, resources, predation), efforts to understand what contributes to currently unexplained variation, that is unrelated to local spatial or temporal controls (e.g., broad climatic and biogeographic patterns, organism physiology and behavior), will lead to a fuller comprehension of how invertebrates in freshwater wetlands are controlled." (Authors)] Address: Batzer, D.P., Dept of Entomology, 120 Cedar St, Univ. of Georgia, Athens, GA 30605, USA. Email: [dbatzer@uga.edu](mailto:dbatzer@uga.edu)

**23296.** 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, Instituto de Ciências Biológicas, Universidade Federal do Pará, Belém, Brazil. Email: [tainasilva.tr@gmail.com](mailto:tainasilva.tr@gmail.com)

**23297.** Roux, A.J.; Clinton, S.M. (2023): Evaluation of the relationship between stream habitat quality and taxa and trait richness and diversity in piedmont streams in North Carolina. *Hydrobiology* 2023, 2(2), 363-381; <https://doi.org/10.3390/hydrobiology2020024>: 363-381. (in English) ["As impervious cover increases with urban development, stream channels are degraded by increased stormwater runoff, which negatively impacts stream habitat quality and benthic macroinvertebrate diversity. We examined the relationship between stream habitat diversity and aquatic insect taxa and trait richness and diversity at the watershed scale in 30 streams, covering a gradient of stream habitat quality. We then quantified the relationship between taxa and trait richness and diversity and seven microhabitats at the reach scale in ten streams with high habitat quality. We found that both taxa richness and diversity declined at a greater rate than trait richness and diversity along an in-stream habitat diversity gradient. Taxa richness was positively correlated with pools, runs, backwater, leaf packs, and riffles, while trait richness was positively correlated with runs, small wood, and riffles. Taxa diversity was positively correlated with pools and leaf packs while trait diversity was positively correlated with

runs, leaf packs, small wood, and riffles. An indicator species analysis revealed that specific taxa and traits were associated with specific microhabitats or combinations of microhabitats. By correlating the taxa in urban streams with specific microhabitats, we can better evaluate the success of stream restoration in restoring stream function and in stimulating benthic macroinvertebrate recovery." (Authors) The following odonate taxa are listed in table S3: *Basiaeschna janata*, *Boyeria vinosa*, *Calopteryx* spp., *Argia* spp., *Enallagma* spp., *Ischnura* spp., *Cordulegaster* spp., *Epithea* spp., *Somatochlora* spp., *Gomphus* spp., *Hagenius brevistylus*, *Lanthus* spp., *Ophiogomphus* spp., *Progomphus obscurus*, *Stylogomphus albistylus*, *Libellula* spp., *Macromia georgina*, *Macromia* spp.] Address: Roux, A.J., PhD Program in Infrastructure and Environmental Systems, University of North Carolina Charlotte, 9201 University City Blvd., Charlotte, NC 28223, USA. Email: tony.roux@mecklenburgcountync.gov

**23298.** Sabine, D.L.; Sabine, M.E.J.; Makepeace, H.S. (2023): First records of Seaside Dragonlet (*Erythrodiplax berenice*) in New Brunswick, Canada: range expansion possibly mediated by climate warming. *The Canadian Field-Naturalist* 137(1): 120-124. (in English) ["The first occurrences of *E. berenice* are reported for New Brunswick, Canada, from seven sites along the Bay of Fundy coast in the southern part of the province. The species joins a suite of several other Odonata species of southern affinity that have been newly documented for New Brunswick over the past 15 years, and its occurrence may represent range expansion resulting from warming climate." (Authors)] Address: Sabine, D., New Brunswick Museum, 277 Douglas Avenue, Saint John, New Brunswick E2K 1E5 Canada. Email: dwayne.sabine@gnb.ca

**23299.** Sadasivan, K.; Nair, V.P.; Pulikkald, S.; Janaki, S.; Samuel, A. (2023): Taxonomic notes on *Davidioides martini* Fraser, 1924 (Odonata: Gomphidae) and description of its female from Western Ghats, Peninsular India. *International Journal of Odonatology* 26: 114-123. (in English) ["A note on the rare dragonfly *Davidioides martini* Fraser, 1924, is provided with an update of its distribution range, status, ecology, and the description of its so far unknown female. This species is endemic to the Western Ghats of Peninsular India and seems to be a rare one as is indicated by the paucity of published records, some of which are shown to be doubtful and in need of corroboration." (Authors)] Address: Sadasivan, K., TORG (TNHS Odonate Research Group), Travancore Nature History Society (TNHS), MBRR, Mathrubhumi Road, Vanchiyoor P.O., Thiruvananthapuram, Kerala, India, PIN 695035. Email: kareshs2002in@gmail.com

**23300.** Saha, S.; Ranjan, K.S.; Pawar, A.A.; Roy, A. (2023): Wind compensation and flight in tailwind by dragonfly species *Pantala flavescens*, during the transoceanic migration. 76th Annual Meeting of the Division of Fluid Dynamics, Sunday–Tuesday, November 19–21, 2023; Washington, DC, Session T06: Aerodynamics: Folding, Flapping, Twisting and Rotating Wings. 4:25 PM–6:09 PM, Monday, November 20, 2023, Room: 102B: (in English) [Verbatim: *Pantala flavescens* (PF) perform the longest known insect migration (14-16000 kms) annually between India and Africa bridging two distant ecologies and, is consequently of tremendous importance amidst rising climate change concerns. Field observations of transoceanic insect migration are unavailable due to the lack of lightweight trackers for dragonflies; therefore, we developed a blend of wind tunnel experiments and theory to study the migration route, timing, and the role of wind. We propose a novel energetics model and modified Dijkstra's path planning algorithm to identify the migration

network, timing, and favorable winds. The migration from Africa to India (~2800kms) is completed in merely 45 hours non-stop with assistance from the strong Somali jet; the return journey originates in north-east India involving a complex network of stopovers in southern India, Sri Lanka, Maldives, Seychelles stretching over months; thus, highlighting the critical role of winds. Our wind tunnel experiments reveal that PF actively compensates for crosswind to remain on course. Also, thrust production dominates tailwind flight to enhance the distance covered in contrast to lift generation in headwind flight. Finally, we highlight how climate change endangers this migration.] Address: not stated

**23301.** Schiel, F.-J. (2023): Vom Aussterben bedroht. Die Alpen-Smaragdlibelle im Schwarzwald. *Der Schwarzwald* 4/2023: 11- (in German) [[https://www.schwarzwaldverein.de/wp-content/uploads/2023/11/Der\\_Schwarzwald\\_04\\_2023\\_web.pdf](https://www.schwarzwaldverein.de/wp-content/uploads/2023/11/Der_Schwarzwald_04_2023_web.pdf)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**23302.** 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>

**23303.** Soboleva, V.A.; Ivlev, K.S. (2023): Materials for the fauna of dragonflies (Odonata) of Kursk region. In: V.G. Golub (ed.) *Sostoyanie i problemy ekosistem srednerusskoy*

lesostepi [State and Problems of Ecosystems of the Mid-Russian Forest-Steppe]. Trudy Biotsentra VGU "Venevitinovo" [Proceedings of the Venevitinovo Biocentre of Voronezh State University], issue XXXV: 58-63. (in Russian, with English summary) ["Based on the original data obtained in 2022, the article provides an annotated list of dragonflies from the north of the Kursk region, including 22 species from 11 genera and 7 families." (Authors)] Address: Soboleva, Viktoria, Voronezh State University, 1 Universitetskaya Sq, Voronezh, 394018, Russia. E-mail: strekoza\_vm@bk.ru

**23304.** van Buggenum, H.J.M.; Geraeds, R.P.G.; Hermans, J.T. (2023): The dragonflies of the Middelsgraaf brook. *Natuurhistorisch Maandblad* 112(7): 188-200. ["Before and after nature-friendly habitat restoration The Middelsgraaf is a 6.7-km long stream, a slow-flowing, lowland brook which used to be canalised. In 2016, a large part of the brook was reconstructed to achieve a more natural morphology. Although the average water quality is good, concentrations of several nitrogen compounds are too high. A few years before the restoration, 13 species of Zygoptera and 17 species of Anisoptera were observed. Certain species were permanently present, others were vagrants. In 2022, the total number of species and the numbers of individuals of several species appeared to have increased. The main causes of this improvement are the restoration measures and climate change. Several originally more southern European species have colonised the Middelsgraaf as a new habitat. There is a difference between the upper and lower reaches. In the upper reaches, the number of species and their numbers have increased significantly, whereas this is not the case in the lower reaches. This has to do with the brook periodically drying up there in the dry, hot summers of recent years, and the incoming water subsiding into the subsoil. In the coming years, work will involve the use of more nature-friendly maintenance methods, further development of natural vegetation, and improving the water quality and hydrological regime." (Authors)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands. E-mail: jthermans21@gmail.com

**23305.** Vorobjeva, L.V.; Borisov, R.R.; Kovacheva, N.P. (2023): Communities of zooplankton and zoobenthos in artificial ponds for Australian red-claw crayfish cultivation in the Astrakhan region. *Materials of the XI International Baltic Maritime Forum, Kaliningrad, September 25–30, 2023*: 29-40. (in Russian, with English summary) ["A study of macrozoobenthos and zooplankton was carried out in ponds for cultivating the Australian red-claw crayfish *Cherax quadricarinatus* on the territory of the scientific and experimental aquaculture complex "BIOS" (Astrakhan region). Samples were taken in July and August 2022. 69 taxa of macrozoobenthos and 20 taxa of zooplankton were identified. The abundance and biomass of invertebrates were calculated. Dominant groups and characteristic taxa for each pond and season have been identified. An assessment was made of the degree of variability of zooplankton and macrozoobenthos communities in accordance with the sampling season and belonging to the pond, as well as the degree of crayfish influence on zooplankton and macrozoobenthos of the grow-out ponds." (Authors)] The study includes four odonate taxa: *Anax* sp., *Crocothemis erythraea*, *Enallagma cyathigerum*, and *Sympetrum depressiusculum*. "In September, larvae of the dragonfly *Crocothemis erythraea* appeared, and the number of *Enallagma cyathigerum* increased significantly compared to July." (Google translate)] Address: Vorobjeva, L.V., Russian Federal Research Institute of Fisheries and Oceanography, Moscow, Russia. Email: vorobjeva.lada@yandex.ru

**23306.** Yonko, A.; Dougherty, C.; Roh, C. (2023): Flow Induced Passive Fluttering of the Insect Wing. *Bulletin of the American Physical Society, 76th Annual Meeting of the Division of Fluid Dynamics, Sunday–Tuesday, November 19–21, 2023; Washington, DC, Session S01: Poster Session & Refreshment Break IV (3:34 - 4:25 p.m.)*, 3:34 PM, Monday, November 20, 2023, Room: Exhibit Hall D; Abstract: S01.00084: (in English) [Verbatim: Insect wings exhibit a high frequency passive flutter in a steady streamline flow without the influence of muscle action. This study attempts to determine the relationships between passive wing fluttering and muscle-driven flight in insects from the orders Lepidoptera, Hymenoptera, and Odonata. To recreate the conditions of steady flight, we exposed tethered insects to flow from a wind tunnel with chord-based Reynolds numbers ranging from  $O(103)$  to  $O(104)$ . The active wing beat frequency and passive flutter effect were measured using high speed cameras. Analysis of this data potentially reveals insightful information regarding morphologically based passive influences on the kinematics of insect flight.] Address: not stated

**23307.** Zheng, X.; Wu, X.; Lu, R.; Cao, X.; Mai, B.-X. (2023): Identification of species-specific prey uptake and biotransformation of chiral polychlorinated Biphenyls (PCBs) in riparian and aquatic food webs. *Environmental Science & Technology* 57(48): 20282-20291. (in English) ["The atropisomeric enrichment of chiral polychlorinated biphenyls (PCBs) can trace the movement of PCBs through food webs, but it is a challenge to elucidate the prey uptake and stereoselective biotransformation of PCBs in different species. The present study investigated the concentrations and enantiomer fractions (EFs) of chiral PCBs in invertebrates, fishes, amphibians, and birds. Chiral PCB signature was estimated in total prey for different predators based on quantitative prey sources. The nonracemic PCBs in snakehead (*Ophiocephalus argus*) were mainly from prey. EFs of PCBs in amphibians and birds were mainly influenced by biotransformation, which showed enrichment of (+)-CBs 132 and 135/144 and different enantiomers of CBs 95 and 139/149. Biomagnification factors (BMFs) of chiral PCBs were higher than 1 for amphibians and passerine birds and lower than 1 for kingfisher (*Alcedo atthis*) and snakehead. BMFs were significantly correlated with EFs of chiral PCBs in predators and indicative of atropisomeric enrichment of PCBs across different species. Trophic magnification factors (TMFs) were higher in the riparian food web than in the aquatic food web because of the high metabolism capacity of chiral PCBs in aquatic predators. The results highlight the influences of species-specific prey sources and biotransformation on the trophic dynamics of chiral PCBs." (Authors)] Address: Zheng, X., Guangdong Provincial Key Laboratory of Agricultural & Rural Pollution Abatement and Environmental Safety, College of Resources and Environment, South China Agricultural University, Guangzhou 510642, China

## 2024

**23308.** Abahi, K.S.; Piscart, C.; Gnohossou, P.M. (2024): Responses of the macroinvertebrate community to urban wastewater pollution in the upper Ouémé Basin in Benin. *International Journal of Limnology* 60, 7: 11 pp. (in English) ["In Benin, most of urban wastewaters are discharged into rivers without any prior treatment. The objective of this study was to assess the effects of urban wastewater on the macroinvertebrate communities of the upper Ouémé River in Benin. To address this question, 30 stations located on five rivers were monitored in the dry and the wet seasons.



For each station and each season, 12 samples of macroinvertebrates following standardized French multi-habitat sampling protocol were collected and physico-chemical parameters were recorded. Three types of stations were chosen on each river: two control stations located upstream of the wastewater discharge points, two stations impacted in the urban area and receiving urban wastewaters, and two stations downstream of the wastewater discharge points to measure the resilience of a set of river characteristics. Urban wastewater impacted the water quality by mainly increasing electrical conductivity and the nutrient concentrations. Wastewaters also deeply impacted the diversity and the composition of the invertebrate community. The Indval index highlighted three indicator taxa for the control stations (Caenidae, Baetidae and Ephemerellidae), one for the impacted stations (Chironomidae), and two for the downstream stations (Libellulidae and Lestidae). We also observed ecosystem resilience a few hundred meters downstream of the discharge points. These results challenge managers on the degradation of river water quality in the upper Ouémé River, but also reveal good self-purification capacities of the watercourses likely to promote the resilience of these ecosystems." (Authors) Taxa are treated at family level.] Address: Abahi, K.S, Université de Parakou (UP), Faculté d'Agronomie (FA), Laboratoire d'Ecologie, de Santé et de Productions Animales (LESPA), BP 123 Parakou, Benin. Email: abassabahi@yahoo.fr

**23309.** Adeleke, S.O.; Amusan, B.O. (2024): Aquatic insects diversity and water quality of a tropical freshwater in Federal University of Education, Ondo, Nigeria. *Nigerian Journal of Entomology* 40(1): 126-137. (in English) ["Aquatic insects are regarded as one of the very important components of the freshwater ecosystem because of the various ecological purposes which they serve. The insects are also the most impacted when surface waters are disturbed. As such, analyzing the structure of assemblage has become a veritable yardstick in the assessment of biodiversity and water quality. This research effort applied the combination of aquatic insect composition and physico-chemical characteristics in assessing the ecological status of Oju Awo stream. Aquatic insects and water samples were collected once in every two months covering a period between December, 2021 and October, 2022 using sweep nets and 1L sterilized bottle respectively. The results obtained for the physical and chemical parameters of the water as well as the aquatic insect assemblage showed that the investigated reaches of the stream did not differ widely except for water temperature which showed significant variations ( $p < 0.05$ ) along the reaches of the waterbody. A total of 242 aquatic insect specimens represented by three (3) orders (Hemiptera, Odonata and Coleoptera) and sixteen (16) taxa were recorded. Hemiptera was the dominant and most abundant taxa as it accounted for about 90.91% of the total insect collection. The dominance of pollution tolerant species, the absence of sensitive insects' species and poor water quality as revealed by the physico-chemical parameters indicated deteriorating water quality conditions in the stream." (Authors) Six odonate genera are listed.] Address: Amusan, B.O., Obafemi Awolowo Univ., Ile-Ife Nigeria. Email: tundeamusan5@yahoo.com

**23310.** Afanasyev, S.A.; Marushchak, O.Yu.; Lietytska, O.M.; Abdunazarov, A.; Golub, O.O.; Domashevsky, S.V.; Gavryts, G.G. (2024): On the study of fauna (Macroinvertebrates, fish, amphibians, reptiles, birds and mammals) of the lower course of Shokhdara River valley in Pamir, mountain Bodakhshan, Tajikistan. *Zoodyversity* 58(3): 203-220. (in English) [The fauna was studied at the Shokhdara River in the vicinities of town of Khorog city near its mouth and confluence

with Panj River from autumn 2019 to spring 2020. Odonata were represented just by one species - *Aeshna grandis* -, which was very abundant at the sampling site #1 (37.3346 N 71.7140 E 2,567 masl) and in lateral arms near this sampling site.] Address: Afanasyev, S.A, Institute of Hydrobiology NAS of Ukraine, prosp. Heroiv Stalinhgradu, 12, Kyiv, 04210 Ukraine. Email: safanasyev@ukr.net

**23311.** Ahmed, H.K.; Kareem, D.K. (2024): Morphological identification of dragonflies naiads (Odonata: Anisoptera) from temporary ponds in Basrah province, south of Iraq. *Iraqi Journal of Aquaculture* 21(1): 89-109. (in English) ["Dragonfly naiads of the Anisoptera species were collected from shallow ponds in Basrah Province, South of Iraq, between December 2017 and November 2018. The specimens were identified based on their morphological features, with special attention to the structure of the mandibles. A total of eight species were recorded, which included *Anax parthenope* ... and ... *Crocothemis erythraea*, *C. servilia*, *Diplacodes trivialis*, *Orthetrum sabina*, and *Selysiotthemis nigra*. Naiads of two species, *Diplacodes lefeverii* and *Sympetrum striolatum*, were also observed in the study region for the first time." (Authors)] Address: Ahmed, H.K., Marine Science Centre, University of Basrah, Basrah, Iraq. Email: hudaa.ahmed@uobasrah.edu.iq

**23312.** Alves-Martins, F.; Stropp, J.; Juen, L.; Ladle, R.J.; Lobo, J.M.; Martinez-Arribas, J.; De Marco Júnior, P.; Schlemmer Brasil, L.; Santos Ferreira, V.R.; Bastos, R.C.; Córdoba-Aguilar, A.; Medina-Espinoza, E.F.; Dutra, S.; Vilela, D.S.; Cordero-Rivera, A.; del Palacio, A.; Ramirez, A.; Carvalho-Soares, A.A.; Farias, A.B.S.; Oliveira de Resende, B.; dos Santos, B.; Bota-Sierra, C.A.; Mendoza-Penagos, C.C.; Veras, D.S.; Anjos-Santos, D.; Périco, E.; González-Soriano, E.; Roque, F.; Lozano, F.; Carvalho, F.G.; Lencioni, F.A.A.; Palacino-Rodríguez, F.; Ortega-Salas, H.; Venâncio, H.; Sanmartín-Villar, I.; Muzón, J.; Santos, J.C.; Montes-Fontalvo, J.; Brito, J.; Pereira, J.L.; Oliveira-Junior, J.M.B.; Dias-Silva, K.; Ferreira, K.G.; Calvão, L.B.; Pérez-Gutiérrez, L.A.; Rodrigues, M.E.; Schmidt Dalzochio, M.; Rocha-Ortega, M.; von Ellenrieder, N.; Hamada, N.; Pessacq, P.; Rodríguez, P.; Martins, R.T.; Guillermo-Ferreira, R.; Koroiva, R.; Miguel, T.B.; Mendes, T.P.; Neiss, U.G.; Rejane de Almeida, V.; Hortal, J. (2024): Sampling completeness changes perceptions of continental scale climate-species richness relationships in odonates. *Journal of Biogeography* 51(7): 1148-1162. (in English) ["Aim: Insects are one of the least studied taxa, with most species lacking basic ecological and biogeographical information. This problem is particularly acute in the tropics, where low sampling effort hampers accurate estimates of species richness at scale and potentially confounds efforts to identify the drivers of biogeographical gradients. Here, we evaluate the quality of the data on the distribution and diversity of odonate species in the Neotropics, while also examining the influence of sampling completeness on climate–richness relationships using a comprehensive database of odonates. Location: The Neotropics. Taxon: Odonata. Methods: Using 56,535 records collected from 1970 to 2021, we assess whether climate–species richness models vary under different scenarios of survey completeness. Results: Our survey compilation revealed that most Neotropical diversity of Odonata likely remains unknown. Only 1% of the one-degree cells covering the Neotropics held reliable information on odonate species richness, with particularly severe gaps in the Caribbean, Central America, northeastern Brazil and northern Chile. Temperature, precipitation and potential evapotranspiration exert consistent effects on Odonata richness across the entire Neotropics, regardless the level of survey completeness.



Whereas seasonality-related variables are less important predictors of species richness at the biogeographical scale. Main Conclusions: By highlighting areas where inventories are more reliable and identifying regions that require increased data collection efforts and mobilization, our assessment offers a roadmap for improving the reliability of odonate inventories in the Neotropics. Furthermore, our findings underscore the importance of accounting for varying levels of survey completeness in macroecological models to reveal robust climate–species richness relationships. Simultaneously, they highlight strong climatic predictors of species richness, irrespective of survey effort intensity. These predictors provide a solid foundation for modelling and predicting odonate species richness in the Neotropics." (Authors)] Address: Alves-Martins, Fernanda, CIBIO-InBIO, Res. Centre in Biodiversity & Genetic Resources, Univ. Porto, Campus de Vairão, 4485-661 Vairão, Portugal. Email: ferfealvesmartins@gmail.com

**23313.** Andrade, A.M.B. De; Silva, C.F. da; Azevêdo, E. de Lira (2024): Estrutura da comunidade de ninfas de Odonata em riachos de brejo de altitude no semiárido / Community structure of Odonata nymphs in high-altitude marsh streams in the semiarid region. *Revista Semiárido De Visu*, Petrolina 12(2): 763-779. (in Portuguese, with English summary) ["Studies on the structure of ecological community are extremely important for the conservation of biodiversity. They are particularly important in little-known areas and can assist in the development of strategies for the conservation of species and ecosystems. The present work had as main objective to carry out the survey of the abundance, richness and diversity of nymphs of Odonata in a stream located in a semiarid region. The study was carried out in the Poço da Laje Creek (Municipality of Triunfo, Sertão de Pernambuco – Brazil), Pajeú River basin. The samples of Odonata were collected with the aid of network D in seven wells and seven stretches of current. In the laboratory, they were washed, sorted and identified for later evaluation of the richness, abundance and diversity of nymphs. The total richness of Odonata genera was 5, the abundance was 32 in wells and 39 in currents, the diversity in wells was 0.54 ( $\pm$  0.52) and in current 0.76 ( $\pm$ 0.44). Furthermore, it is possible to infer that there are two groups of sampling sites separated by the level of environmental quality. This study contributes to the recognition of the diversity of Odonata nymphs in streams located in high-altitude swamps in the semiarid region, which are poorly understood, and also contributes to the development of future biodiversity conservation actions." (Authors)] Address: Andrade, A.M.B. De, Licenciada em Ciências Biológicas, Instituto Federal de Educação, Ciência e Tecnologia da Paraíba – Campus Princesa Isabel. BR 426, s/nº, Sítio Barro Vermelho – Princesa Isabel – PB – Brasil. CEP: 58.755-000. E-mail: alane.andradeifpb@gmail.com

**23314.** Arthiyan, S.; Eswaramohan, T.; Hemphill, A.; Surendran, S.N. (2024): Predatory potential of nymphal odonates on *Aedes aegypti* developing in freshwater and brackish water habitats. *Insects* 2024, 15, 547. <https://doi.org/10.3390/insects15070547>: 12 pp. (in English) ["Simple Summary: *Aedes aegypti*, the primary vector of dengue, undergoes preimaginal development in freshwater and brackish water habitats in northern Sri Lanka and other parts of the world. Dengue vector control in the form of source reduction targets only freshwater habitats. Since biological control is a component of integrated vector control, the present study investigated the predatory efficacy of dragonfly nymphs and damselfly nymphs that develop in both freshwater and brackish water habitats targeting *Ae. aegypti* larval forms in laboratory conditions. The dragonfly nymph *Hydrobasileus*

*croceus* and the damselfly nymph *Paracercion hieroglyphicum* were found to be the most effective among six different species [in addition: *Pantala flavescens*, *Brachydiplax sbrina*, *Ceriagrion coromandelianum*, *Paracercion v-nigrum*] tested in both freshwater and brackish water conditions. The findings suggest that these odonate nymphs could serve as biological control agents to target preimaginal forms of dengue vectors under varying salinity conditions. Abstract: *Aedes aegypti*, the primary vector of dengue, undergoes preimaginal development in brackish water (BW). However, dengue vector control exclusively targets freshwater (FW) habitats. The present study evaluated the predatory efficacy of nymphal odonates that can develop in both FW and BW. Nymphs of three damselfly and three dragonfly species from FW and BW habitats were identified and acclimatized to FW (<0.5 gL<sup>-1</sup> salt) and BW (10 gL<sup>-1</sup> salt) mesocosm conditions. The experiment was repeated nine times with nine different individual predators per species under both salinity conditions. One hundred L3 *Ae. aegypti* from FW and BW laboratory colonies were introduced to determine the predatory rate (PR) and clearance rate (CR) after 24, 48, and 72 h, and one hundred L3 larvae were introduced every 24 h. *H. croceus* and *P. hieroglyphicum* showed the highest PR and CR under both rearing conditions at all times. However, damselfly and dragonfly nymphs significantly ( $p < 0.05$ ) differed in their CR under both FW and BW conditions. Thus, all six odonate species have predatory potential and this suggests that they could be used as biological control agents to eliminate preimaginal stages of *Ae. aegypti* developing in both FW and BW habitats." (Authors)] Address: Arthiyan, S., Centre for Research in Entomology (CRE), Dept of Zoology, Fac. of Science, Univ. of Jaffna, Jaffna 40000, Sri Lanka

**23315.** 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, February 2024, 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

**23316.** Baitchorov, V.M.; Moroz, M.D.; Hihiniak, U.G.; Giginyak, 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 – the

mayfly *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

**23317.** 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 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 Biol. Sciences, Univ. of Oklahoma, Norman, OK, USA. Email: lbergey@ou.edu

**23318.** 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 *O. 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

**23319.** Bespalaya, Y.V.; Aksenova, O.V.; Aksenov, A.S.; Bovykina, G.V.; Kondakov, A.V.; Kropotin, A.V.; Soboleva, A.A.; Sokolova, S.E.; Travina, O.V.; (2024): Zoonchorous dispersal of freshwater peaclams (*Bivalvia: Sphaeriidae*): potential role of aquatic insects. *Ruthenica* 34(3): 111-116. (in English, with Russian summary) ["The present study reports the first observation of *Euglesa globularis* peaclams attached to dragonfly nymph *Aeshna juncea*, and *E. parvula*

attached to the leg of the water boatmen nymph *Callicorixa* sp. from the Kolyma River basin in eastern Siberia (Asiatic Russia). It has been shown that the aquatic insects may play a potential role in the dispersal of bivalves both locally within one and between different water bodies." (Authors)] Address: Bespalaya, Yulia, N. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of Russian Academy of Sciences, Russia. Email: jbespalaja@yandex.ru

**23320.** Boderau, M.; Jouault, C.; Aracheloff, C.; Ngô-Muller, V.; Engel, M.S.; Berthier, S.; Schöllhom, B.; Huang, D.; Nel, A.; Garrouste, R. (2024): Morphological and palaeoecological aspects of fossil insects unveiled by UV-A light. *MethodsX* 13,102794: 9 pp. (in English) ["Studying insect fossils, particularly those preserved as compressions in sedimentary matrices, can be difficult due to the taphonomic processes that often result to poor preservation and contrast of structures compared to the embedding matrix. To address this, we propose a user-friendly and simple methodology based on UV-light to study insect fossils and select specimens of interest for more advanced imagery exploration. While UV-light imaging has been previously applied to compressions of arthropod fossils, it typically involved laser light sources. Our approach allows the investigation of fossils using an affordable, compact, and portable UV-light source, along with a simple and replicable low-cost protocol. • The methodology is based on UV-light induced natural fluorescence of sediment and fossil remains. • UV-light is effective on compression fossils to gain natural contrast and enhance observation of body structures like veins or setae on wings. • UV-light is effective to reveal palaeoecological information such as pollen grains preserved on specimens, especially near or on putative pollinator or pollen-eating taxa." (Authors) *Stenolestes oeningensis* (Odonata: Sieblosiidae) holotype] Address: Garrouste, R., Institut de Systématique, Évolution, Biodiversité (UMR 7205), MNHN, CNRS, SU, EPHE-PSL, UA, CP50, 57 Rue Cuvier, F-75005 Paris, France. Email: romain.garrouste@mnhn.fr

**23321.** Bolanakis, G.; Paragkamian, S.; Chatzaki, M.; Kotsitsa, N.; Kardaki, L.; Trichas, A. (2024): The conservation status of the Cretan endemic Arthropods under Natura 2000 network. *Biodiversity and Conservation* 33: 2635-2662. (in English) ["Arthropod decline has been globally and locally documented, yet they are still not sufficiently protected. Crete (Greece), a Mediterranean biodiversity hotspot, is a continental island renowned for its diverse geology, ecosystems and endemism of flora and fauna, with continuous research on its Arthropod fauna dating back to the nineteenth century. Here we investigate the conservation status of the Cretan Arthropods using Preliminary Automated Conservation Assessments (PACA) and the overlap of Cretan Arthropod distributions with the Natura 2000 protected areas. Moreover, we investigate their endemism hotspots and propose candidate Key Biodiversity Areas. In order to perform these analyses, we assembled occurrences of the endemic Arthropods in Crete located in the collections of the Natural History Museum of Crete together with literature data. These assessments resulted in 75% of endemic Arthropods as potentially or likely threatened. The hotspots of endemic taxa and the candidate Key Biodiversity Areas are distributed mostly on the mountainous areas where the Natura 2000 protected areas have great coverage. Yet human activities have significant impact even in those areas, while some taxa are not sufficiently covered by Natura 2000. These findings call for countermeasures and conservation actions to protect these insular environments, especially mountain species that lack the space to further escape from threats

affecting their habitat." (Authors) *Calopteryx splendens krtensis*, *Coenagrion intermedium*, *Boyeria cretensis*] Address: Bolanakis, G., Department of Biology, University of Crete, Heraklion, Crete, Greece

**23322.** Bota-Sierra, C.A.; Álvarez-Álvarez, K.; Amaya, V.; Carrillo Camargo, B.; Garzón-Salamanca, L.L.; Hoyos, A.; Mendoza-Penagos, C.C.; Montes-Fontalvod, J.; Palacino-Rodríguez, F.; Pérez-Gutiérrez, L.A.; Realpe, E.; Sánchez Herrera, M.; Sandoval-H, J.; Stand-Pérez, M.; Torres-Pachón, M.; Velásquez, M.I.; Cano-Cobos, Y. (2024): Commented checklist of the Odonata from Colombia. *International Journal of Odonatology* 27: 103-150. (in English, with Spanish summary) ["Colombian odonatological history was scarce until two decades ago. Here, we present an updated, thoroughly vetted, and refined checklist of taxonomic and geographical records of Colombian odonates, built upon the previous publication in 2011. To achieve this, we conducted an extensive literature review, and curated the most representative biological collections of odonates in the country. Our goal was to integrate new records and recently described species, while excluding misidentifications or doubtful identifications due to a lack of support from taxonomic revisions and specimens in collections. We report a total of 536 species, reflecting a 38% increase in odonate richness since the last published checklist in 2011. This number positions Colombia among the top ten countries with the highest number of odonates worldwide. We include important taxonomic details for each species in the checklist, the availability of female and/or larva description(s), and the IUCN species assessment. We also highlight rare or puzzling species, which records for the country are controversial. It is noteworthy that the majority of these contributions stem from local Colombian research efforts that have enriched our national reference collections, including ANDES-E, CEUA, and UARC. Geographically, the department with the highest diversity is Meta with 205 species followed by Antioquia with 170 species. The latter holds the highest number of endemics across the country. We anticipate that this effort will be the basis and inspiration to future research on Colombian odonotofauna, especially in underexplored areas, and will encourage conservation initiatives for freshwater ecosystems across the country." (Authors)] Address: Cano-Cobos, Yiselle, Laboratorio de Biodiversidad y Genética Ambiental (BioGeA), Universidad Nacional de Avellaneda, Piñeyro 1870, Avellaneda, Buenos Aires, Argentina. Email: yisellecanoc@gmail.com

**23323.** Botrel, M.; Maranger, R.; Nuñez, M.M.A.; Kazanjian, G.; Kosten, S.; Velthuis, M.; Hilt, S. (2024): Changing phenology of benthic primary producers in inland waters: Current knowledge and future directions. *Limnology and Oceanography Letters* 9(4): 340-353. (in English) [oas 76;"Benthic primary producers (BPP) in inland waters, including aquatic macrophytes and periphyton, are foundational habitats that are highly sensitive to multiple human drivers of environmental change. However, long-term seasonal monitoring of BPP is limited, leaving us with little information on the cause, directionality, and consequences of the potential shifts in timing of BPP life cycle events. Here, we review the literature on the phenological changes of BPP and show that BPP respond primarily to temperature, but also to other interactive drivers related to climate change and eutrophication. In addition, we present four rare case studies where BPP display strong and earlier shifts in event timing associated with increasing temperature and discuss potential impacts of these changes on ecosystem functioning. Given the responsive nature of BPP to multiple human

drivers, we provide suggestions on how to improve basic monitoring to better understand the future impact of phenological changes of this critical habitat." (Authors) The paper includes a passing reference to Odonata.] Address: Botrel, M., Département de Sciences Biologiques, Groupe de Recherche Interuniversitaire en Limnologie (GRIL), Université de Montréal, Montréal, Québec, Canada. Email: morganbotrel@gmail.com

**23324.** 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, article number 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 sub-orders, 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, Univ. Federal Do Pará, Belém, Pará, Brazil

**23325.** Calvão, L.B.; Pires, M.M.; Périco, E.; Juen, L. (2024): Dragonflies (Insecta, Odonata) from northeast Santa Catarina and notes on the occurrence of species in the region. *Biota Neotropica* 24(2): e20241620, 2024: 8 pp. (in English, with Portuguese summary) ["We present a checklist of Odonata species occurring in streams in the municipality of Araquari, northeastern state of Santa Catarina (SC), southern Brazil. Five stream reaches were surveyed bi-annually from March 2016 to March 2018. Overall, we recorded 18 taxa (16 species) from 12 genera and four families. Coenagrionidae and Libellulidae were the most species-rich families (seven species each; 43% of the total number of species recorded each). *Idioneura ancilla*, *Telagrion longum* and *Erythrodiplax umbrata* are recorded for the first time in the state of Santa Catarina. Species occurrence patterns were remarkably seasonal in the studied streams, with 70% of the species recorded in the summer only, and only 25% of the species occurring in both seasons at the same stream. Our findings revealed odonate communities with marked space-time interactions in species occurrence and contribute to understand odonate biology in subtropical streams

in a human-dominated landscape, and also contribute to improve the knowledge on odonate distribution in South America." (Authors)] Address: Mateus Marques Pires, M.M., Univ. do Vale do Taquari, Programa de Pós-graduação em Ambiente e Desenvolvimento, Lab. de Ecologia e Evolução, Lajeado, RS, Brasil. Email: marquespiresm@gmail.com

**23326.** 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 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

**23327.** Cannings, R.A.; Klymko, J.; Catling, P.M.; Savard, M.; Lemelin, G.; Jones, C.D.; Cannings, S.G.; Savard, R.-J. (2024): List of the Odonata of Canada. OdonataCentral, University of Alabama. Available at <https://www.odonatacentral.org/app/#/wol/>: 15 pp. (in English) ["This list of 220 species of Canadian Odonata, with a few exceptions, uses the scientific nomenclature and English names of the North American list (Paulson, Dunkle & Johnson 2024: NA\_Odonata\_Checklist\_2024.pdf (odonatacentral.org)). The French common names have been revised under the auspices of Entomofaune du Québec, including all the Canadian fauna, for the purposes of the present checklist. According to usage among authors, ligatures are applied in the writing of French names, but not for English and scientific names. The list is kept up-to-date with taxonomic changes, name changes, and species added to the fauna of Canada and its provinces and territories." (Authors)] Address: Savard, M., Entomofaune du Québec, 637 boulevard Talbot, Saguenay, Québec G7H 6A4, Canada. Email: m\_savard@hotmail.com

**23328.** Chang, J.; Peng, W.; Zheng, X.; Ci, P.; Wang, B.; Gao, X.; Li, F.; Dong, S. (2024): A dragonfly-wings like self-powered magnetic field sensor with vibration noise restriction function. *Sensors and Actuators A: Physical*. 376, 115610: (in English) ["Highlights: • A self-powered biomimetic dragonfly-wings like magnetic field sensor has been developed. • The vibration noise was decreased by 30dB compared to traditional cantilever beam ME sensors. • The energy harvesting density of  $100\mu\text{W}\text{Oe}^{-2}\text{cm}^{-3}$  and a detectability of 2.7 nT for AC magnetic field was obtained. Abstract: As the rapid development of the Internet of Things (IoT), the demand for the self-powered sensors and devices has become urgent. In this work, we present a self-powered magnetic field sensor based on a biomimetic dragonfly-wings like magnetoelectric (DWL-ME) laminated cantilever. The two pairs of wings in DWL-ME cantilever operating in anti-phase vibration modal has shown a strong magnetoelectric coupling for converting magnetic field energy into electric

energy with an energy harvesting density of as high as  $100\mu\text{W}\text{Oe}^{-2}\text{cm}^{-3}$ . It also shows a linear response to an alternating magnetic field ( $H_{AC}$ ) with a high detectability of 2.7 nT at 60Hz. Compared to traditional cantilever beam ME sensors, its vibration noise is also effectively decreased by more than 30dB due to the anti-phase vibration modal of two pairs of wings. The proposed biomimetic design strategy has inspirational significance for future sustainable, self-powered intelligent sensor networks." (Authors)] Address: Chang, J., Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education, School of Electronic Science and Engineering, Xi'an Jiaotong University, Xi'an 710049, China. Email: changjl@xjtu.edu.cn

**23329.** Clark, Z.W. (2024): Mercury biomagnification in aquatic food webs of Great Smoky Mountains National Park. MSc thesis, The University of Tennessee, Knoxville: VIII + 67 pp. (in English) ["Mercury is a widespread pollutant threatening human, fish, and ecosystem health on a global scale. Biomagnification concentrates mercury in upper trophic level organisms including predatory fishes, a primary route of dietary mercury exposure for humans. However, mercury biomagnification is not well understood in stream ecosystems, especially in places with no known point sources of contamination. A 2016 study revealed that Smallmouth Bass *Micropterus dolomieu* mercury concentrations varied between three streams in Great Smoky Mountains National Park (GSMNP), Tennessee USA. However, the reason for this spatial variation in mercury concentrations is not understood. Our objectives were to (1) measure environmental and organismal concentrations of mercury, (2) describe and compare trophic pathways, (3) and evaluate evidence for mechanisms leading to differential mercury contamination, in three streams of GSMNP; and (4) to compare Smallmouth Bass mercury concentrations in 2016 and 2022. We analyzed stable isotope ratios and mercury concentrations of eight food web components of GSMNP streams: leaf detritus, periphyton, and filamentous algae to represent basal resources; mayfly nymphs (Heptageniidae), Central Stoneroller *Campostoma anomalum*, dragonfly nymphs, and crayfish (Cambaridae) to represent intermediate consumers; and Smallmouth Bass, an apex predator. Stable isotope analyses revealed similar food web structure across all three streams. Total mercury (THg) concentrations were lowest in basal resources and highest in Smallmouth Bass and crayfish. Compared to a previous study in 2016, mean Smallmouth Bass THg concentrations were lower in 2022 in all three streams, however, many individuals from Abrams Creek still exceeded the EPA threshold for safe consumption of 0.3 mg/kg, ww. In both years, Smallmouth Bass mercury concentrations were highest in Abrams Creek and lower in Little River and Little Pigeon. Mean THg concentrations of basal resources did not differ between streams, but the spatial pattern of concentrations of intermediate consumers mirrored Smallmouth Bass. The slope of the relationship between log-transformed contaminant concentrations and trophic level was positive for all three streams, indicating biomagnification is occurring in GSMNP. Our findings indicate that differences in mercury contamination of top predators in these systems are driven by differences in food web dynamics rather than differences in basal resource THg concentrations." (Author)] Address: [https://trace.tennessee.edu/cgi/viewcontent.cgi?article=11445&context=utk\\_gradthes](https://trace.tennessee.edu/cgi/viewcontent.cgi?article=11445&context=utk_gradthes)

**23330.** 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 (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 Ecol., Evol. & Marine Biol., Univ. California, Santa Barbara, Santa Barbara, CA 93106, USA. Email: sdcooper@ucsb.edu

**23331.** 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)

**23332.** 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 *Callitriche rimosa* Fassetv (*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: franciaralp@yahoo.com.br

**23333.** De los Ríos-Escalante, P.R.; Wilson, R.; Norambuena, J.-A.; Esse, C.; Baaloudj, A. (2024): Null model for explain benthic macroinvertebrates communities in Salado River, (23°S, Antofagasta Region, Chile). *Idesia (Chile)* 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 subsaline 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, 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, Facultad de Recursos Naturales, Departamento de Ciencias Biológicas y Químicas, Casilla. Temuco, Chile. Email: prios@uct.cl

**23334.** Dias-Oliveira, T.M.; Fôlha-Ferreira, E.D.; Silva, M.L.S.; Gouvêa, T.P.; Vilela, D.S. & Souza, M.M. (2024): O

zigue-zague das libélulas (Insecta: Odonata) na cultura brasileira: uma análise bibliográfica. *A Bruxa* 8(7): 99-111. (in Portuguese, with English summary) ["The "zigue-zague" (Insecta: Odonata) in the Brazilian culture: a bibliographic analysis. Dragonflies are widely distributed throughout Brazil, being the country with the largest number of recorded species. The proximity of the people with these animals makes their relationship pass from the natural environment to the popular imagination, in addition to being part of the empirical knowledge of original peoples. By virtue of the absence of a compendium that addresses such works, the present work was carried out, which aims to demonstrate how present the insects of the order Odonata are in Brazilian culture. To achieve this, musical works, popular literature, and scientific literature were considered. The records show that dragonflies are present in different Brazilian cultural manifestations, in all regions of the country. Thus, the relationship between Brazilian culture and its biodiversity can be observed, pointing out the necessity for more research in this field, since knowing its biological heritage in all its instances becomes an efficient tool for its conservation and protection." (Authors)] Address: Fôlha-Ferreira, E.D., Laboratório de Zoologia, Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas, Campus Inconfidentes, Minas Gerais, MG, Brasil. Email: eike.ferreira@alunos.ifsuldeminas.edu.br

**23335.** Díaz-Suárez, L.; Cordero-Rivera, A. (2024): Emergence and composition of the odonate communities in an urban river in north-western Spain. *Notulae odonologicae* 10(3): 86-98. (in English) ["Urban rivers are very important elements of the urban landscape, but increasingly degraded by human activities. We studied the composition and emergence patterns of odonates in three sectors of an urban river, the Sarela, in Santiago de Compostela, north-western Spain, to evaluate its ecological state. Exuviae collection was carried out weekly between May and September 2022. We found exuviae belonging to six species, the most abundant being *Boyeria irene*, *Cordulegaster boltonii* and *Onychogomphus uncatatus*, and we report the occurrence of *Oxygastra curtisii* in this river for the first time. This community is typical of medium sized rivers in the region. We analysed whether the emergence (both in relation to date and abundance) varied depending on the species, sex and the section of the river, based on the three most abundant species. The sex ratio was similar in all species, and the section of the river did not affect the mean date of emergence, but density was clearly different among sections. There were significant differences among species in emergence patterns, with *O. uncatatus* emerging earlier, then *C. boltonii* and finally *B. irene*." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**23336.** Dow, R.A.; Reels, G.T. (2024): Previously unpublished Odonata records from Sarawak, Borneo, part X: Maludam and Ulu Sebuyau National Parks. *Faunistic Studies in SE Asian and Pacific Island Odonata* 44: 1-18. (in English) ["Previously unpublished records of Odonata collected during surveys at Maludam National Park (MNP) in 2018 and Ulu Sebuyau National Park (USNP) in 2015 are presented. Both protected areas are situated in the southwest of Sarawak and consist of peat swamp forest (PSF), a habitat that has declined dramatically in extent in southeast Asia in recent decades. Probably the most significant result of the surveys was the discovery of a population of the extremely poorly known *Pseudagrionoptera diotima* Ris, 1912 in MNP. Other significant records include *Podolestes chrysopus*

*Selys*, 1889, *Podolestes parvus* Dow & Ngiam, 2019, *Pachycypha aurea* Lieftinck, 1950, *Elattoneura longispina* Lieftinck, 1937, *Ceriagrion new sp.*, *Mortonagrion sp. cf. aborensis* (Laidlaw, 1914), *Metaphya micans* Laidlaw, 1912 and *Raphismia inermis* Ris, 1910. With these records 62 species of Odonata are now known from MNP and 33 species are known from USNP. Checklists are given for the two areas in Appendix 1 and Appendix 2. The differences between numbers of species known from the two areas are partly explained by differences in sampling effort and a lack of running water habitats in the sampled part of USNP, but there is a somewhat surprising lack of swamp forest specialist or near specialist Libellulidae in the checklist for USNP. The proportion of species that are currently classified as Endangered, Vulnerable or Near Threatened on the IUCN Red List is high at both locations – ca. 29% at MNP, ca. 21% at USNP. Species that we consider to be specialists of low pH waters are listed." (Authors)] Address: Dow, R.A., Institute of Biodiversity & Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia Email: rory.dow230@yahoo.co.uk

**23337.** Duff, H.; Debinski, D.; Maxwell, B.D. (2024): Ecological refugia enhance biodiversity and crop production in dryland grain production systems. *Agriculture, Ecosystems & Environment* 359(1), 108751: 15 pp. (in English) ["Highlights: • Ecological refugia harbored native biodiversity in annually disturbed crop fields. • Plant and arthropod diversity declined with distance from refugia into crop fields. • Fields with refugia had a higher abundance of Coleoptera than fields without. • Grain yield decreased with distance from refugia while grain quality increased. • Precision agriculture data provided a novel way to assess non-crop habitat impacts. Abstract: Meeting global food demand while reducing biodiversity loss will require strategies that quantify and minimize conservation and production tradeoffs in agroecosystems. Ecological refugia (non-crop habitat patches) were identified in three dryland grain production systems in the Northern Great Plains and assessed for their capacity to enhance biodiversity, crop yield, and crop quality. A radial design of six 100–200 meter transects originating from the refugia and extending into crop fields was used to assess trends in plant and arthropod diversity with increasing distance from the refuge center. Plant species diversity significantly declined with distance from established refugia into crop fields in all years sampled and from a newly established refuge by the third year of data collection. Arthropod taxon diversity declined significantly with distance from refugia on two organic farms but not on a conventional farm. Fields with a refuge hosted a higher abundance of arthropods belonging to Coleoptera than fields without a refuge. Distance from refuge was the most important variable explaining grain yield and grain quality in a random forest model. Yield significantly declined with distance from refugia while grain nutritional quality, based on protein content, iron concentration, and polyphenol concentration, significantly increased with distance from refugia. Overall, ecological refugia enhanced farmland biodiversity and provided tradeoffs for marketable crop production. Moving forward, ecological refugia could serve as a multi-objective conservation practice to integrate food production and conservation goals in agroecosystems." (Authors) Figure 6 contains information on Odonata.] Address: Duff, Hannah, Dept of Land Resources & Environmental Sciences, Montana State Univ., Bozeman, Montana, USA. Email: hannah.duff8@gmail.com

**23338.** Duff, H.; Debinski, D.; Maxwell, B.D. (2024): Landscape context affects patch habitat contributions to biodiversity in agroecosystems. *Ecosphere* 15(6), e4879: 15 pp. (in

English) ["Effective conservation schemes are needed to advance the dual objectives of biodiversity conservation and agronomic production in agricultural landscapes. Understanding how plant and arthropod taxa respond to both local habitat patch characteristics and landscape complexity is crucial for planning effective agri-environment schemes. This study investigated the relative effects of local variables (plant and insect diversity =100 m from patch habitat center) and landscape variables (landscape composition and configuration metrics =5 km from patch habitat center) on the diversity of plants and arthropods within noncrop patches (1) at different spatial extents ranging from 0.1 to 5 km, while (2) quantifying differential effects of local and landscape variables on particular components of diversity (i.e., species richness and abundance) ["Orthoptera, Hemiptera, Coleoptera, Diptera, Hymenoptera, Araneae, Odonata, Lepidoptera"], and accounting for (3) particular components of landscape extent (0.1-, 0.5-, 1-, 2-, and 5-km radii) and complexity (i.e., landscape composition and configuration). Landscape variables were significantly correlated with local plant and arthropod species richness and abundance at all spatial extents. Biodiversity responses to landscape variables were largely scale-dependent, as pairwise comparisons were significantly different between all spatial extents except between 1- and 2-km extents, and correlations were lowest at the 5-km extent. Partial R<sup>2</sup> values for predicting local biodiversity were highest when both local and landscape variables were included as predictors of species richness and abundance, increasing from 0.163 to 0.469 when landscape variables were included, underscoring the importance of considering both local and landscape effects on local diversity. Landscape configuration variables accounted for more variation in plant and arthropod species richness than composition variables. However, models performed best when composition and configuration were considered together rather than alone, suggesting that both components of landscape complexity should be considered for identifying and managing conservation areas in crop fields. Existing conservation schemes that incentivize farmers to create or conserve seminatural patch habitat within crop fields may be more effective when combined with landscape-scale designs that enhance landscape complexity across the Northern Great Plains. Local conservation efforts should be coordinated with landscape-level efforts to ultimately enhance biodiversity and desired ecosystem service outcomes across agricultural landscapes." (Authors)] Address: Duff, Hannah, Dept of Land Resources & Environmental Sciences, Montana State Univ., Bozeman, Montana, USA. Email: hannahduff8@gmail.com

**23339.** Echeverría-Sáenz, S. (2024): Tolerancia y alteraciones de la comunidad de macroinvertebrados dulceacuícolas debida a la presencia de residuos de plaguicidas en cuerpos de agua superficial de Costa Rica. PhD thesis / Docinade Doctorado, Facultad de Ciencias Exactas y Naturales, Departamento de Física, Universidad Nacional Costa Rica, Heredia: 165 pp. (in Spanish, with English summary) ["Costa Rica is a country with great biodiversity; however, the excessive use of pesticides has generated contamination of surface waters, with effects on aquatic biota which are still not fully understood. The objective of this study was to analyze the effects of pesticides on the distribution, structure and ecosystemic function of aquatic macroinvertebrate communities as a tool to improve the conservation of tropical aquatic ecosystems. For this, information on pesticide concentrations of 1036 surface water samples was digitized and unified, as well as the abundance of macroinvertebrate families in 441 samples collected between the years 2009-2019. The most frequently detected pesticides in Costa Rica during that time period

were diuron, ametryn, pyrimethanil, flutolanil, diazinon, azoxystrobin, buprofezin and epoxiconazole, with presence in >20% of the samples. 32 pesticides were detected at concentrations exceeding international standards and an ecological risk model (msPAF) was calculated that revealed a moderate to high acute toxicity risk to aquatic organisms (especially primary producers and arthropods) in 13% of the analyzed samples. In addition, the tolerance/sensitivity of macroinvertebrate families to 13 selected pesticides was estimated by ecological threshold analysis. The organisms that showed tolerant responses were mollusks and the families Corophiidae and Hyalellidae (Amphipoda), as well as aquatic mites (Trombidiformes), the families Ceratopogonidae, Simuliidae, Empididae and Psychodidae (Diptera), Leptoceridae (Trichoptera), Baetidae (Ephemeroptera), Collembola, Corydalidae (Megaloptera), Elmidae (Coleoptera) and Libellulidae. In contrast, the families Blaberidae (Blattodea), Dixidae (Diptera), Ecnomidae, Lepidostomatidae, Odontoceridae (Trichoptera), Euthyplociidae, Isonychiidae (Ephemeroptera), Polythoridae and Atyidae (Decapoda) were completely absent in sites with detection of pesticides, while Philopotamidae, Helicopsychidae (Trichoptera), Gyrinidae, Scirtidae, Hydrophilidae, Limnichidae (Coleoptera), Gomphidae and Perlidae (Plecoptera), among others, showed a sensitivity response for =5 pesticides, indicating a very low tolerance of the freshwater macroinvertebrate community to these substances. The sensitivity or tolerance response of the organisms was also discussed by analyzing anatomical or physiological traits of the organisms, which could confer increased vulnerability (e.g. those that could increase the rate of contaminant uptake or that limit escape capacity). It was observed that although the traits have great potential for predictive use in the sensitivity of organisms, there is still uncertainty in defining the most useful characters for this purpose. Through the analysis of ecological thresholds, the community change points (CCP) were estimated, which represent the concentration of each pesticide at which an abrupt and synchronic change in the abundances of many taxa of the community is observed. In 10 out of 13 pesticides analyzed, the CCP was well below the environmental quality criteria for protection of aquatic biota, thus revealing that abrupt and synchronic effects occur at concentrations much lower than those established as safe according to chronic toxicity data for aquatic organisms. This study has also shown that together with the presence of pesticide residues, other stress factors associated with agricultural areas such as the degradation of riparian vegetation, the increase in temperature and the presence of excess 13 nutrients, generate effects that diminish biodiversity, and can even generate uninhabited areas either due to toxicity or mechanisms of evasion of contaminants (passive or active), producing fragmentation of the connectivity of aquatic ecosystems at concentrations considerably lower than those considered safe in international regulations. Therefore, the results of these studies could complement the development of numerical water quality criteria for protection of aquatic ecosystems and also be useful in retrospective risk assessments in the Tropics." (Author) Odonata are treated at family level.] Address: <https://repositorio.una.ac.cr/handle/11056/28225>

**23340.** Filipiuk, M.; Buczynski, P.; Kloskowski, J. (2024): Feeding ecology and reproductive success of the Little Bittern *Ixobrychus minutus* in differently managed pond habitats. *Journal of Ornithology* 165: 473-484. (in English, with German summary) ["Knowledge of the relationships between food habits and habitat is crucial for the assessment of habitat quality for birds. The present study investigated the diet and reproductive success of Little Bitterns *Ixobrychus minutus* nesting on cyprinid fish ponds, an important



breeding habitat of this species in central and eastern Europe. Being subject to different management practices, fish ponds provide food resources of uneven availability for this small heron. Prey items regurgitated by nestlings were examined, and breeding success was estimated on monoculture ponds stocked either with small fish (of a size suitable for feeding nestlings) or large fish (unavailable to Little Bitterns and adversely affecting their non-fish prey), on abandoned ponds dominated by small fish but with large fish also present, and on angling ponds dominated by large sport fish but harbouring significant numbers of small fish as well. A total of 1356 prey items from 78 broods were identified. Although Little Bitterns exhibited dietary flexibility in response to the contrasting availability of prey on their nesting ponds, the bulk of the nestlings' diet consisted of fish. The size of fish brought to the nest increased significantly with brood age, showing that parents adjusted the prey size to the gape constraints of their young. The chick production determined for 73 broods did not differ with respect to pond management, but the dietary composition indicated that to compensate for food shortages, birds nesting on ponds containing mainly large fish made foraging flights to food-richer ponds. The abundance of small-sized fish prey may be a factor limiting the breeding success of small- and medium-sized predatory waterbirds and should be taken into consideration in management strategies of habitats dominated by fish." (Authors)] Address: Filipiuk, M., Dept of Zoology & Nature Protection, Institute of Biological Sciences, Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. Email: maciej.flipiuk@mail.umcs.pl

**23341.** Gabetti, A.; Maganza, A.; Mossotto, C.; Rizzioli, B.; Esposito, G.; Bertoli, M.; Pizzul, E.; Bozzetta, E.; Prearo, M.; Pastorino, P. (2024): Macrobenthic assemblages and the influence of microhabitat in a high-mountain lake (Northwest Italy). *Diversity* 2024, 16(6), 329; <https://doi.org/10.3390/d16060329>: 19 pp. (in English) ["High-mountain lakes are freshwater ecosystems situated above the tree line which are known for their remote locations and limited accessibility. These ecosystems host simplified biotic communities primarily concentrated in the littoral zone and dominated by benthic macroinvertebrates that serve as bioindicators of environmental pressures. A two-year monitoring investigation was performed in July 2022 and July 2023 at Nero Lake (Cesana Torinese, Northwest Italy). Five sites along the lakeshore were selected for sampling physicochemical water parameters and macrobenthos [including the single odonate species *Enallagma cyathigerum*]. All collected data were analysed to compare trends across years and within specific sites. The results revealed that Nero Lake exhibited consistent macrobenthic communities across the two years studied, but significant differences were observed in its microhabitats. This suggests that substrate type and physicochemical water parameters strongly influence community composition. Chironomidae larvae and Mollusca were the dominant species, showing distinct associations with different substrates and environmental factors from one year to another. These findings contribute to our understanding of the intricate relationships between benthic macroinvertebrates and their environments, highlighting the necessity of detailed, small-scale assessments to comprehend ecosystem dynamics and develop effective conservation strategies." (Authors)] Address: Pastorino, P., The Veterinary Medical Research Institute for Piemonte, Liguria and Valle d'Aosta, Via Bologna 148, 10154 Torino, Italy. Email: paolo.pastorino@izsto.it

**23342.** Gain, B. I.; Kulkarni, R.R. (2024): Study on diversity of Odonata (dragonflies and damselflies) fauna of Lohara lake, District-Chandrapur (M.S), India. *Environment Conservation*

*Journal* 25(2): 384-387. (in English) ["The study was carried out for 12 months from January to December 2022 in and around Lohara Lake. The objective of this study is to assess the diversity of Odonata species and the impact of temperature on Libellulidae and Coenagrionidae in Lohara Lake. In the present investigation, total 12 species were identified belonging to 11 genera and 2 families. .... The minimum and maximum temperature of the site was 16°C and 44°C, respectively." (Authors)] Address: Gain, B.I., Dept of Zoology, Sardar Patel Mahavidyalaya, Chandrapur, 442401 (M.S.) India. Email: gainbibha@gmail.com

**23343.** Gauci, C. (2024): *Pantala flavescens* successfully breeding for the second time in Malta (Maltese Archipelago) (Odonata: Libellulidae). *Fragmenta entomologica* 56(1): 103-106. (in English) ["After being first recorded in the Maltese Islands in 2013 and successfully breeding on the archipelago's largest island of Malta in 2020 following an unprecedented influx, *P. flavescens* has again bred successfully on the same island in 2023. 259 exuviae were found at four small reservoirs in the same valley system of Burmarrad, on the island of Malta." (Author)] Address: Gauci, C., 28 Triq il-Kissier, Mosta, Malta. Email: cjpgauci48@yahoo.com

**23344.** Golfieri, B.; Dodaro, G. (2024): Assessment of Odonate assemblages in the Agro Pontino (Latina, Central Italy) using two biotic indices (Insecta: Odonata). *Fragmenta entomologica* 56(1): 89-98. (in English) ["Odonate assemblages were surveyed in seven sites within the context of the EU LIFE project GREENCHANGE that aims to preserve biodiversity and to enhance the ecological value of the agroecosystems of Agro Pontino (Latina, Central Italy) through interventions of ecological restoration. In total 16 species were recorded during the ante-operam surveys in 2019, which represent 28% of the Odonate fauna of the Lazio Region. None of them has a significant conservation interest, however *Coenagrion castellani*, an endemic Italian species, was observed in a small rivulet near the Pantanello site during an additional field survey. The application of OHI (Odonate Habitat Index) and ORI (Odonate River Index) allowed a detailed characterization of the dragonfly assemblages that are mainly dominated by eurytopic and euryecious species typical of standing waters. The assemblages of Pantanello and Fosso Epitaffio are notable exceptions thanks to the presence of sensitive lentic and lotic species. The main pressures affecting Odonate assemblages identified in the study area are the alterations of aquatic and riparian vegetation, the hydro-morphological degradation of running waters, limited water quality and the presence of the invasive crayfish *Procambarus clarkii*." (Authors)] Address: Golfieri, B., CIRF, Centro Italiano per la Riquilificazione Fluviale, Viale Garibaldi n.44/A, 30173 Mestre (Venezia), Italy. Email: b.golfieri@cirf.org

**23345.** Goodnight, S.R.; McCoy, M.W. (2024): Cannibalism and competition can increase parasite abundance for parasites with complex life history strategies. *Ecology* 2024:e4325: 15 pp. (in English) ["Ecological interactions among hosts are critical to consider when predicting disease dynamics. Most theory predicts that intraguild predation (IGP) and cannibalism negatively impact parasite populations, but this is based primarily on assumptions of simple or single-host life cycles. Here we investigate the effects of cannibalism in a size-structured host population on two digenean trematodes that have complex, multihost life cycles. A high incidence of cannibalism among paratenic hosts produced higher parasite infection loads and abundance, whereas cannibalism among obligate hosts reduced parasite abundances. We attributed this difference to trophic transmission aggregating



parasites in larger, potentially fitter hosts and also to transmission among paratenic hosts via cannibalism. Moreover, we found evidence of indirect competitive interactions between parasites that can also increase infections at small scales. Our results show there are multiple mechanisms through which high cannibalism environments can benefit parasites that use paratenic hosts and trophic transfer to complete their life cycles." (Authors) *Erythemis simplicicollis*] Address: Goodnight, Sarah, George Mason Univ., Potomac Science Center, Woodbridge, Virginia, USA. Email: sarah.r.goodnight@gmail.com

**23346.** Goswami, D.; Rekha; Singh, V. (2024): Species richness and diversity of insects in an argo-ecosystem in Bhabar Region of Uttarakhand. *Uttar Pradesh Journal of Zoology* 45(13): 312-323. (in English) ["The aim of the presented study was to estimate the species richness and diversity of insects were investigated in an agro-ecosystem in Bhabar region of Uttarakhand. In total, 992 individuals were collected representing 7 orders (Lepidoptera, Coleoptera, Hemiptera, Hymenoptera, Orthoptera, Diptera and Odonata), 30 families and 91 species that included herbivores, predators, omnivores and saprophages. The most dominant order was Lepidoptera with a relative abundance of (46.15%) and, the least was Diptera (6.59%). The five most abundant families by numbers of individuals were Pieridae (14.8%), Nymphalidae (13.9%), Lycaenidae (6.1%), Papilionidae (5.9%), and Libellulidae (5.4%). The five most diverse families by species were Nymphalidae (13), Pieridae (9), Lycaenidae (8), Papilionidae (7), and Libellulidae (6). The diversity index showed significant Diversity ( $H^{\prime}=1.832$ ), Evenness ( $E=0.9449$ ) and Margalef species richness ( $d=2.076$ ) of insect fauna." (Authors) Seven odonate species are listed: *Crocothemis servilia servilia*, *Orthetrum chrysis*, *Neurothemis ramburii*, *Orthemis ferruginea*, [sic], *O. pruinatum*, *O. taeniolatum*, *Paragomphus lieantus*.] Address: Goswami, D., Department of Zoology, Lab of Entomology, D.S.B. Campus, Kumaun University, Near to Galaxy Canteen, Nainital, Uttarakhand, 263001, India

**23347.** Gueddouche, M.; Fatiha, B.-S.; Mahmoudi, K.; Sol-tani, N. (2024): Larval mosquito predation: evaluation of the effectiveness of five aquatic arthropod species against larvae of *Culex pipiens* Linnaeus, 1758 (Diptera: Culicidae). *Oriental Insects* 58(3): 490-510. (in English) ["Mosquitoes are insects of medical interest. They contribute to the transmission and spread of many viral and parasitic diseases. Various methods have been used to control mosquitoes such as conventional insecticides, which are widely used throughout the world and have a negative impact on the environment and targeted species. Predatory insects are significant for the biocontrol of various pests, including the important potential against the larval instars of mosquitoes. In this study, we tested the efficacy of five species *Piona uncatata* Koenike, 1888; *Notonecta glauca* Linnaeus, 1758; *Corixa punctata* Illiger, 1807; *Ilyocoris cimicoide* Linnaeus, 1758; and *Sympetrum striolatum* Charpentier, 1840 against the fourth instars larvae of *Culex pipiens* Linnaeus, 1758, according to two exposure phases (Light phase, Twilight phase). The predation assays show a significant effect of tested species against mosquito larvae with the following decreasing order of efficacy: *S. striolatum* > *N. glauca* > *P. uncatata* > *I. cimicoide* > *C. punctata*. The early larval instars are the most favourable trophic choice of the five predatory species. On the other hand, we noticed a difference in the predation rate for each species during the two experimental periods. The light phase exhibits the highest predatory efficacy than the twilight phase." (Authors)] Address: Gueddouche, Malika, Lab., of Applied Animal Biology, Dept of Biology, Faculty of Sciences, Badji Mokhtar University, Annaba, Algeria

**23348.** Guglielmi, M.; de Filippo, G.; Usai, A.; Elicio, F. (2024): Revisione delle conoscenze sulle Libellule e Damigelle nella Riserva Naturale Regionale "Foce Volturno - Costa di Licola". Libro degli abstract. XIV CONVEGNO NAZIONALE "LE LIBELLULE IN ITALIA", Cisterna di Latina, Italia: 6. (in Italian) [Verbatim/Google translate: Starting from studies carried out on the Odonata of Campania between the 80s and 90s of the last century, the Authors have updated the list of species present in the wetlands of the "Foce Volturno - Costa di Licola" Regional Nature Reserve, among the provinces of Caserta and Naples (Campania, Southern Italy). The development of the checklist was conducted through bibliographic research in texts and databases, conducting new investigations on the sites and launching citizen-science projects. In total, 22 species were recorded (23.1% of Italian species and 39.2% of Campania species as of 2022) of which 7 belonging to damselflies and 15 to dragonflies. In reference to the 1995 list of regional odonatofauna, 18 species are confirmed (32.14% of those reported in Campania and 18.9% of those reported in Italy as of 2022). To these are added *Selysiothemis nigra* and *Brachytron pratense* sampled by the Authors for the first time in the area of the Reserve and *Orthetrum trinacria* observed by a citizen-scientist for the first time at a regional level, relevant data regarding their national distribution. The contribution provided brings the total number of Odonata species in Campania to 58 and represents the first piece of an ongoing investigation into species richness on a regional scale.] Address: Guglielmi, Marina, Istituto di Gestione della Fauna, Napoli, Italia. Email: marinaguglielmi99@gmail.com

**23349.** Guillermo-Ferreira, R.; Filippov, A.E.; Kovalev, A.; Gorb, S.N. (2024): Voronoi diagrams and Delaunay triangulation for modelling animal territorial behaviour. *Ecology and Evolution* 14(7): e11715.: 14 pp. (in English) ["We explore the use of movable automata in numerical modelling of male competition for territory. We used territorial dragonflies as our biological inspiration for the model, assuming two types of competing males: (a) faster and larger males that adopt a face-off strategy and repulse other males; (b) slower and smaller males that adopt a non-aggressive strategy. The faster and larger males have higher noise intensity, leading to faster motion and longer conservation of motion direction. The velocity distributions resemble the Maxwell distributions of velocity, expected in Brownian dynamics, with two probable velocities and distribution widths for the two animal subpopulations. The fast animals' trajectories move between visually fixed density folds of the slower animal subpopulation. A correlation is found between individual velocity and individual area distribution, with smaller animals concentrated in a region of small velocities and areas. Attraction between animals results in a modification of the system behaviour, with larger animals spending more time being surrounded by smaller animals and being slowed down by their interaction with the surroundings. Overall, the study provides insights into the dynamics of animal competition for territory and the impact of attraction between animals." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Kiel University, Am Botanischen Garten, 1-9, 24118 Kiel, Germany. Email: sgorb@zoologie.uni-kiel.de

**23350.** Hämmäläinen, M.; Orr, A.G. (2024): Notes on an undescribed new *Dysphaea* species from north-eastern India and north-eastern Bangladesh (Odonata: Euphaeidae). *Notulae odonatologicae* 10(3): 73-78. (in English) ["In several publications in India and Bangladesh, photographic images of a *Dysphaea* *Selys*, 1853, species with striking caerulean coloration on the male abdomen have been identified as *Dysphaea walli* Fraser, 1927, a species described from the

Shan State in Burma. We present evidence suggesting that these individuals represent an undescribed new species, rather than *D. walli*, and document the published records of this new species from India and Bangladesh." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecol. & Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**23351.** Hartman, M.E. (2024): Odonata species composition in agroecosystems: Preliminary surveys with an emphasis on potential for biological control on farms. MSc. thesis, Faculty of the Graduate School of the University of Maryland, College Park: 86 pp. (in English) ["Adult Odonata are efficient aerial predators that provide ecosystem service as consumers of pest arthropods. However, their role as predators of agricultural pests in agroecosystems has been understudied. The prey of odonates has been historically difficult to quantify but new molecular methods can make diet analysis easier. I conducted visual encounter surveys across four farms in 2020 and 2021. I found odonates were present on all farms surveyed but there were significant differences in abundance and richness. Fecal pellets were collected from 94 odonates in 2021 for prey DNA analysis using next generation sequencing. Nine odonate samples produced exceptional libraries, resulting in a large quantity of identifiable prey sequences. This preliminary study can help future researchers develop best practices for maintaining healthy farm water bodies and optimizing fecal DNA analysis methodology to better understand odonates' potential for agricultural pest suppression." (Author)] Address: <https://api.drum.lib.umd.edu/server/api/core/bitstreams/2539aca2-5887-47f7-8947-b3e840e6bb19/content>

**23352.** Hawkes, W.L.; Doyle, T.; Massy, R.; Weston, S.T.; Davies, K.; Cornelius, E.; Collier, C.; Chapman, J.W.; Reynolds, D.R.; Wotton, K.R. (2024): The most remarkable migrants — systematic analysis of the Western European insect flyway at a Pyrenean mountain pass. *Proc. R. Soc. B* 291: 20232831: 12 pp. (in English) ["In autumn 1950 David and Elizabeth Lack chanced upon a huge migration of insects and birds flying through the Pyrenean Pass of Bujaruelo, from France into Spain, later describing the spectacle as combining both grandeur and novelty. The intervening years have seen many changes to land use and climate, posing the question as to the current status of this migratory phenomenon. In addition, a lack of quantitative data has prevented insights into the ecological impact of this mass insect migration and the factors that may influence it. To address this, we revisited the site in autumn over a 4 year period and systematically monitored abundance and species composition of diurnal insect migrants. We estimate an annual mean of 17.1 million day-flying insect migrants from five orders (Diptera, Hymenoptera, Hemiptera, Lepidoptera and Odonata) moving south, with observations of southward 'mass migration' events associated with warmer temperatures, the presence of a headwind, sunlight, low windspeed and low rainfall. Diptera dominated the migratory assemblage, and annual numbers varied by more than fourfold. Numbers at this single site hint at the likely billions of insects crossing the entire Pyrenean mountain range each year, and we highlight the importance of this route for seasonal insect migrants." (Authors)] Address: Hawkes, W.L., Centre for Ecology & Conservation, & Environment & Sustainability Inst., Univ. Exeter, Cornwall Campus, Penryn, Cornwall TR10 9FE, UK. Email: will.leo.hawkes@vogelwarte.ch

**23353.** He, X.; Wang, C.; Jia, P.; Zhong, Z. (2024): The effect of hindwing trajectories on wake–wing interactions in the configuration of two flapping wings in tandem. *Biomimetics*

2024, 9, 406. <https://doi.org/10.3390/biomimetics9070406>: 22 pp. (in English) ["The present investigations on tandem wing configurations primarily revolve around the effects of the spacing  $L$  and the phase difference  $\varphi$  between the forewing and the hindwing on aerodynamic performance. However, in nature, organisms employing biplane flight, such as dragonflies, demonstrate the ability to achieve superior aerodynamic performance by flexibly adjusting their flapping trajectories. Therefore, this study focuses on the effects of  $f$ , as well as the trajectory of the hindwing, on aerodynamic performance. By summarizing four patterns of wake–wing interaction processes, it is indicated that  $\varphi = -90^\circ$  and  $0^\circ$  enhances the thrust of the hindwing, while  $\varphi = 90^\circ$  and  $180^\circ$  result in reductions. Furthermore, the wake–wing interactions and shedding modes are summarized corresponding to three kinds of trajectories, including elliptical trajectories, figure-eight trajectories, and double figure-eight trajectories. The results show that the aerodynamic performance of the elliptical trajectory is similar to that of the straight trajectory, while the figure-eight trajectory with positive surging motion significantly enhances the aerodynamic performance of the hindwing. Conversely, the double-figure-eight trajectory degrades the aerodynamic performance of the hindwing." (Authors)] Address: He, X., School of Science, Harbin Institute of Technology (Shenzhen), Shenzhen 518055, China. Email: hexu19950207@163.com

**23354.** Higashikawa, W.; Matsuzawa, Y.; Mori, T. (2024): Forest expansion affects Odonata assemblage in floodplain: a case study in the Kiso River, central Japan Asia/Oceania report. *Limnology* 25: 337-344. (in English) ["In floodplains, which are highly modified and less inundated, trees are expanding, thus raising concerns regarding their impact on freshwater organisms. We analyzed the relationship between forest expansion and the change in Odonata assemblage over an extended period of time in the floodplain with ponds of the Kiso River, central Japan. In the 1970s, the ponds were mainly surrounded by grasslands, and approximately 80% of Odonata species were non-forest species. However, the number of forest species increased and that of non-forest species largely decreased with the forest expansion over the past five decades, resulting in almost a similar number of forest and non-forest species in 2021. Whereas the abundance of the non-forest species had been greater than that of the forest species until the 2000s, the difference has been much smaller in the 2010s, and the non-forest species occupied approximately only 30% of the number of individuals in 2021. The forest expansion may have reduced the open-lentic habitats for the non-forest species, which require riparian grasslands for resting, foraging, and reproduction, and may disturb the immigration of non-forest species from the adjacent rice paddy fields and rivers. The development of canopy cover over the waterbodies may have decreased the light and temperature above and within the ponds, which might have caused a decline in species that prefer warm and open-water environments. Maintaining shifting-mosaic patterns of vegetation around the floodplain waterbodies through active management may be effective in conserving floodplain Odonata communities, including both forest and non-forest species." (Authors)] Address: Higashikawa, W., Kyushu Research Center, Forestry and Forest Products Research Institute, Kumamoto 860-0862, Japan. Email: higashi\_n34@yahoo.co.jp

**23355.** Höpstein, G (2024): Das Landschaftsschutzgebiet „Rinne-Rottenbachtal“ (Thüringen, Landkreis Saalfeld-Rudolstadt/ Landkreis Ilm-Kreis) – Faunistische Beobachtungen (Insecta: Lepidoptera, Odonata, Orthoptera; Amphibia; Reptilia). *Mauritiana (Altenburg)* 42: 1-17. (in German, with English summary) ["The landscape conservation area "Rinne-

Rottenbachtal" (Thuringia, district Saalfeld Rudolstadt/ district Ilm-Kreis) – Faunistic observations (Insecta: Lepidoptera, Odonata, Orthoptera; Amphibia; Reptilia): Over a period of 28 years, from 1995 to 2023, the occurrences of selected species groups in the landscape conservation area "Rinne-Rottenbachtal" were investigated. Together with historical data, 29 grasshopper, 33 dragonfly, 6 amphibian and 5 reptile species were found in the area. ... Among the dragonflies, the presence of *Cordulegaster boltonii* is noteworthy. ...] Address: not stated

**23356.** Hou, D.; Tan, B.; Shi, B.; Zhong, Z. (2024): Aerodynamic effects of time-varying corrugations on dragonfly wings in flapping flight. *Biomimetics* 2024, 9(7), 433; <https://doi.org/10.3390/biomimetics9070433>: 15 pp. (in English) ["The aerodynamic effects of wing corrugation on insect flight have received widespread attention. However, there has hardly been any specific focus on dynamic changes to corrugation angle in the models. The flexible vein joints containing resilin in the wings of dragonflies and damselflies enable the longitudinal veins to rotate and thereby change the corrugation angles throughout flapping cycles. Therefore, a two-dimensional corrugated airfoil with time-varying corrugation angles is proposed and the aerodynamic performance is evaluated in terms of aerodynamic force, power and efficiency. The results indicate that the airfoil with time-varying corrugations outperforms the rigid one in terms of enhancing thrust and reducing power consumption. The aerodynamic performance of time-varying corrugated airfoils is optimal when the angle varies in a specific range, and an excessively large angle variation may have negative effects. In addition, excessive height or a negative leading edge of the corrugation can lead to a reduction in the thrust. A design concept for the 2D airfoil with time-varying corrugations is provided and the findings are of significance for enhancing the aerodynamic performance of biomimetic flexible flapping-wing vehicles.] Address: Hou, D., Department of Mechanical Engineering, Shanghai Maritime University, Shanghai 201306, China. Email: [dhou@shmtu.edu.cn](mailto:dhou@shmtu.edu.cn)

**23357.** Huang, D.-Y.; Cai, C.-Y. (2024): The 9th International Conference on Fossil Insects, Arthropods and Amber held in Xi'an, China. *Mesozoic* 1(2): 107-116. (in English) ["At the 8th International Conference on Fossil Insects, Arthropods and Amber (Fossil×3) held in 2019 in Santo Domingo, Dominican Republic, Professor Diying Huang, from the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS), won the bid to host the 9th Fossil×3 conference in Xi'an, China. Due to the pandemic, the conference was postponed twice and was finally successfully held in the ancient city of Xi'an from April 18–25, 2024.

**23358.** The conference was hosted by the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, and the venue was located at the Qujiang Huibinyuan Hotel in Xi'an. Over 170 experts, scholars, and graduate students attended the conference. The participants came from more than 20 countries across Asia, Europe, North America, South America, Africa, and Australia, including China, Spain, Poland, France, Russia, the United Kingdom, the United States, Germany, Finland, Dominica, Lebanon, New Zealand, Kazakhstan, Argentina, Morocco, South Africa, Japan, South Korea, Norway, Chile, and Croatia (Figs 1, 2). Pre- and mid-conference field trips feature systematic investigation of the Mesozoic strata in northern Shaanxi, including the Middle Triassic Ermaying Formation, the Middle-Late Triassic Yanchang Formation, the Early/Middle Jurassic Yan'an Formation, the Middle-Late Jurassic Zhiluo Formation,

and the Lower Cretaceous Yijun and Luohe formations. Fossil collection was carried out in the Yan'an Formation at Huangjiagou Village, Yuyang District, Yulin City, and Yan'an City. Additionally, participants visited and studied the topography and landforms of the Loess Plateau, as well as the ancient cultural sites in northern Shaanxi (Figs 3, 4, 7). The conference focused on several research areas, including the diversity and evolution of insect fossils, phylogenetics, integrated studies on amber, Cambrian arthropods, and the taphonomy and methodologies related to arthropods. It showcased a series of new advances in the integrated study of fossil insects, arthropods, and amber in recent years, promoting academic exchanges among experts, scholars, and graduate students in related fields worldwide. Professor Jacek Szwed, the President of the International Palaeontological Society (IPS), presented awards to Professors Dany Azar, Chengyang Cai, Jun Wang, Alex Rasnitsyn, and Michael S. Engel. Professors Diying Huang and Dany Azar, editors-in-chief of the journal *Palaeontology*, awarded the Best Contribution Award to Professor André Nel and the Best Citation Award to Dr Andrew Ross. Professor Diying Huang also presented journal recognition awards to Dany Azar, Jacek Szwed, Chenyang Cai, Neal Evenhuis, and Zhiqiang Zhang. Professor Xingliang Zhang from Northwest University, China, and Professor Jacek Szwed from the University of Gdansk, Poland, delivered invited plenary talks at the conference (Figs 5, 6). Over 100 attendees delivered keynote and regular oral presentations, while 30 participants presented posters. Ms. Shumin Li from Sun Yat-sen University won the Best Student Oral Presentation Award, and Ms. Xinhui Chen, a joint training student from Hebei Normal University and NIGPAS, won the Best Student Poster Award. Eleven graduate students received Excellent Student Oral Presentation Awards, and four graduate students received Excellent Student Poster Awards, presented by Jacek Szwed, the IPS President, and Agnieszka Soszynska, Chair of the Scientific Committee of the IPS (Figs 8, 9). The International Palaeontological Society held elections for its new executive and scientific committee members. Professor Diying Huang was elected President, Professor Agnieszka Soszynska was elected Vice President, and Dr Mónica M. Solórzano Kraemer was elected General Secretary. In a competitive vote, El Jadida, Morocco, won the bid to host the 10th International Conference on Fossil Insects, Arthropods and Amber in 2027, surpassing Rennes, France." (Authors) References and photographs of well known authors of fossil Odonata papers are made or given.] Address: Huang, D.-Y., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China

**23359.** Ishara, J.; Matendo, R.; Ng'ang'a, J.; Siddiqui, S.A.; Niassy, S.; Katcho, K.; Kinyuru, J. (2024): The contribution of commonly consumed edible insects to nutrition security in the Eastern D.R. Congo. *Scientific Reports* 14(16186): 12 pp. (in English) ["Edible insects are perceived as an incredible opportunity to mitigate the major challenge of sustainably producing healthy foods for a growing world population in the face of climate change uncertainties over the coming decade. In this study, we assessed the nutrient composition and sensory properties of *Acheta domesticus*, *Apis mellifera*, *Gnathocera trivittata*, *Gryllotalpa africana*, *Imbrasia epimethea*, *Imbrasia oyemensis*, *Locusta migratoria*, *Macrotermes subhyalinus*, *Nomadacris septemfasciata*, *Rhyncophorus phoenicis*, *Ruspolia differens* and *Rhyncophorus ferrugineus* consumed in Eastern D. R. Congo. The investigated edible insects are highly appreciated and nutritious, with proteins (20.67–43.93 g/100 g) and fats (14.53–36.02 g/100 g) being the major macro-nutrients, proving their potential to improve diets

through food enrichment. The high potassium (24–386.67 mg/100 g), sodium (152–257.82 mg/100 g), magnesium (32–64 mg/100 g), iron (5.3–16.13 mg/100 g), calcium (25–156.67 mg/100 g) and zinc (11–19.67 mg/100 g) content make the assessed edible insects a useful mineral-containing ingredient for preventing undernutrition in countries which are plagued by micronutrient deficiencies. A scatter plot of matrices and Pearson's correlations between sensory attributes and nutritional composition showed a negative correlation ( $r = -0.45$ ) between protein and appearance. While no strong correlation was observed between nutritional attributes and sensory acceptance, a positive correlation was observed between potassium and aroma ( $r = 0.50$ ), after-taste ( $r = 0.50$ ) and acceptability ( $r = 0.52$ ). Principal component analysis results indicated that the two axes accounted for up to 97.4% of the observed variability in the nutrient composition and sensory attributes of commonly consumed edible insects in the Eastern D. R. Congo. Given the significant delicacy and nutritional potential of edible insects highlighted in this paper, households can rely on the latter to meet their nutritional needs rather than conventional livestock, thus contributing to environmental and financial security through local business opportunities." (Authors) The paper includes a reference to Odonata.] Address: Ishara, J., Dept of Food Science & Technology, Université Evangélique en Afrique, P.O. Box 3323, Bukavu, Democratic Republic of the Congo. Email: jack.ishara@outlook.com

**23360.** Janah, N.K.F.; Rauf, A.; Bustamin, B. (2024): Makrozoobentos sebagai bioindikator kualitas air di sungai paneki pombewe kabupaten sigi. Bioscientist: Jurnal Ilmiah Biologi 12(1): 856-864. (in Indonesian, with English summary) ["...The objective of this study is to describe the water quality of Paneki River based on the presence of macrozoobentos organisms as water bioindicators. This research is a quantitative descriptive study using a line transect sampling technique at three purposively selected stations. The results showed that macrozoobentos found belonged to 11 families: .... The calculation of water quality analysis based on the Family Biotic Index at station I was 4.07, and station II was 4.09, indicating both stations are classified as excellent water quality with slight pollution from organic matter. Station III scored 4.42, classified as good water quality with some pollution from organic matter." (Authors) Taxa - including Coenagrionidae and Gomphidae - are treated at family level.] Address: Janah, N.K.F., Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Tadulako, Jalan Soekarno Hatta KM 9, Palu, Sulawesi Tengah 94148, Indonesia. Email: nidyajannah@gmail.com

**23361.** Jödicke, R.; Borkenstein, A. Schröter, A. (2024): Diel pattern of flight activities in *Anax imperator* under a cool temperate climate (Odonata: Aeshnidae). Odonatologica 53(1/2): 111-132. (in English) ["Visits by *A. imperator* to breeding ponds were recorded in north-western Germany from dawn to dusk. On warm and windless sunny days, the species flew in three clearly defined time periods: before sunrise, from morning to afternoon, and from sunset to nightfall. Feeding flight over the water was only observed during both twilight periods, with both sexes foraging. Males patrolled not only in the diurnal period, but also at dusk and occasionally at dawn. Females oviposited during the diurnal period and on average flew one hour later than the males. The latest-flying vespertine males cruised close to the water surface during the last minutes of daylight, losing their aggression towards other males and finally leaving the pond when minimum light intensity reached 4 lx. Our observations confirm that mating is not initiated at the breeding ponds, although patrolling males and egg-laying females encounter each other there

for hours during the diurnal period. The rendezvous site of the species is obviously away from the water. Overall, given its general abundance there are relatively very few records of mating wheels, which is why we assume that females mate rarely, perhaps even only once in their lifetime. Thus, the purpose of the long-lasting patrol flight remains a mystery." (Authors)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany

**23362.** Johnson, J.T.; Tennessen, K.J. (2024): Diagnostic characteristics for distinguishing adult females of *Ischnura fluviatilis* and *I. ramburii* (Odonata: Coenagrionidae). Notulae odonatologicae 10(3): 79-85. (in English) ["Adult females of *Ischnura fluviatilis* can be distinguished structurally from *I. ramburii* by the presence of small pits on the middle lobe of the prothorax (absent in *I. ramburii*) and the hind margin of the prothoracic hind lobe curved and directed posteriorly (straight, directed posterodorsally in *I. ramburii*). Color pattern differences between immature females of both species are discussed; color differences between mature females are considered equivocal." (Authors)] Address: Johnson, J., 13003 Unander Avenue, Vancouver, WA 98660, USA

**23363.** Jonah, U.E.; Akpan, I.I. (2024): Characterization of physicochemical parameters and insect composition in a reservoir in Northern Akwa Ibom State, Nigeria. Ceylon Journal of Science 53(3): 303-312. (in English) ["This study was conducted in a reservoir located in Mbiabet Ikot Udo community, Northern Akwa Ibom State, Nigeria, to assess the physicochemical status, composition and abundance of aquatic insects. Samples were collected from June 2022 to January 2023 and all the parameters were evaluated using standard methods. The results revealed that temperature ranged from 22.7 to 30.6°C, TDS (153 – 238 mgL<sup>-1</sup>), EC (153 – 238 μScm<sup>-1</sup>), TDS (97.9 – 152.3 mgL<sup>-1</sup>), pH (6.3 – 8.1), DO (2.22 – 5.14 mgL<sup>-1</sup>), TSS (1.62 – 6.34 mgL<sup>-1</sup>), NO<sub>3</sub> (1.53 – 5.68 mgL<sup>-1</sup>), PO<sub>4</sub> (2.18 – 4.16 mgL<sup>-1</sup>), Mg<sup>2+</sup> (3.92 – 5.36 mgL<sup>-1</sup>), Ca<sup>2+</sup> (5.39 – 8.13 mgL<sup>-1</sup>), Na<sup>+</sup> (0.72 – 2.37 mgL<sup>-1</sup>), K<sup>+</sup> (0.68 – 1.48 mgL<sup>-1</sup>), BOD (1.34 – 6.46 mgL<sup>-1</sup>), Ni (0.001 – 0.08 mgL<sup>-1</sup>), Fe (0.1 – 0.3 mgL<sup>-1</sup>), Pb (0.003 – 0.008 mgL<sup>-1</sup>), Cu (0.01 – 1.3 mgL<sup>-1</sup>) and Cd (0.002 – 0.008). There were significant temporal variations in some of these parameters. However, all the parameters were within the acceptable limits, except for TSS, BOD, DO, Ni, Cu and Fe. A total of 185 species of aquatic insects, in five taxonomic orders and 10 families, were recorded. Odonata had the highest percentage (40.5%), followed by Hemiptera (25.0%), and Diptera had the lowest percentage (8.6%). The dominant family was Aeshnidae (18.9%) while the least percentage was from Pleidae (1.1%). The analysis revealed that parameters such as temperature, DO, pH, Ca<sup>2+</sup>, EC, TDS and Cu negatively influenced the abundance of aquatic insects coupled with seasonal influence." (Authors) With the exception of *Palpopleura jucunda*, all odonate taxa listed are from the Americas.] Address: Jonah, U.E., Department of Zoology & Environmental Biology, College of Natural Sciences, Michael Okpara University of Agriculture, Umudike, Nigeria. Email: udemejonah@gmail.com

**23364.** Kalkman, V.J.; Villanueva, R.J.T. (2024): On the synonymy of *Crocothemis crocea* Navás, 1918, with *Crocothemis servilia* (Drury, 1773), with remarks on Philippine odonates (Odonata: Libellulidae). Notulae odonatologicae 10(3): 107-109. (in English) ["No new information on *C. crocea* has been published since its original description in 1918 based on three females from the Philippines. The original description does not discuss differences between *C. crocea* and other species of *Crocothemis* and the description itself fits

well with *C. servilia*, a species common and widespread in the Philippines. It is therefore concluded that *C. crocea* is a junior synonym of *C. servilia*." (Authors)] Address: Kalkman, V.J., Natural Biodiversity Center, naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**23365.** Kefford, B.J.; Hyne, R.; Brooks, A.J.; Shenton, M.D.; Hills, K.; Nichols, S.J.; Bray, J.P. (2024): Do magnesium and chloride ameliorate high sodium bicarbonate concentrations? A comparison between laboratory and mesocosm toxicity experiments. *Science of The Total Environment* 912:169003. (in English) ["Increasing salinity is a concern for biodiversity in many freshwater ecosystems globally. Single species laboratory toxicity tests show major differences in freshwater organism survival depending on the specific ions that comprise salinity types and/or their ion ratios. Toxicity has been shown to be reduced by altering ionic composition, despite increasing (total) salinity. For insistence, single species tests show the toxicity of sodium bicarbonate ( $\text{NaHCO}_3$ , which commonly is a large proportion of the salts from coalbeds) to freshwater invertebrates is reduced by adding magnesium ( $\text{Mg}^{2+}$ ) or chloride ( $\text{Cl}^-$ ). However, it is uncertain whether reductions in mortality observed in single-species laboratory tests predict effects within populations, communities and to ecosystem processes in more complex multi-species systems both natural and semi-natural. Here we report the results of an outdoor multi-species mesocosm experiment to determine if the effects of  $\text{NaHCO}_3$  are reduced by increasing the concentrations of  $\text{Mg}^{2+}$  or  $\text{Cl}^-$  on: a) stream macroinvertebrate populations and communities; b) benthic chlorophyll-a and; c) the ecosystem process of leaf litter decomposition. We found a large effect of a high  $\text{NaHCO}_3$  concentration ( $\sim 4.45 \mu\text{S}/\text{cm}$ ) with reduced abundances of multiple taxa, reduced emergence of adult insects and reduced species richness, altered community structure and increased leaf litter breakdown rates but no effect on benthic chlorophyll-a. However, despite predictions based on laboratory findings, we found no evidence that the addition of either  $\text{Mg}^{2+}$  or  $\text{Cl}^-$  altered the effect of  $\text{NaHCO}_3$ . In semi-natural environments such as mesocosms, and natural environments, organisms are subject to varying temperature and habitat factors, while also interacting with other species and trophic levels (e.g. predation, competition, facilitation), which are absent in single species laboratory tests. Thus, it should not be assumed single-species tests are good predictors of the effects of changing ionic compositions on stream biota in more natural environments. ... The most abundant taxa belonged to Elmidae (Coleoptera), Chironomidae (Diptera), Baetidae and Leptophlebiidae (Ephemeroptera), Gomphidae, worms (Oligochaeta), Hydropsychidae and Hydroptilidae (Trichoptera)."] (Authors)] Address: Kefford, B.J., Centre for Applied Water Science, Institute for Applied Ecol., Univ. Canberra, Canberra, Australia. Email: Ben.kefford@canberra.edu.au

**23366.** Keil, L.; Hunger, H.; Klein, A.-M. (2024): Sparsely reeded areas as main reproductive habitat of *Sympetma paedisca* at Lake Constance (Odonata: Lestidae). *Odonatologica* 53(1/2): 133-153. (in English) ["This study investigates the reproductive habitat of *S. paedisca* at Lake Constance, a region of special importance for the conservation of the species in Germany, focussing on vegetational characteristics. The reproductive activity of *S. paedisca* was analysed by sampling active individuals along transects, distinguishing between males, females, and tandems. Sixty-eight plots, including controls, were defined according to the *S. paedisca* observations, and vegetation surveys were conducted on each plot. Additionally, an analysis of the relationship between long-term *S. paedisca* monitoring data and the expanse of

flooded reedbeds and reed meadows (i.e., traditional litter meadows used to produce bedding for the stables) was conducted. The results suggest that the reproductive habitat description for *S. paedisca* at Lake Constance needs to be revised. The importance of sparse *P. australis* vegetation for *S. paedisca* was highlighted and the plant community of low sedge swamps was identified as additional reproductive habitat. Overall, the results indicate that plant community composition is not the main cue for *S. paedisca* habitat selection. Whilst the reed meadows are significant reproductive habitats for *S. paedisca*, this is not the case for the reedbeds." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse – INULA, Basler Landstr. 49e, 79111 Freiburg, Germany. Email: holger.hunger@inula.de

**23367.** Kheam, S.; Rubene, D.; Markovic, D.; Ith, S.; Uk, O.N.; Soung, S.; Ninkovic, V. (2024): The effects of cultivar mixtures on insect pest and natural enemy abundance, diseases, and yield in tropical soybean cropping system. *Biological Control* 196, September 2024, 105571: 11 pp. (in English) ["Highlights: • Increasing cultivar mixtures can attract certain groups of natural enemies in soybean field. • Cultivar mixtures of soybeans have inconsistent effects on insect pests, possibly due to low pest pressure. • Cultivar mixtures of soybeans do not alter diseases and yield, likely due to the lack of interaction effects between the selected cultivars. • The selection of cultivars exhibiting interaction effects in cultivar mixtures could be an alternative strategy for biological pest control and sustainable soybean production. Abstract: Increasing genotypic crop diversity via cultivar mixtures is a promising sustainable approach to control insect pests and diseases, thereby improving yield. The effects of genotypic diversity have not been studied for many crops. We investigated the effects of cultivar mixtures in a tropical soybean (*Glycine max* L. Merrill) cropping system on i) insect pest abundance, ii) natural enemy abundance, iii) diseases, and iv) yield. In the field trial, three soybean cultivars were used, two commercial and one traditional, with a randomized complete block design. Significant differences among cultivars and some mixtures were found for certain insect pest abundance (whitefly and brown bean bug), but no consistent mixture effects were observed. Significant increases in natural enemies (predatory ant, lady beetle, parasitoid wasp, and dragonfly) were detected in some cultivar mixtures, compared to single cultivars. Higher genetic diversity in cultivar mixtures increased the abundance of certain natural enemies at specific plant stages. The cultivar mixtures did not alter disease symptoms or yield. These results were obtained during a season with very low overall pest pressure, and the effects of cultivar mixtures might be altered at higher pest pressure, which should be further investigated. This study highlights trade-offs in cultivar selection when jointly considering pest and disease abundance and yield, as no single cultivar (or mixture) performed better in all observed aspects. Our study supports the hypothesis that increasing cultivar mixtures can promote the abundance of certain natural enemies, suggesting the potential of cultivar mixture effects for biological control and sustainable agricultural management." (Authors)] Address: Kheam, S., Dept Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden. Email: sokha.kheam@slu.se

**23368.** Khedr, A.; Castellani, F. (2024): Dragonfly-inspired blades for high aerodynamic performance small horizontal axis wind turbine. *Journal of Physics: Conference Series* 2767 072013: 10 pp. (in English) ["Inspired from the fascinating realm of Dragonfly features, this study intricately investigates the aerodynamic performance of a distinctive 1 m diameter small-scale Horizontal Axis Wind Turbine characterized

by a unique bio-inspired tandem-blades configuration. Based on experimental wind tunnel tests and computational fluid dynamics simulations, the turbine performance is explored at different Tip Speed Ratios (TSRs). Remarkably, the bio-inspired turbine exhibits exceptional traits, achieving a notable peak power coefficient of approximately 0.35 at a low TSR of 3. A detailed investigation includes thorough analyses of pressure contours, relative velocity distributions, and individual blade contributions, revealing unique dynamics within the tandem configuration. The fore blade notably prevails in extracting wind energy, showcasing superior performance. While the hind blade influence in enhancing the fore blade efficiency emerges, underscoring the role of blade interactions in this bio-inspired designs. This study contributes significantly to the comprehension of the new design dragonfly-inspired wind turbine aerodynamics." (Authors)] Address: Khedr, A. & F. Castellani, University of Perugia, Department of Engineering, Via Duranti, 06125, Perugia, Italy. E-mail: amrkhedr1994@gmail.com & francesco.castellani@unipg.it

**23369.** Kosterin, O.E.; Onishko, V.V.; Ilyina, E.V.; Chepurinov, G.Yu.; Blinov, A.G. (2024): The genus *Coenagrion* Kirby, 1890 (Odonata: Coenagrionidae) in the Russian part of the Caucasus. *Zootaxa* 5471(2): 151-190. (in English) ["Distribution, characters and habitats of *Coenagrion* spp. in the Russian part of the Caucasus is considered, chiefly by the authors' own data. There are seven species, of which *C. australocaspicum* Dumont & Heidari, 1996 is for the first time recorded in Russia (Dagestan), *C. ornatum* (Selys, 1850) and *C. scitulum* (Rambur, 1842) in Karachay-Cherkess and Dagestan Republics and *C. pulchellum* (Vander Linden, 1825) in Dagestan. *Coenagrion lunulatum* is still known from the territory only by a century-old record by A.N. Bartenev from the highlands of West Caucasus. Keys for identification of the Caucasian species of the puella-group in a broad sense - *C. australocaspicum*, *C. puella* (Linnaeus, 1758), *C. pulchellum* and *C. ponticum* (Bartenev, 1929) - are provided. *Coenagrion ponticum* is supposed to be a hybridogenic species resulting from hybridisation between *C. puella* and *C. pulchellum* in the past. Three of the EPIC (exon-primed intron-crossing) molecular markers, AgT, MLC and PRMT, were sequenced from the above mentioned puella-group spp. and *C. ornatum*, from the territory considered and elsewhere, plus from *C. persicum* (Lohmann, 1993) from Iran. *Coenagrion ponticum* thus entered molecular analysis for the first time. *Coenagrion australocaspicum* appeared divergent from the rest of the group. *Coenagrion ponticum* appeared inside the cluster of *C. pulchellum* while *C. persicum* outside it, so the species status of the former is challenged while that of the latter confirmed. The joint tree showed two clades in *C. puella* (with no difference in outer characters), one composed of specimens originating from the regions to the south of the Main Caucasian Range and from the Caspian areas of Dagestan including foothills, and the other with specimens from Inner Dagestan (plus one locality in the Caspian-faced foothills), West Caucasus, Western Europe, Ural and West Siberia." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**23370.** Kurata, S.; Mano, S.; Nakahama, N.; Hirota, S.; Suyama, Y.; Ito, M. (2024): Development of mitochondrial DNA cytochrome c oxidase subunit I primer sets to construct DNA barcoding library using next-generation sequencing. *Biodiversity Data Journal* 12: e117014. <https://doi.org/10.3897/BDJ.12.e117014>: 20 pp. (in English) ["Insects are one of the most diverse eukaryotic groups on the planet, with one million

or more species present, including those yet undescribed. The DNA barcoding system has been developed, which has aided in the identification of cryptic species and undescribed species. The mitochondrial cytochrome c oxidase I region (mtDNA COI) has been utilised for the barcoding analysis of insect taxa. Thereafter, next-generation sequencing (NGS) technology has been developed, allowing for rapid acquisition of massive amounts of sequence data for genetic analyses. Although NGS-based PCR primers designed to amplify the mtDNA COI region have been developed, their target regions were only a part of COI region and/or there were taxonomic bias for PCR amplification. As the mtDNA COI region is a traditional DNA marker for the DNA barcoding system, modified primers for this region would greatly contribute to taxonomic studies. In this study, we redesigned previously developed PCR primer sets that targetted the mtDNA COI barcoding region to improve amplification efficiency and to enable us to conduct sequencing analysis on NGS. As a result, the redesigned primer sets achieved a high success rate (> 85%) for species examined in this study, covering four insect orders (Coleoptera, Lepidoptera, Orthoptera and Odonata [*Paracerion hieroglyphicum*, *Davidius nanus*, *Lestes sponsa*, *Rhyothemis fuliginosa*, *Sympetrum darwinianum*, *S. frequens*, *S. infuscatum*, *S. kunckelii*]). Thus, by combining the primers with developed primer sets for 12S or 16S rRNA regions, we can conduct more detailed taxonomic, phylogeographic and conservation genetic studies using NGS." (Authors)] Address: Kurata, S., Tomakomai Experimental Forest, Hokkaido University, Tomakomai, Japan

**23371.** Lambret, P. (2024): Conservation ecology of the threatened temporary-pond damselfly *Lestes macrostigma* - An integrated life cycle approach / Conservatie biologie van de bedreigde waterjuffersoort van tijdelijke plassen *Lestes macrostigma* - Een geïntegreerde levenscyclus benadering. PhD thesis, KU Leuven, Belgium: 216 pp. ["Insects are the fastest declining group of species and among the most threatened by anthropogenic activities. However, they are largely overlooked in conservation policies and conservation research. Wetlands have greatly declined over the last centuries and continue to face important threats, impacting all sectors of biodiversity, including insects. Odonates (damselflies and dragonflies) are valuable indicators of wetlands' conservation status. Habitat restoration (including habitat recreation) has been raised as a priority strategy during the current decade. Such conservation actions are facilitated using flagship species, but to be efficient, a thorough knowledge of their ecological requirements is necessary. This doctoral thesis focused on the threatened damselfly *Lestes macrostigma*, as a flagship species to implement the conservation and restoration of temporary brackish ponds. There was limited knowledge concerning the influence of hydroperiods and water salinity levels on eggs and larvae, which are key stages in odonate population dynamics. With the goal of undertaking evidence-based conservation actions, we aimed to fill these knowledge gaps by conducting four studies in the Camargue, southern France. This area is characterized by salt deposits and a Mediterranean climate, creating brackish and temporary wetland habitats which harbour *L. macrostigma* breeding populations. First, to improve our knowledge of the egg biology, we studied the embryonic development and hatching phenology and success in two temporary brackish ponds. We found that the eggs -laid in plant shoots during late spring- remained at an early development stage during summer, autumn and winter. This likely increases their resistance to extreme temperatures and illustrates the adaptation of *L. macrostigma* to temporary habitats with uncertain timing of flooding. Yet, embedment in

the ice of the plant shoots decreases egg survival, suggesting that higher water levels above the shoots would reduce egg mortality caused by lower winter temperatures. Hatching lasted from mid-March to mid-April and was synchronised. Differences in hatching phenology among ponds were most probably due to differences in water temperatures. Water salinity is a major driver of insect communities. Hence, we studied in the laboratory the effect of salinity levels experienced during the egg and larval stages. We found no effect of sea salt on egg survival (hatching success) in the range 2-9.5 g/L. By contrast, larval survival increased with salinity level from 0.5 to 8 g/L but was reduced to zero at 16 g/L. Increasing salinity levels augmented development time until the adult stage, decreased larval growth rates and reduced adult size at emergence. The salinity level experienced at the larval stage had no effect on adult thorax muscle mass, flight performance, investment in immune function and available energy. However, energy consumption increased with higher salinity levels, resulting in a lower net energy budget in the adult stage. Our results therefore indicated that *Lestes macrostigma* is a saline generalist (fundamental niche) of which the realised niche shifted toward brackish waters. Other factors, especially biotic interactions, experienced during the larval stage may have consequences on larvae and carry over to affect the adults. We therefore led a field study across 33 ponds, testing for the effect of 14 biotic and abiotic variables on *L. macrostigma* larval abundance and adult size at emergence. We found that larvae were more abundant in smaller ponds and with later flooding in autumn-winter. This seemed mediated by predatory aeshnid dragonfly larvae, which were more abundant and bigger in earlier flooded ponds. A high susceptibility of *L. macrostigma* larvae to predators could be related to their high activity levels associated with their fast growth and development rate imposed by the drying out of their temporary habitats. Further, *L. macrostigma* tended to emerge larger from ponds with higher water levels, most probably because the lower water temperatures extend the larval growth period. By contrast, we found no effects of water salinity levels and availability of oviposition plants on *L. macrostigma* larval abundance. In order to investigate whether the preference adults have for certain plants to lay their eggs benefit the progeny, we used semi-controlled conditions to study the effect on hatching success according to the flooding date and the type of plant shoot where the eggs were laid. We found that wetting was mandatory for hatching. Eggs were able to cope with desiccation until flooding as late as April (i.e. after 10 months in unflooded conditions) -yet with low survival rate- but later flooding resulted in no hatching. Laying eggs in the Sea club-rush *Bolboschoenus maritimus* provided higher survival rate and faster embryonic development. Given that *B. maritimus* grows in deeper parts of the pond, thus experiencing earlier flooding, suggests that the preference of adults for this plant is an adaptive response to the uncertain flooding conditions of *L. macrostigma* typical habitat. The results of these studies, which integrated key stages of the life cycle of *L. macrostigma*, provide a scientific basis to develop conservation actions targeting not only the species, but also the restoration of Mediterranean temporary brackish ponds when using *L. macrostigma* as flagship species. Setting a hydroperiod from November to June is crucial in reducing egg desiccation risks and in favouring its larvae over that of other odonate species in the study region. This may require ecological engineering at the watershed scale, based on modelling the pond hydrology using meteorological and topographic data. Given climate change and the increase in the unpredictability of rainfall in the Mediterranean area, flooding some ponds artificially by irrigation may guarantee the

sustainability of a number of perennial reproduction sites. Irrigation may also help control salinity levels and maintain high water levels during the flooding period in order to increase the species' fitness. The colonisation of newly created ponds by *B. maritimus* should be accelerated by transplanting tubers and ramets collected in situ. The existing vegetation cover should be maintained by implementing an adaptive grazing scheme by livestock linked to the target hydroperiod. Considering the past degradation of temporary brackish ponds, a network of these habitats should be restored or recreated using *L. macrostigma* as a flagship species. Their long-term monitoring would help identifying the reasons of the project's success or failure, and improve the design of future projects. In this regard, new research about reintroducing *L. macrostigma* in some restored ponds is necessary. This PhD provides an important case study about how to take into account threatened insects within biodiversity conservation strategies." (Author)] Address: [https://libellules.pnaopie.fr/wp-content/uploads/2024/06/PhD-THESIS\\_PLambret\\_June2024.pdf](https://libellules.pnaopie.fr/wp-content/uploads/2024/06/PhD-THESIS_PLambret_June2024.pdf)

**23372.** Lee, M.-K.; Lee, H.; Kang, M.-H.; Hwang, C.; Kim, H.-E.; Oudega, M.; Jang, T.-S.; Jung, H.-D. (2024): Bioinspired nanotopography for combinatory osseointegration and antibacterial therapy. *American Chemical Society Appl. Mater. Interfaces* 2024, 16(24): 30967-30979. (in English) ["The ongoing global health has highlighted the critical issue of secondary infections, particularly antibiotic-resistant bacterial infections, which have been significant contributors to mortality rates. Orthopedic implants, while essential for trauma and orthopedic surgeries, are particularly susceptible to these infections, leading to severe complications and economic burdens. The traditional use of antibiotics in treating these infections poses further challenges including the risk of developing antibiotic-resistant bacteria. This study introduces a novel approach to combat this issue by developing nanostructured surfaces for orthopedic implants using target ion-induced plasma sputtering. Inspired by the natural design of dragonfly wings, these surfaces aim to prevent bacterial adhesion while promoting preosteoblast activity, offering a dual-function solution to the problems of bacterial infection and implant integration without relying on antibiotics. The in vitro results demonstrate the effectiveness of these bioinspired surfaces in eradicating bacteria and supporting cell proliferation and differentiation, presenting a promising alternative for the development of biomedical implants." (Authors)] Address: Lee, M.-K., Querrey Simpson Institute for Bioelectronics, Northwestern University, Evanston, IL 60208, USA

**23373.** Lemes da Silva, A.L.; Pinto de Macedo-Soares, L.C.; Quinás Serra, S.R.; Petrucio, M.M.; Feio, M.J. (2024): Changes in functional diversity of aquatic invertebrates across urbanization levels in a coastal island, Brazil. *Hydrobiologia* 851: 2731-2748. (in English) ["As the world becomes more urbanized, multiple stressors act in complex ways, but their effects remain poorly studied in coastal island streams. Due to the small length and isolation and the limited amount of freshwater available in the islands, these ecosystems are particularly vulnerable to anthropogenic pressures. Here, we investigated the effects of urbanization on taxonomic and functional diversity of aquatic invertebrate of a subtropical coastal island. Benthic invertebrate communities were sampled using litter bags (10 mm mesh) containing mixtures of leaf litter that were colonized in the stream bottom over 30 days. We hypothesized that invertebrate communities would show alteration in taxonomic and functional composition over the urbanization gradient. Based on the invertebrate communities and their biological traits, we computed the taxonomic richness and four functional diversity indices. Significant



changes in taxonomic, functional richness, evenness, and dispersion were observed. Sites with low urbanization (< 5% urbanized area) had a higher proportion of taxa with gill respiration than sites with high level of urbanization (> 15% urbanized area) had higher proportion of taxa with tegument respiration. Sites with medium (15–5% urbanized area) and high urbanization levels exhibited higher proportions of scrapers and collector–gatherers, whereas sites with low urbanization had higher proportions of shredders and collector–filters. Our results show that urbanization changed the benthic communities and their biological traits. These changes can determine variations in the ecosystem processes and compromise the ecosystem services they supply." (Authors)] Address: Lemes da Silva, Aurea Luiza, Programa de Pós-Graduação em Ecologia, Depto de Ecologia e Zoologia, Centro de Ciências Biológicas, Univ. Federal de Santa Catarina, Campus Universitário, Florianópolis, Santa Catarina, 88040-900, Brazil

**23374.** Leon-Cortes, J.L.; Cordoba-Aguilar, A.; Rodriguez, P.; Rocha-Ortega, M. (2024): Chapter 2. Habitat fragmentation and insect biodiversity change in Mexican landscapes. In: Jorge L León-Cortés, Alex Córdoba-Aguilar (eds.). *Insect Decline and Conservation in the Neotropics*. Springer, Cham. <https://doi.org/10.1007/978-3-031-49255-62>: 17-34. (in English) ["The long-term and large-scale cause of habitat fragmentation and loss is determined by human intervention, primarily due to the expansion of agriculture and increase in deforestation and urbanization. In this chapter, we present case studies to discuss the effects of habitat fragmentation on insect diversity and change in Mexican tropical areas. In this context, insect assemblages have responded in varied and contrasting ways. First, butterfly diversity and abundance from tropical dry forest fragments ranging from 10 to 90% forest cover area responded negatively to habitat loss. Ants and dung beetles from tropical rainforest fragments and surrounding matrix features showed idiosyncratic (significant) responses to patch attributes (the case for hypogeic ants) and/or to landscape composition (the case for dung beetles). At a larger (national) scale, loss of primary vegetation had a significant effect on species composition of Odonata yet this effect does not necessarily mirror the effects detected for species richness, which likely are driven by species turnover effects. Unveiling complex dynamics for many insect populations and spatial patterns of insect diversity in fragmented landscapes requires accounting for species-level trait effects and responses, along with monitoring of trends in habitat extent and fragmentation over a range of spatial scales." (Authors)] Address: León-Cortes, J.L., Depto de Conservación de la Biodiversidad, El Colegio de la Frontera Sur, San Cristóbal de las Casas, Chiapas, Mexico. E-mail: jleon@ecosur.mx

**23375.** Lin, B.; Chen, H.; Li, J.; Liao, J. (2024): Characteristics and phylogenetic implications of the mitochondrial genome of a rare species, *Libellula melli*. *Gene Reports* 36, 101986: (in English) ["Highlights: • The mitochondrial genome of *L. melli*, a rare dragonfly, was sequenced and deposited in NCBI GenBank (accession number PP588458). • The genome spans 15,149 bp, including 13 PCGs, 22 tRNA genes, 2 rRNA genes, and a D-loop. 25 genes are on the H-strand, while 13 are on the L-strand. • The genome exhibits an AT bias with a positive AT skew of 0.059, highlighting the predominance of A and T bases. • RSCU analysis reveals UUA as the most frequently used codon, encoding leucine, with an RSCU value of 3.75. • Phylogenetic analysis places *L. melli* within the Libellulidae family, providing insights into its evolutionary relationships within the Odonata order. Abstract: This study sequenced and assembled the mitochondrial genome of the rare dragonfly species

*Libellula melli*, and submitted the results to the NCBI GenBank database, obtaining the accession number PP588458. The mitochondrial genome spans a total length of 15,149 bp, encompassing 13 protein-coding genes (PCGs), 22 tRNA genes, 2 rRNA genes, and a control region or D-loop. Of these, 25 genes and segments are located on the heavy strand (H-strand), while the remaining 13 reside on the light strand (L-strand). The nucleotide composition of the *L. melli* mitochondrial genome exhibits a prominent AT bias (AT = 73.3%), with T, C, A, and G bases comprising 34.5%, 15.6%, 38.8%, and 11.1% respectively, displaying a positive AT skew of 0.059. Among the 13 PCGs, the primary start codons are ATT, ATG, and TTG, while the primary stop codons are TAA, with instances of TA(C) and T(AT) also observed. RSCU analysis reveals that the most frequently used codon is UUA, with an RSCU value of 3.75, encoding leucine (Leu). The secondary structures of the proteins encoded by the 13 PCGs generally exhibit a trend of  $\alpha$ -helix > random coil > extended strand >  $\beta$ -turn. Phylogenetic analysis uncovers the phylogenetic relationships of *L. melli* within the reported Libellulidae species, revealing ((((((*L. melli* + *L. quadrimaculata*) + *L. angelina*) + ((*O. chrysis* + *O. glaucum*) + *O. albistylum*)) + ((*C. servilia servilia* + *T. virginia*) + *N. fulvia*) + (*L. albifrons* + *S. eroticum*)) + (*P. flavescens* + *T. aurora*)) + (*D. phaon* + *H. croceus*)) + (*B. contaminate* + *P. zonata*)). This study provides insights into the mitochondrial genome and its characteristics of this rare dragonfly species, contributing to our understanding of the intricate evolutionary relationships within the Odonata order. The data obtained serve as a foundation for further exploration of the complex phylogenetic relationships among dragonfly insects." (Authors)] Address: Liao, J., College of Fisheries, Guangdong Ocean University, Zhanjiang 524088, China. Email: liaojian05@outlook.com

**23376.** Littlefair, M.; Scheele, B.C.; Westgate, M.; Lindenmayer, D. (2024): The ecological and biodiversity conservation values of farm dams: A systematic review. *PLoS ONE* 19(5): e0303504. <https://doi.org/10.1371/journal.pone.0303504>: 18 pp. (in English) ["Biodiversity is in rapid decline globally with agriculture being one of the leading causes. Within agricultural landscapes, some features provide a benefit to biodiversity that is disproportionate to their spatial area. An interesting example is artificial ponds—or farm dams—which can support a large variety of taxa. Here, we present a global review of farm dam research related to biodiversity conservation objectives to provide an overview of the topics, key research insights, and the characteristics of current research. We used a three-stage process to screen literature and identified 104 relevant papers across 27 countries encompassing studies of 13 different taxa. Most of the studies were short-term (less than 5 years) with small sample sizes (less than 20 sites). Of the 104 papers, 88 were focussed primarily on ecological outcomes, such as species richness or abundance, and 15 on primary production outcomes, such as crop and livestock yield, despite addressing or measuring ecological metrics. Only one study measured both ecological and primary production outcomes. Studies frequently examined how the features of dams (79 studies) and attributes of the surrounding landscape (47 studies) impact particular species and communities. Terrestrial mammals (1 study) were under-represented in the literature with macrophytes (28 studies), macroinvertebrates (26 studies), and amphibians (19 studies) receiving the most attention. Our results reveal a growing trend towards recognizing farm dams as habitats for various taxa, including amphibians, beetles, dragonflies, and other macroinvertebrates within agricultural environments. Significant knowledge gaps exist in understanding how dam age, invasive species, and effective management

practices impact the biodiversity conservation values of farm dams. Future research should emphasize enhancing biodiversity by collaborating with landholders to increase habitat through strategic vegetation planning, minimizing runoff and nutrient inflow, and restricting stock access." (Authors)] Address: Littlefairl, Michelle, Sustainable Farms, Fenner School of Environment & Society, The Australian National Univ., Acton, Australian Capital Territory, Australia. Email: michelle.littlefair@anu.edu.au

**23377.** Liu, T.; Liu, H.; Li, Y.; Yang, Y. (2024): Staying on the current niche: consensus model reveals the habitat loss of a critically endangered dragonfly *Libellula angelina* under climate changes. *Journal of Insect Conservation* 28: 483-499. (in English) ["Climate change is expected to exert a large impact on the spatial distribution of insects, yet limited analyses are available for assessing the influences of climate change on the distribution of *Libellula angelina*, which hindered the development of conservation strategies for this critically threatened dragonfly species. Here, a consensus model (BIOCLIM, GAM, MaxEnt and Random Forest) and niche analysis approach were applied to predict the dynamic change of potential distribution areas and ecological niche for *L. angelina* under future climate change. Meanwhile, the important environmental variables affecting the potential distribution of *L. angelina* were identified. The results demonstrated that the potential distribution pattern and ecological niche of *L. angelina* will not shift significantly in face of future climate change, but its highly suitable area in southern Beijing (China), the western and southern South Korea, and the southern Honshu Island (Japan) will decrease constantly. Further analyses indicated that the human influence index (23.8% of variation) is the highest factor in predicting the potential distribution of *L. angelina*, followed by the precipitation of warmest quarter (18.4% of variation). Based on the obtained results, we suggest that extensive cooperation among the countries (China, South Korea and Japan) be advocated to formulate the international conservation strategies, especially more attention and conservation efforts should be paid in those high-suitability areas of *L. angelina* to gain better protection efficiency, and proper artificial ecological restoration measures (e.g., creating suitable habitats, establishing additional natural wetlands, and raising citizens' awareness) should also be exerted. Implication for insect conservation: Our results indicate that there is no significant change in the location of the suitable habitat for *L. angelina* confronted with climate change, but the total area would constantly decrease due to human activities. Therefore, we should make more conservation efforts in those highly suitable areas, including Aosen and Hanshiqiao parks in China, Gangwon do and Doowoong parks in South Korea, and Chichibu Tama Kai and Ise-Shima parks in Japan, especially we should pay much attention to the anthropogenic impact such as human population and land use there." (Authors)] Address: Liu, H., The Key Laboratory of Zoological Systematics & Application, School of Life Science, Institute of Life Science & Green Development, Hebei Univ., Baoding, 071002, China

**23378.** Maamar, B.; Berrabah, H.; Nouar, B.; Rabah, H.F.; Bnina, B. (2024): The Bougara dam's water quality assessment using macroinvertebrates benthic indices. *Agrarian Academic Journal* 7(2): 39-46. (in English, with Portuguese summary) ["The benthic macroinvertebrate communities along with the physicochemical variables in Bougara dam waters (Nahr Ouassel river) downstream of a dam North-western of Algeria, were recorded from three sampling sites during January to May 2022. All the physicochemical parameters were highest in the first station (temperature, pH,

conductivity, BOD and COD) while they were slightly lower in the second station and low in the third station. A total of 13 species [including *Crocothemis* sp.], belonging to 10 families of 7 orders of benthic macroinvertebrates were recorded. With a great domination of insects. The maximum density of benthic fauna was recorded from the site nearest to the dam exit. These results were confirmed by the benthic indices of macroinvertebrates where the recommendations are to clean the first highly polluted station and to keep monitoring the other remaining stations moderately polluted." (Authors)] Address: Maamar, B., University of Tiaret. Algeria. E-mail: benchohra\_19@hotmail.fr

**23379.** Mallick, M.A.I.; Ghorai, N. (2024): Biodiversity and relative abundance preliminary assessment of Odonata (Insecta) fauna in and around Serampore, Jolkol, Hooghly, West Bengal, India. *World Scientific News* 187: 47-65. (in English) ["A seasonal study was aimed to examine the diversity and dominance of Odonata in Serampore, Jolkol in Hooghly District, West Bengal was carried out for a period of one year from March 2022 to February 2023, which grouped into monsoon (March to August), post-monsoon (September to November), and winter (December to February) periods. This study emphasizes a checklist of total 29 species of Odonata. In our study there are two suborders Anisoptera and its family Libellulidae have 19 species, Aeshnidae, Gomphidae, Macromiidae have 1 species in each. Other suborder is Zygoptera and it has the family of Coenagrinoidea with 6 species and Platycnemiidae with one species. The two suborder Zygoptera and Anisoptera the Relative abundance have 75.86% and 24.13% respectively in Serampore, Jolkol. The most abundant species was observed on basis of the results from the abundance formula by using Odonates diversity in the area of Serampore Jolkol. The Shannon diversity index is 2.99 from that result we also conclude evenness index of the Odonata in Serampore, Jolkol was 0.103. Simpson diversity index was 0.056 from that result species dominance should be calculated that is 0.944 and the Margalef's richness index was 4.21. It indicates the high diversity of odonates during the monsoon and post-monsoon periods. Major contributing factors observed for biodiversity include water availability, vegetation cover and abundance of predatory species like mosquitoes during monsoon and post-monsoon period. The degradation of the wetland by human activities are the threat to the odonates along with the biodiversity. Finally, increased education on the importance of using native insect species as first-level indicators of environmental health that can save the nation a lot of money if improved is otherwise used for chemical assessments and environmental wetland monitoring." (Authors)] Address: Mallick, I., Dept of Zoology, West Bengal State University, Berunanpukuria, North 24 Parganas – 700126, West Bengal, India. Email: imranmallick708@gmail.com

**23380.** Marcellino, B.J.L.; Yee, P.; McCauley, S.J.; Murray, R.L. (2024): Too hot to handle: male dragonflies decrease time spent mating at higher temperatures. *Animal Behaviour* 207(1): 109-118. (in English) ["Traits and patterns of time allocation that improve mating success can impose costs with respect to other functions, including thermoregulation. In dragonflies, melanin on their wings can be used as a sexual signal. However, melanin also absorbs solar radiation and can cause animals to overheat in warm temperatures. We examined how dragonfly mating effort and thermoregulatory behaviour change in response to temperature and whether those responses vary based on levels of wing melanin ornamentation in the calico pennant dragonfly, *Celithemis elisa*. We conducted our study at the northern edge of C.

elisa's range and measured the time spent on mating effort behaviours and thermoregulatory behaviours as a function of ambient and microhabitat temperature in male dragonflies. We found a trade-off between mating effort and thermoregulatory behaviour in response to temperature; time spent on mating effort significantly decreased with increasing temperatures, while time spent on thermoregulation was positively related to temperature. However, we found no effect of wing melanin on behavioural patterns. These findings suggest that, as temperatures rise in response to climate change, some species may be forced to reduce important life history activities (including mating effort) with potential population level consequences for animals living in temperate areas." (Author)] Address: Marcellino, Bianca, Biology Dept, University of Toronto Mississauga, ON, Canada. Email: bianca.marcellino@mail.utoronto.ca

**23381.** Márquez-Rodríguez, J. (2024): Contribution to the knowledge of *Anax ephippiger* (Burmeister, 1839) (Insecta: Odonata) in the south of the Iberian Peninsula, Spain. *Revista Chilena de Entomología* 50(1): 13-17. (in English, with Spanish summary) ["A phenomenon of *A. ephippiger* aggregation on the coast for the Strait of Gibraltar area, southern Iberian Peninsula, was recorded. Likewise, an annotated list of species recorded in Microreserve Arroyo Negro nearby to the Strait of Gibraltar is presented. Most of the species observed are thermophilic. The environmental and climatic conditions of this microreserve favor the settlement of African migratory species in a global warming scenario." (Author)] Address: Márquez-Rodríguez, J., Laboratorio de Zoología, Facultad de Ciencias Experimentales Universidad Pablo de Olavide, Sevilla, Spain. Email: jmarrod1@admon.upo.es

**23382.** Matser, D. (2024): Operationalizing the concept of BKN for the municipality of Amsterdam with the use of Urban Regulating Ecosystem Services. MSc thesis, Utrecht University: 31 pp. (in English) ["The Dutch organization "De Vogelbescherming" has introduced a new concept called "Basiskwaliteit Natuur", which aims to enhance the quality of nature and thereby the protection of common species. The municipality of Amsterdam has taken an interest in this concept and plans to use it in its city planning but with a broader perspective. Thereby, not only focusing on the protection of common species but also considering other aspects that are related to the quality of nature, like ecosystem services. To achieve this, more information is needed about the quality of nature in cities like Amsterdam. Therefore, this literature review analyzes what soil and water quality is needed for a healthy Amsterdam and what Urban Regulating Ecosystem Services can contribute to this quality. This review shows that the current focus in studying the quality of nature is on the presence or absence of nutrients and toxins in urban soil and water. Nevertheless, the focus should also be on the physiological and biological quality of these abiotic components of the ecosystem. Monitoring different indicator species, like earthworms and dragonflies, can be a good practice to study the BKN. Furthermore, to improve the BKN, more focus should be on the enhancement of urban regulating ecosystem services, like water purification, pest control, and pollination. The use of these URES as indicators of ecosystem health particularly of soil and water bodies, provides a practical framework for the operationalizing of the BKN in urban planning in the city of Amsterdam." (Author)] Address: <https://studenttheses.uu.nl/handle/20.500.12932/46491?show=full>

**23383.** Maximova, A.A.; Berezina, N.A. (2024): Macrozoobenthos of subarctic lakes as an indicator of climate change. *Russian Journal of Ecology* 55(3): 218-227. (in English)

["Changes in the macrozoobenthos of two northern lakes differing in degree of humification of water over the 50-year period that have passed since the first studies were considered. In the lake with water uncolored by humus, the benthos biomass increased, and in the humified one, it decreased. The changes that have occurred are due to climate warming, especially pronounced in winter. It was concluded that even closely located bodies of water can respond differently to climate change. Depending on the nature of the catchment area and the morphology of the lakes, either an increase in their productivity due to the supply of nutrients or a decrease due to humification can be observed." (Authors) Table 5 with Average biomass ( $M \pm m$ ) of different groups of macrozoobenthos in Lake Krugloe in 1968, 1969, 2019 and 2020 includes "Odonata".] Address: Maximova, A, Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034 Russia. Email: alexeymaximov@mail.ru

**23384.** Medina-Espinoza, E.F.; Juen, L.; Calvão, L.B.; Cruz, G.A. (2024): Variations in the Odonata assemblages: How do the dry season and water bodies influence them? *Neotropical Entomology* 53(8): 630-640. (in English) ["Diverse abiotic and biotic factors drive the ecological variation of communities across spatial and temporal dimensions. Within the Amazonian landscape, various freshwater environments exhibit distinct physicochemical characteristics. Thus, our study delved into the fluctuations of Odonata assemblages amidst distinct water bodies within Amazonia, encompassing two distinct climatic seasons. Comparative analysis was conducted on Odonata species diversity and assemblage composition across a blackwater pond, a lake, and a stream, spanning the initiation and culmination of the dry season in the southwestern Amazon region in Peru. Our methodology involved capturing adult Odonata using entomological nets on three separate occasions between 11:00 and 14:00 h for each water body in May (beginning of the dry season) and October (end of the dry season) of 2018. We also evaluated the influence of temperature, precipitation, and percent cloud cover on the abundance and richness of adult Odonata. Species richness and composition differed among the three water bodies in both periods of the dry season. No effect of the dry season periods on species richness and abundance was observed. However, except in the oxbow lake, the more abundant species were substituted to the end of the dry season. Our study highlights the influence of water body types on Odonata species diversity and composition. The effects of the sampling period during the dry season may not be immediately apparent in conventional diversity metrics, such as species richness and abundance. Instead, its effects manifest predominantly in the relative abundance of the species that compose these assemblages." (Authors)] Address: Medina-Espinoza, Emmy, Depto Entomología, Museo de Historia Natural, Univ Nacional Mayor de San Marcos, Lima, Lima, Peru

**23385.** Mutshekwa, T.; Mugwedi, L.; Wasserman, R.J.; Dondofema, F.; Cuthbert, R.; Dalu, T. (2024): Aquatic macroinvertebrate community colonisation and succession in macadamia orchard and communal area reservoirs: a case study of Luvuvhu River valley, South Africa. *Water SA* 50(2): 137-147. (in English) ["The demand for macadamia nut production worldwide has led to increased use of pesticides and chemicals for pest and disease control. Reservoirs in these macadamia farming sectors are at risk, since these chemicals can enter and contaminate the water through direct application, runoff, and atmospheric deposition, subsequently negatively affecting aquatic organisms. The current study investigated macroinvertebrate colonisation and succession associated with two macadamia orchards and two communal

area reservoirs. The potential effects of stressors from these land uses was tested for and compared using stone substrates over a 6-week period. Stone substrates from both reservoir types were abundantly colonised over time and the total macroinvertebrate taxa and abundance showed an increasing trend across the sampled weeks, with macadamia orchards having the highest number of macroinvertebrate taxa. Strong ecological succession was observed across reservoirs, with the initial succession of early colonisers - i.e., Chironominae (collector-gatherers), Ostracoda (collector-filterers) and Anax sp. (predator) within communal area reservoirs, and Chironominae, Ostracoda and Radix natalensis (scrapers) in macadamia orchard reservoirs - followed by predatory colonisers such as Gyrinidae larvae, Trithemis sp. (macadamia orchard reservoirs), and Ranatra sp. (communal area reservoirs). Macroinvertebrate community structure differed significantly across sites and weeks, with no similarity being observed for communities across the different reservoirs. Redundancy analyses further highlighted 11 sediment chemistry variables (i.e., pH, resistivity, P, K, Na, Ca, Mg, Cu, B, Fe and S) which were significantly related to macroinvertebrate community structure. Thus, sediment variables were found to be better predictors of macroinvertebrate community structure in macadamia orchard reservoirs than communal area reservoirs. Consequently, we concluded that differences in colonisation ability among taxa and environmental stressors were important factors driving succession. These results add to the understanding of the macroinvertebrate colonisation processes and environmental stressors within agricultural landscapes, which can aid in the development of conservation management of freshwater ecosystems." (Authors)] Address: Thendo Mutshekwa, T., Aquatic Systems Research Group, Dept of Geography and Environmental Sciences, Univ. of Venda, Thohoyandou 0950, South Africa. Email: thendzamuchekwa@gmail.com

**23386.** Nahic, B.; Omeragic, A.; Vesnic, A.; Gajevic M.; Mušovic, A. (2024): Diversity of aquatic macroinvertebrate communities in the Misoca River: the argument for conservation. *Natura Croatica* 33(1): 13-27. (in English, with Croatian summary) ["In the present study the macroinvertebrate composition in the Misoca River, its diversity and abundance were analyzed. The study was conducted in autumn and spring, in order to determine the influence of seasonal dynamics on the structure of macroinvertebrate communities and water quality. A biotic element analysis revealed a high abundance and diversity of macroinvertebrate taxa. Significant differences in the structure of communities with respect to seasons and sampling sites were observed, as well as in species dominance, which was confirmed by the Bray-Curtis similarity analysis. The results of the EPT% index, EPT/Chironomidae index, Shannon-Weaver and Simpson's biodiversity indices showed the good ecological status of water at studied sites. The Pantle-Buck saprobic index indicated an oligo to β-mesosaprobic category, or slightly contaminated water. The presence of the Natura 2000 species *Austropotamobius torrentium*, and of six Trichoptera species new to the fauna of Bosnia and Herzegovina and, among others, the species *Hydropsyche botosanaenui* was recorded in samples. This study represents the first literature data on macroinvertebrate diversity for the protected area of the Misoca River." (Authors) Odonata are represented exclusively by *Onychogomphus forcipatus*.] Address: Nahic, Belma, Faculty of Natural Sciences & Mathematics, Univ. of Sarajevo, Zmaja od Bosne 33-35, 71000 Sarajevo, Bosnia and Herzegovina

**23387.** Nanda, S.N.; Rawana, A.P.; Wilda, N.R.; Puan, A.A.P.; Dian, P.P.; Kurdiyanto, K. (2024): Keanekaragaman Hayati

dan Peranannya Dalam Ekosistem di Taman Kehati Tanggulangin (Biodiversity and Its Role in Ecosystem of Tanggulangin Biodiversity Park). *Wahana Forestra: Jurnal Kehutanan* 19(2): 168-175. (in Indonesian, with English summary) ["Tanggulangin Biodiversity Park is a biodiversity conservation area outside the forest area with an area of 14 Ha located in Tuban Regency, East Java Province, which is a stretch of karst mountain ecoregion where this ecosystem also has an essential element as a water resource buffer area for Tuban Regency. Biodiversity measured in this research includes Flora; vegetation and fauna; birds, reptiles and amphibians and Lepidoptera and Odonata where the method used in sampling flora uses the census method and the method used in sampling fauna uses the Visual Encounter Survey and Point Count methods. The results of the research showed that the Diversity Index (H') value for vegetation was 2.142 with a Richness Index (R) of 4.670, for aves the H' value was 2.474 and the R value was 0.856 for herpetofauna, the H' value was 2.168 and the R value was 0.872 for insects. The H' value is 1.962 and the R value is 0.944. Overall, the Biodiversity Value of Tanggulangin Biodiversity Park is included in the medium diversity level category." (Authors) *Ischnura senegalensis*, *I. senegalensis*, *Crocothemis servilia*, *Diplacodes trivialis*, *Orthetrum sabina*, *Pantala flavescens*.] Address: Nanda, S.N., Program Studi Kehutanan, Fakultas Kehutanan, Institut Pertanian ST-IPER Yogyakarta, Yogyakarta 55283, Indonesia.

**23388.** Nel, A.; Ross, A.J. (2024): New dragonflies from the Upper Eocene of the Isle of Wight, UK (Odonata: Anisoptera). *Proceedings of the Geologists' Association* 135(2): 141-146. (in English) ["Three new fossil wings of dragonflies are described from the Upper Eocene of the Isle of Wight (UK), which add to our knowledge of the Odonata fauna of the Bemburidge Insect Bed. They consist of a male hind wing attributed to the Gomphaeschnidae *Anglogomphaeschna eocenica*, a forewing attributed to the Aeshnidae *Aeschnophlebia andreasii*, and the first Libellulidae discovered in this outcrop. The two former fossils provide more complete diagnoses of these Aeshnoidea. Although the latter is too incomplete for formal description, it belongs to the subfamily Pantalinae, and is among the oldest known fossils that can be attributed to the crown group of the Libellulidae." (Authors)] Address: Ross, A.J., Dept of Natural Sciences, Nat. Museum of Scotland, Chambers St., Edinburgh EH1 1JF, UK. Email: a.ross@nms.ac.uk

**23389.** Nel, A.; Jouault, C.; Huang, D.-Y. (2024): A new species of *Mesosticta* in mid-Cretaceous Kachin amber (Odonata: Platystictidae). *Mesozoic* 1(2): 139-143. (in English) ["*Mesosticta additicta* sp. nov., fourth species of this platystictid genus, is described from the mid-Cretaceous Kachin amber, suggesting its endemic diversification in the West Burma Block (WBB), possibly in relation to the geographic isolation of this area during the formation of mid-Cretaceous Kachin amber." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**23390.** Niwa, H.; Kanaya, T. (2024): Distribution analysis of adult and larval *Calopteryx japonica* using unmanned aerial vehicle acquired water temperature distribution. *River Research and Applications* 40(4): 627-640. (in English) ["In rivers, water temperature has a significant impact on aquatic organisms. Thermal infrared sensors mounted on unmanned aerial vehicles (UAVs), which can measure surface temperatures over an area with high spatial resolution, provide new ways to investigate river water temperatures. Therefore, we analyzed the high-spatial-resolution water temperature distribution acquired by UAV as an environmental

factor affecting *C. japonica* inhabiting the river. The study site was a 9-km section of the Sasayama River in the Kako River system, Japan. Adult and larval *C. japonica*s were counted walking along the water's edge. The water temperature distribution was determined by taking UAV photographs in August, when river temperatures were estimated to be the highest of the year, and in February, when river temperatures were estimated to be the lowest in the study area. The number of adult and larval *C. japonica*s were used as the objective variable, and water temperature, vegetation, and water area classification were used as variables in RandomForest analysis. These findings are consistent with existing research on *C. japonica* ecology. The analysis revealed that the water temperature distribution acquired by UAV can be used as an environmental factor in the analysis of aquatic organisms. This method has the potential to be applied to the analysis of other aquatic organisms." (Authors)] Address: Niwa, H., Kyoto Univ. Advanced Sci. 1-1 Sogabe-cho Nanjyo Otani, Kameoka, Kyoto, Japan. Email: niwa.hideyuki@kuas.ac.jp

**23391.** Novella Fernandez, R. (2024): A straightforward protocol to sample morphological traits of dragonflies and damselflies in the field. *Ecology and Evolution*. 2024;14:e11604: 7 pp. (in English) ["Scarcity of morphological data limits the potential of functional ecology approaches, which rely on traits to elucidate ecological processes. Odonata are a frequently used ecological model for which, however, only limited morphological data is available. Here, it is presented a field sampling protocol to collect ecologically relevant yet largely unavailable morphological traits of Odonata. The protocol enables the straightforward collection of traits from living individuals directly in the field. Those traits include body mass, wing area and wing loading as well as thorax width, hindwing length and body length. Furthermore, the protocol allows for posterior wing morphometric analyses. The protocol proved to be robust and universally applicable based on testing on roughly half (76) of all European odonate species. The use of this protocol can increase our understanding of odonatan morphology at interspecific and intraspecific levels and assist in developing mechanistic understanding of their ecology." (Author)] Address: Novella Fernandez, R., Dept for Life Science Systems, School of Life Sciences, Technical Univ. of Munich, Terrestrial Ecology Research Group, Freising, Germany. Email: r.novellaf@outlook.com

**23392.** Novelo-Gutiérrez, R.; Gómez-Anaya, J.A. (2024): Los odonatos del bosque mesófilo de montaña de Cuetzalan, Puebla, México, con una clave para los imagos (Insecta: Odonata). *Dugesiana* 31(2): 101-123. (in Spanish, with English summary) ["The odonates community from Cuetzalan and surroundings was studied through direct collections of adults in the years 2007 and 2009. Seventy-two species included in 37 genera and 11 families of the suborders Zygoptera and Anisoptera, were found, of which 19 species are new records for Puebla State. The collections efficiency was evaluated with three non-parametric estimators, reaching percentages of 82–98%. Phylogenetic diversity was calculated and compared to other two areas with cloud forest cover in the Northern Mountain Range in Puebla state and Hidalgo state, resulting more diverse that of Cuetzalan. An illustrated key to adult odonate species is provided." (Authors)] Address: Red de Biodiversidad y Sistemática, Instituto de Ecología, A. C., Carretera Antigua a Coatepec 351, Col. El Haya, 91073 Xalapa, Veracruz, México. Email: rodolfo.novelo@inecol.mx

**23393.** Nurhafizah-Azwa, A.S.; Zalina, M.A.; Nur Riza, M.S. (2024): Refining stream ecosystem evaluation: A novel approach using the family ecological index (FEIS). *Journal of*

*Asia-Pacific Entomology* 27(1), 102182: (in English) ["The use of ecological indices based on benthic macroinvertebrate population for streams ecosystem quality assessment receives great attention. Streams in general have high variability characteristics; thus, using a single index used for the whole stream stretch renders less accurate readings. Therefore, this study was conducted to produce an ecological index using benthic macroinvertebrates as a bioindicator for a clean stream ecosystem. In this study, 42 recreational streams throughout Peninsular Malaysia were sampled and 663 units of water and benthic macroinvertebrates samples were analysed. Three phyla, 19 orders, 117 families and 55,410 macroinvertebrate individuals were recorded. Benthic macroinvertebrate data were analysed using existing indices such as Shannon Diversity Index (H'), biotic indices (BMWP/THAI and FBI) and WQI to analyse water quality. Canonical Correspondence Analysis (CCA) was used to evaluate the strength of water quality and physical habitat in determining benthic macroinvertebrate community structure. Next, Principal Component Analysis (PCA) was used to produce new weights. Based on the similarities and dissimilarities of each family in their ecological functions, the components were truncated into only three significant groups with respective weights and a new ecological index, namely Family Ecological Index for Streams (FEIS). From the FEIS values calculation, three scales which are 2.11 to 3.00 (first class: excellent ecosystem), 1.36 to 2.10 (second class: healthy ecosystem), and 0.00 to 1.35 (third class: moderately healthy ecosystem) were obtained. It is found that FEIS is capable of exhibiting variations in stream quality even within clean streams and able to detect early deterioration in streams which is highly useful for management stakeholders to manage recreational streams in Malaysia. The new data-driven approach in the development of FEIS in this study can be applied to other rivers and the difference in the weights determination as well as formulation obtained can be observed." (Authors)] Address: Nurhafizah-Azwa A.S., Dept of Earth Science & Environment, Faculty of Science & Technology, Univ. Kebangsaan Malaysia, 43600 UKM, Bangi, Selangor, Malaysia

**23394.** O'Neill, D.; Shaffrey, L.; Neumann, J.; Cheffings, C.; Norris, K.; Pettorelli, N. (2024): Investigating odonates' response to climate change in Great Britain: A tale of two strategies. *Diversity and Distributions* 30:e13816: 11 pp. (in English) ["Aim: Species are largely thought to maintain broadly static niches over time, an assumption underpinning much theoretical ecology including the implementation of ecological models to project species' current and future distributions. Here, we assess niche conservatism in odonates in Great Britain over the past six decades by simultaneously quantifying changes in species geographic distribution and evaluating temporal trends in species realised climatic niche. Location: Great Britain. Methods: Distributional changes were assessed by calculating changes in species distribution centres and deriving occupancy trends. Changes in climatic niches were assessed using a principal component analysis to quantify niche overlap, using information on both climate averages and extremes. Results: We show that dragonflies and damselflies displayed distinct responses to changing climatic conditions. Dragonflies shifting to higher latitudes maintained, on average, greater consistency in their climatic niches, providing evidence for climate tracking. Greater climate niche flexibility and increased occupancy over time, on the other hand, were more common in damselflies. Main Conclusions: We unveil evidence for climatic niche divergence in damselflies on a national scale, casting doubt on the relevance of species distribution models for predicting the impacts of climate change on this, and potentially other, groups of species. More broadly, our

results call for more multi-species temporal comparisons of spatial distributions and climate niches during recent periods of changes in climatic conditions to improve our ability to contrast species' vulnerability risk to the ongoing climate crisis." (Authors)] Address: O'Neill, Daisy, Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY, UK. Email: d.oneill@pgr.reading.ac.uk

**23395.** Orr, A.G.; Butler, S.G. (2024): A riddle wrapped in a mystery inside an enigma: notes on an enigmatic larva collected in Nepal, with a reappraisal of Fraser's so called 'Caliphaea confusa' larva from Meghalaya, India (Odonata: Calopterygidae). *Odonatologica* 53(1/2): 155-168. (in English) ["A late instar larva of an unknown calopterygid species, here termed 'species Q', was collected at Godawari, Nepal, in 1992 by SGB. It resembles, but appears to differ fundamentally from a larva described erroneously as *Caliphaea confusa* by F.C. Fraser from Meghalaya, Assam, in 1943. Fraser's description seems to contain impossible discrepancies but the original specimen may pertain to *Echo margarita*, which occurs in the same locality. However, there are no records of this genus from Nepal, from where just three species of the family, *Caliphaea confusa*, *Neurobasis chinensis* and *Vestalis gracilis*, are known. None of these three genera have larvae matching that of 'species Q'. The mystery larva is described and compared with that described by Fraser. Fraser's description is analysed and critiqued. The larva is concluded to be related to the genera *Mnais*, *Echo* and *Psolodesmus* but its specific identity and that of the larva described by Fraser remain uncertain, with the possibility of 'species Q' representing a new species or even a new genus with an unknown adult being suggested." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Australia. Email: agorr@bigpond.com

**23396.** Orr, A.G.; Hämäläinen, M. (2024): The larva of the endangered *Heterophaea barbata* (Martin, 1902), from Luzon Island, the Philippines (Odonata: Euphaeidae). *Odonatologica* 53(1/2): 169-182. (in English) ["The final instar larva of the large, spectacular Philippine and Luzon endemic euphaeid damselfly *Heterophaea barbata* (Martin, 1902) is described and illustrated for the first time, based on field collected exuviae of both sexes. Identification is by supposition, but larvae of the only other euphaeid on the island, *Euphaea refulgens* Hagen in Selys 1853, have been previously described and illustrated and can be confidently ruled out. The specimens are exceptionally large for the family and present several novel structural features not recorded in other euphaeid genera. The antennae of the principal specimen studied were asymmetric in length and numbers of segments, suggestive of a possible teratological event caused by genetic load or environmental factors during development. This and other specimens exhibited up to 14 antennomeres, more than hitherto recorded for any odonate larvae." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Australia. Email: agorr@bigpond.com

**23397.** Ott, J. (2024): Massive Rückgänge von *Aeshna juncea* in der Pfalz – von mehreren Seiten in die Zange genommen und eliminiert (Odonata: Aeshnidae). *Libellula* 43(1/2): 71-88. (in German, with English summary) ["Massive declines of *Aeshna juncea* in the Palatinate region – being targeted and eliminated from several sites (Odonata: Aeshnidae) – Forty years have passed since Niehuis (1984) recorded the dragonflies in the former Regierungsbezirk Rheinhessen-Pfalz (Rhineland-Palatinate, Germany), from which the compilation of the data on *Aeshna juncea* also emerged (Niehuis 1983), and here a current search in the habitats in which in

that time positive evidence of *juncea*-presence had been obtained. The species could not be found in any of the 18 biotopes where it was recorded originally. The possible reasons are manifold and complex: on the one hand, various biotopes suffer from groundwater extraction, climate change in general and a changed water balance. In return, the thermophilic and very aggressive *Anax imperator* has spread to the water bodies, whose larvae are likely to have a negative impact on the larvae of *A. juncea*. Due to the changed biotope conditions and the now strong presence of *A. imperator* it is fairly certain that the populations of *A. juncea* in the Palatinate will not recover." (Author)] Address: Ott, J., L.U.P.O. GmbH, Friedhofstr. 28, 67705 Trippstadt, Germany. Email: ott@lupogmbh.de

**23398.** Pahari, P.R.; Pandit, T.K.; Maiti, S.; Bhattacharya, T. (2024): Community composition of aquatic insects in relation to water quality in a pond in Midnapore town, West Bengal, India. *International Journal of Entomology Research* 9(6): 62-66. (in English) ["25 species of aquatic insects have been recorded from a small weed infested water body in Midnapore town, West Bengal, India. Hemiptera was the most abundant order comprising 51.93% of total entomofauna followed by Odonata (16.12%), Coleoptera (15.15%), Ephemeroptera (13.68%) and Diptera (3.12%) in that order. *Anisops breddini* was the only dominant species along with 11 sub-dominant, 12 recedent and one sub-recedent species. Most of the species were found to be either positively or negatively correlated with the physico-chemical properties of the water. Existence of 13 species of macrophytes provided ample scope of niche differentiation for the coexistence of the insect species." (Authors) The following Odonata species are listed: *Anaciaeschna jaspidea*, *Anax guttatus*, *Brachythemis contaminata*, *Crocothemis servilia*, *Pantala flavescens* and *Copera marginipes*.] Address: Pahari, P.R., Dept Zoology, Tamralipta Mahavidyalaya, Tamluk, West Bengal, India

**23399.** Patterson, J., Stoffel, M.; Shadick, S. (2024): First confirmed nesting of Northern Pygmy-Owl in Saskatchewan. *Blue Jay* 82(1): 22-26. (in English) [The first fledgling of Northern Pygmy-Owl (*Glaucidium gnoma*) "remained on the same branch for almost an hour, moving at one point from the trunk about 2 m farther out on the branch. It had been fed an unidentified prey item when first spotted and was fed again 45 minutes later, when an adult brought a large, seemingly intact dragonfly (*Aeshna* sp.), with wings still attached." (Authors)] Address: Patterson, J., 554 Bornstein Terrace, Saskatoon, SK S7N 3Y1, Canada

**23400.** Perthen, E. (2024): Globální změna klimatu a změny rozšíření a fenologie vážek (Odonata) - Effect of global climate change on areal and phenology shifts of dragonflies species. BSc thesis, Univerzita Karlova, Přírodovědecká fakulta, Studijní program: Biologie, Studijní obor: Ekologická a evoluční biologie: 33 pp. (in Czech, with English summary) ["Climate change in recent decades affects the distribution and phenology of dragonflies. The main factor causing these changes is the increase in the average global temperature, but other factors, such as loss of habitats or changes in precipitation regime, also play a role. As a result of climate change, phenological processes are accelerating. We can therefore observe a faster egg development rates, an earlier emergence of adults, a longer flight period and also a shift in voltinism towards a greater number of generations per year. Good dispersal abilities allow dragonflies to respond to changing environmental conditions also by shifting their distribution. The ranges of most species are currently expanding towards the poles. Generalists and species capable of using temporary

waters expand their ranges the most, while specialized species with a narrow niche are the most threatened by climate change. Shifts are also visible in the altitudinal distribution, increasing temperatures allow warm-adapted species to expand their ranges to higher altitudes." (Author)] Address: <https://dspace.cuni.cz/bitstream/handle/20.500.11956/189826/130-386125.pdf?sequence=1>

**23401.** Phalee, W.; Sittikul, S.; Phalee, A. (2024): Diversity of aquatic insects in rice field, Phitsanulok province. *Life Sciences and Environment Journal* 25(1): 189-196. (in Thai, with English summary) ["The study aims to study the diversity of aquatic insects in rice fields in Phitsanulok Province. A total of 20,984 specimens of aquatic insects were collected by using a sweep net. These aquatic insects were classified into three main orders: Odonata, Hemiptera, and Coleoptera, comprising 12 families. The highest number of insects was found in the order Hemiptera, with the family Notonectidae being the most abundant. Following that were the orders Odonata and Coleoptera. The analysis of the Shannon-Wiener's Index ( $H'$ ) and evenness ( $J'$ ) for all collected aquatic insects in the rice fields showed values of 2.800 and 0.281, respectively. Among the districts in Phitsanulok Province, Mueang Phitsanulok had the highest biodiversity and evenness values, with 2.817 and 0.283, respectively. The month with the highest biodiversity and evenness values was July, with values of 2.834 and 0.285, respectively. The results of this study can be used as baseline data for planning and managing rice fields sustainably to preserve biodiversity in the future." (Authors)] Address: Phalee, W., Fac. Science & Technology, Pibulsongkram Rajabhat Univ., Muang District, Phitsanulok Province 65000, Thailand. E-mail: Waraporn.n@psru.ac.th

**23402.** Piron, E. (2024): État des populations indigènes des Anisoptères au sein d'un réseau de marais et de tourbières dans le département de la Somme. Formation Expertise Naturaliste des Milieux (ENM) Pôle Sup Nature. Promotion 2022-2023: 58 pp. (in French, with English summary) ["Anisoptera, ... are particularly present in the lower Somme valley near Abbeville (France), a large complex of peatlands and marshes classified Natura 2000 and Ramsar located in the Somme district. Carried out as part of a renewal of the Management Plan and the LIFE Anthropofens Programme for the preservation of alkaline peatlands in northern France and Belgium, this study aims to know the diversity and abundance of the native Anisoptera community and its ecology in a sample of 15 ponds. We assessed the indigenous character of Anisoptera species using a protocol based on exuviae collection. 6 species that reproduce in-situ: Anax imperator, Orthetrum cancellatum, Sympetrum striolatum, S. sanguineum, Crocothemis erythraea, Aeshna mixta. The second step of this methodology was the characterization of the habitat structure of each station by identifying different environmental variables. Two statistical analyses were carried out to infer the influence of each variable on abundance and richness of Anisoptera. The results obtained tend to say that the main factors favorable to the occurrence of exuviae are a large water cover and a great density of hydrophytes within the ponds. Conversely, the parameters negatively affecting their presence would be a strong vegetation in helophytes banks and ponds. In the long term, this study aims to suggest strategies for the management and conservation of wetlands." (Author)] Address: [https://www.life-anthropofens.fr/media/nzgdzb3u/piron-elise\\_rapport-de-stage-enm-session-2022-2023.pdf](https://www.life-anthropofens.fr/media/nzgdzb3u/piron-elise_rapport-de-stage-enm-session-2022-2023.pdf)

**23403.** Portmann, J.M.; Davenport, G.H.; Starinchak, B.H.; Griscom, H.P. (2024): A preliminary assessment of water

quality in silvopastoral systems of Panama's dry tropical forest. *Neotropical Biology and Conservation* 19(2): 173-183. (in English) ["Dry tropical forests are unique, biodiverse ecosystems threatened by human development, especially deforestation for agricultural land use. Deforestation reduces carbon sequestration in landscapes and, in turn, pollutes nearby waterways. Agroforestry practices, like silvopastoralism, can mitigate these impacts by integrating trees into working landscapes, but their effect on stream water quality has not been studied. We assessed the stream condition on five silvopastoral farms in Panama's Azuero Peninsula by utilizing aquatic macroinvertebrates as indicators. We collected aquatic macroinvertebrates and calculated the percent EPT, Diptera, and Odonata. Using ArcGIS, we measured distance to live fence, riparian connectivity, and forest patch size. We also measured tree carbon stored in the riparian area and throughout each farm. We analyzed the relationships between landscape or habitat variables and water quality scores using single linear regressions in R Studio. Percent EPT, Odonata [no further details], and diversity were positively predicted by riparian tree carbon, while percent Diptera was negatively predicted by riparian tree carbon. Our results highlight the importance of expanding agroforestry in this region and suggest that increasing tree cover in agricultural landscapes may be beneficial to stream condition, but additional research is needed." (Author)] Address: Portmann, Julia M., Dept Biology, James Madison Univ., Harrisonburg, VA 22802, USA. Email: Julia M. Portmann (portmajm@gmail.com)

**23404.** Prommi, T.O.; Khamboonruang, P.; Klorvuttimontara, S. (2024): Diversity and structure of aquatic insect communities in relation to water quality parameters in the Kasetsart University drainage ditches, Central Thailand. *Journal of Food Health and Bioenvironmental Science* 17(1). Retrieved from <https://iio1.tci-thaijo.org/index.php/sdust/article/view/262361:11-22>. (in English) ["This study evaluates the impact of anthropogenic influence on the drainage ditches of Kasetsart University's Kamphaeng Saen Campus in Nakhon Pathom Province, using water quality measurements and aquatic insect data collected during a six-month period from October 2022 to March 2023. Six sampling ditches with various human activities were chosen. Organic wastes from agriculture, residences and buildings were the primary causes of pollution. A total of 6,232 aquatic insects from six orders—Hemiptera (28.32%), Coleoptera (7.76%), Odonata (12.52%), Diptera (36.33%), Ephemeroptera (2.47%) and Trichoptera (12.6%)—were collected. In the current study, the order Diptera was the most diversified and relatively abundant in all sampling sites. However, the order Trichoptera was most common in KUKPS6, a running water ditch. The orders Hemiptera and Coleoptera had the highest abundance in the KUKPS1, while Odonata and Ephemeroptera had the highest abundance in KUKPS2. The Shannon-Weiner diversity index for aquatic insects was between 1.527 and 2.959, indicating slightly good water quality. According to the Canonical Correspondence Analysis (CCA), dissolved oxygen, orthophosphate, nitrate-nitrogen, turbidity and pH were the most influential factors. Based on the data on physicochemical water quality and entomofauna composition, the results concluded that Kasetsart University's drainage ditches were slightly polluted." (Authors) The paper includes "Telebasis" a Neotropical genus.] Address: Prommi, T.O., Dept of Science & Bioinnovation, Faculty of Liberal Arts & Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom Province, 73140, Thailand

**23405.** Prunier, F.; Miralles-Núñez, A.; Zaldívar, C.; Cabana, M.; Torralba-Burrial, A.; Luque, P.; de Vega, L.; Cordero-Rivera,



A. (2024): Nombres comunes de los odonatos para la conservación y la educación ambiental en España. *Boletín de la Sociedad Entomológica Aragonesa* 74: 190-200. (in Spanish, with English summary) ["Common Names of Odonates in Spain for Conservation and Environmental Education. The traditional Spanish vernacular names identifying some types of insects recognize supra-specific taxonomic units habitually, and produced a long list of common names in the case of odonates mainly to refer to the whole order or differentiate both of its suborders. We propose a standardization of the terms 'caballitos de agua' (Zygoptera) and 'libélulas' (Anisoptera) in Spanish. The progressive diffusion of scientific culture and ecology in Europe has been accompanied by the creation of popular names in various languages in order to reflect the scientific names of the most observed species. We propose a standard list of common names in Spanish for the 87 species of the order Odonata recorded in mainland Spain, the Canary Islands, the Balearic Islands, Ceuta and Melilla." (Authors)] Address: Prunier, F., Red de Observadores de Libélulas en Andalucía (ROLA). Asociación de Educación Ambiental El Bosque Animado. 29490, Benarrabá, Spain. Email: aeaelboqueanimado.info@gmail.com

**23406.** Rubio, A.O.; Dye, A.M.; Ifill, K.E.; Summers, K. (2024): On the wings of dragons: Wing morphometric differences in the sexually dichromatic common whitetail skimmer dragonfly, *Plathemis lydia* (Odonata: Libellulidae). *PLoS ONE* 19(5): e0303690. <https://doi.org/10.1371/journal.pone.0303690>: 17 pp. (in English) ["Sexual dimorphism is common throughout the animal kingdom, leading to sex-specific phenotypic differences. *P. lydia* is sexually dichromatic, where males of this species display a conspicuous white abdomen and females display a dark brown abdomen. Differences in abdomen conspicuousness between male and female *P. lydia* are likely attributed to differences in selective pressure where males use their white conspicuous abdomen during male-male territorial chases. We hypothesized that male *P. lydia* would exhibit wing morphology adaptations to better offset the costs of predation and territoriality and that these adaptations would differ from females. We used field-collected images to quantify differences in body length, wing length, wing area, wing shape, and wing loading between male and female *P. lydia*. Our results show that male *P. lydia* have significantly shorter fore and hind wings relative to body size with a higher wing loading when compared to females. We also found that male *P. lydia* have narrower and pointier fore and hind wings compared to females. These results are consistent with the idea that males are adapted for faster flight, specifically higher acceleration capacity, and higher agility whereas females are adapted for higher maneuverability." (Authors)] Address: Rubio, A., Dept of Biology, East Carolina Univ. Greenville, North Carolina, USA. Email: andreworubio@gmail.com

**23407.** Samandarova, O.D. (2024): Imperator ninachisi (*Anax imperator*) ning biologik ekologik hususiyatlari [Biological and ecological characteristics of the emperor dragonfly (*Anax imperator*)]. Barqaror rivojlanish maqsadlari: Xorijiy tajriba va O'zbekiston amaliyoti mavzusidagi xalqaro ilmiy-amaliy konferensiya, 2024-YIL 22-Aprel [Sustainable development goals: international scientific and practical conference on foreign experience and practice of Uzbekistan, April 22, 2024]: 311-312. (in Uzbek) [This is a very superficial discussion of dragonflies, and *Anax imperator* in particular. Unfortunately, the article does not contain any relevant or usable information.] Address: Samandarova, Oygul Davlatnazar qizi, O'zbekiston Milliy Universiteti, Toshkent

**23408.** Samways, M.J. (2024): Conservation of dragonflies. Sentinels for freshwater conservation. Publisher: CABI, Nosworthy Way, Wallingford, Oxfordshire OX10 8DE, UK: 568 pp.

(in English) ["Dragonflies are among the most familiar and popular of all insects, deeply embedded in human cultural history. They are iconic and tell us much about the environments in which we and they live. Their conservation is an important part of biodiversity conservation. One modern dragonfly species is listed as extinct, with many others currently threatened. It is now essential to increase conservation efforts towards saving these threatened species, with strategies now available for doing this. Recovery of dragonfly populations goes hand in hand with improvements to both freshwater conditions and bank vegetation quality. In contrast, some other dragonfly species have benefitted greatly from human transformation of the landscape, with artificial ponds in particular, increasing the population levels of many species. In turn, climate change is seeing many geographical range shifts. Dragonflies are variously sensitive to the health of freshwater systems, and the quality of vegetation along rivers and around ponds. Dragonflies are excellent indicators in these times of great concern over the quality of our freshwater supplies. Their wide range of sensitivities enables us to measure the extent to which freshwater ecosystems are either deteriorating or are improving when we undertake restoration. They enable us to gauge how well we are conserving freshwaters, whether ponds and lakes, streams or rivers. They are also good umbrellas for many other freshwater inhabitants, which altogether reflect the health of a freshwater system. Conservation of Dragonflies: Sentinels for Freshwater Conservation is for naturalists, citizen scientists, entomologists and conservation scientists, as well as practitioners and policy makers around the world." (Publisher)]

**23409.** Seehausen, M.; Terragni, M. (2024): Name-bearing types of Zygoptera preserved at the Senckenberg Naturmuseum Frankfurt/Main (Odonata). *Odonatologica* 53(1/2): 183-248. (in English) ["The name-bearing types of Zygoptera preserved at the Senckenberg-Museum Frankfurt/Main (SMF), Germany are catalogued. There are 464 name-bearing types of 104 taxa deposited at the SMF. Of these taxa there are 68 additional paratypes and paralectotypes. The holotype male of *Disparocypha biedermanni* and both syntypes of *Acanthagrion lindneri* are missing. The type status of *Chalcopteryx radians*, *Cora irene*, *C. notoxantha*, *Euthore leroii*, *Bayadera melanopteryx*, *Calopteryx melli*, *Vestalis smaragdina velata*, *Platycnemis agrioides*, *Acanthagrion adustum*, *A. kennedii*, *Enallagma fractum*, and *Pseudagrion pontogenes* is investigated. All types of these taxa are considered syntypes, because their lectotype designations were invalid. In addition, 222 secondary types of 69 other taxa are listed. A supplementary list of name-bearing types of Zygoptera of 39 taxa described by Friedrich Ris and deposited in collections other than the SMF is provided. Evidence that *Aciaagrion feuerborni* is a junior synonym of *A. approximans* is discussed." (Authors)] Address: Seehausen, M., Zoologisches Museum der CAU zu Kiel, Hegewischstr. 3, 24105 Kiel, Germany

**23410.** Silaturahmi, E.M. (2024): Diversity of dragonflies (Odonata) in the waters of several situ in south Tangerang. Undergraduate Thesis. Biology Study Program. Faculty of Science and Technology. Syarif Hidayatullah State Islamic University Jakarta: 59 pp. (in Indonesian, with English summary) ["Dragonfly diversity is a good indicator to determine changes in the environment around the waters. This study aims to determine the diversity of dragonflies in the waters of several sites in South Tangerang City. Observations were made using the survey method. In this study, dragonflies were collected using a purposive sampling method and line transects were drawn along 200 meters following the path. Dragonflies found from 8 sites in South Tangerang amounted to 1,787 individuals from 15 species, 10 genera, 4 families,

and 2 suborders. The dragonfly species found the most was *Brachythemis contaminata* which amounted to 1,134 individuals. No dragonflies were found in Situ Bungur. The index of dragonfly species diversity in situ is categorized as low to medium ranging from 0.39-1.53. The species evenness index in situ ranged from 0.20-0.95. The dominance index at the site ranged from 0.23-0.85. The dominance index value in Situ Cileduk and Situ Pondok Jagung is categorized as high. The results of Pearson correlation analysis of light intensity, air speed and air temperature have a negative correlation value (-) with the number of dragonflies. Light intensity and air speed have sufficient relationship criteria with the number of dragonflies while air humidity and air temperature have low relationship criteria with the number of dragonflies." (Author)] Address: <https://repository.uinjkt.ac.id/dspace/bitstream/1234-56789/76683/1/EGI%20MAULANA%20SILATURAHIM-F-ST.pdf>

**23411.** Silva, J.; Martinez Falcon, A.P. (2024): The wonderful journey of dragonflies around the world. *Herreriana* 6(2): 27-32. (in Spanish, with English summary) ["Migration is distinguished by long trips and movements with the objective of reproduction, search for breeding places, search for shelters among other places. A large part of the insect species has been this type of behavior; the effect has been to protect migratory species and protect the habitats and components of biodiversity found on migratory routes. Migration in dragonflies is of most importance since it can explain the distribution of certain species, in addition to helping us to know beneficial aspects for conservation and to know the potential of freshwater bodies and the biodiversity that are in them, therefore, it is important to recognize the value of the study in these aspects of migration and dispersion." (Authors)] Address: Silva, J. Email: [jodsilhur@gmail.com](mailto:jodsilhur@gmail.com)

**23412.** Silvius, M.J.; Dow, R.A. (2024): Observations of *Prodasineura yulan* Dow & Ngiam, 2013, from Sungai Utik, West Kalimantan, Indonesia (Odonata: Platycnemididae). *Notulae odonatologicae* 10(3): 99-106. (in English) ["*P. yulan* was observed in a small peaty-water stream in the Iban Dayak customary land of the Sungai Utik, West Kalimantan, Indonesia. It had previously only been known from the holotype male from Maludam National Park in Sarawak. The observation indicates a wider distribution, but with no other sites discovered as yet, the species should still be considered endangered. A checklist of Odonata that have been observed in the Sungai Utik area is included." (Authors)] Address: Dow, R.A., Institute of Biodiversity & Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: [rory.dow230@yahoo.co.uk](mailto:rory.dow230@yahoo.co.uk)

**23413.** Snegovaya, N.Yu. (2024): Odonata collected in 2023 in Azerbaijan, including the confirmation of *Cordulia aenea* Linnaeus, 1758 for Azerbaijan. *International Dragonfly Fund - Report 186*: 1-33. (in English) ["This paper presents the results of a study conducted on the odonate fauna in Azerbaijan, held in 2023 and covering 40 localities in 19 districts. A total of 42 species from 9 families was recorded." (Author)] Address: Snegovaya, Nataly Yu., Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. Email: [snegovaya@yahoo.com](mailto:snegovaya@yahoo.com)

**23414.** Stahl, L.; Johansson, F. (2024): Effects of temperature and resource level on interspecific interactions in two species of Odonata larvae. *Ecology & Evolution* 14(6), e11502: 11 pp. (in English) ["Identifying how temperature and food resources affect interactions between species is important for understanding how climate change will shape community

structure in the future. Here, we tested how temperature and resource density affect survival and growth in the larval stage of two coexisting odonates: *Lestes sponsa* and *Symptetrum vulgatum*. We performed a laboratory experiment at two temperatures (21 and 24°C) with two resource densities. We estimated the timing of egg hatching of individual egg clutches and thereafter the larval growth rate-, survival- and size-mediated priority effects under interspecific conditions. Eggs of both species hatched slightly faster at 24°C, and *S. vulgatum* eggs started hatching approximately 1 day earlier than *L. sponsa* eggs. However, this earlier hatching did not result in a size-mediated priority effect, that is, a higher predation on the later hatching *L. sponsa*. Nevertheless, *L. sponsa* larvae were significantly larger than *S. vulgatum* at hatching. Growth rate and survival were significantly higher: (1) at 24°C compared with 21°C, (2) at high compared with low-resource density and (3) in *L. sponsa* compared with *S. vulgatum*. Several significant interaction effects between resource density and temperature and between temperature and species were found. At high temperature, *L. sponsa* had a higher growth rate than *S. vulgatum*, but no difference in growth rate between species was found at low temperature. Additionally, a high-resource density resulted in a higher growth rate in both species, but only under high temperature. There was a negative relationship between growth rate and survival in both species, suggesting that the higher growth rate of larvae was to some degree driven by intraguild predation and/or cannibalism. Our results imply that resource levels interact with temperature to affect interactions between the species." (Authors)] Address: Johansson, F., Dept of Ecology & Genetics, Animal Ecology program, Uppsala University, Uppsala, Sweden. Email: [frank.johansson@ebc.uu.se](mailto:frank.johansson@ebc.uu.se)

**23415.** Stenger, P.-L.; Theuerkauf, J.; Mille, C.G.; Jourdan, H.; Marinov, M. (2024): Description of the female and variation in males of the critically endangered *Caledargiolestes janiceae* Lieftinck, 1975 from South New Caledonia (Odonata: Zygoptera: Argiolestidae). *Zootaxa* 5468(2): 379-392. (in English) ["*C. janiceae* was erected on the basis of a single not-fully mature male. Eleven years later a female was captured but never described. Despite further searching, this species was only rediscovered in early 2022 with one female and two males (immature and mature) collected. This paper provides descriptions of the female and of the male in different stages of maturity." (Authors)] Address: Stenger, P.-L., IAC, Institut Agronomique néo-Calédonien (IAC), Équipe Sol & Végétation (SolVeg), 101 Promenade Roger Laroque, 98848 Nouméa, New Caledonia. Email: [Pierrelouis.stenger@gmail.com](mailto:Pierrelouis.stenger@gmail.com)

**23416.** Strickland, B.A.; Patrick, C.J.; Carvallo, F.R.; Kinard, S.K.; Solis, A.T.; Reese, B.K.; Hogan, J.D. (2024): Long-term climate and hydrologic regimes shape stream invertebrate community responses to a hurricane disturbance. *Journal of Animal Ecology* 93(7): 823-835. (in English) ["(1) Disturbances can produce a spectrum of short- and long-term ecological consequences that depend on complex interactions of the characteristics of the event, antecedent environmental conditions, and the intrinsic properties of resistance and resilience of the affected biological system. (2) We used Hurricane Harvey's impact on coastal rivers of Texas to examine the roles of storm-related changes in hydrology and long-term precipitation regime on the response of stream invertebrate communities to hurricane disturbance. (3) We detected declines in richness, diversity and total abundance following the storm, but responses were strongly tied to direct and indirect effects of long-term aridity and short-term changes in stream hydrology. The amount of rainfall a site received drove both flood duration and flood magnitude across sites, but lower annual

rainfall amounts (i.e. aridity) increased flood magnitude and decreased flood duration. Across all sites, flood duration was positively related to the time it took for invertebrate communities to return to a long-term baseline and flood magnitude drove larger invertebrate community responses (i.e. changes in diversity and total abundance). However, invertebrate response per unit flood magnitude was lower in sub-humid sites, potentially because of differences in refuge availability or ecological-evolutionary interactions. Interestingly, sub-humid streams had temporary large peaks in invertebrate total abundance and diversity following recovery period that may be indicative of the larger organic matter pulses expected in these systems because of their comparatively well-developed riparian vegetation. (4) Our findings show that hydrology and long-term precipitation regime predictably affected invertebrate community responses and, thus, our work underscores the important influence of local climate to ecosystem sensitivity to disturbances. ... In our study, our main invertebrate predators (Odonata) did not display a lagged recovery and a lag in invertebrate fish in Poeciliidae family could be responsible for crashes, we consider it more likely that spatio-temporal variability in food quality and quantity explains the patterns we observed and suggest that this mechanism interacts with long-term climate regime. ... In our study, our main invertebrate predators (Odonata) did not display a lagged recovery and a lag in invertebrate fish in Poeciliidae family could be responsible for crashes, we consider it more likely that spatio-temporal variability in food quality and quantity explains the patterns we observed and suggest that this mechanism interacts with long-term climate regime." (Authors)] Address: Patrick, C.J., Virginia Inst. of Marine Science, William and Mary, Gloucester Point, Virginia, USA. Email: cpatrick@vims.edu

**23417.** Subramanian, K.A.; Babu, R. (2024): Fauna of India Checklist: Arthropoda: Insecta: Odonata. Version 1.0. Zoological Survey of India. DOI: <https://doi.org/10.26515/Fauna-1/2023/Arthropoda: Insecta: Odonata>: 15 pp. (in English) ["In India a total 504 species belong to 157 genera, 17 families, three genera and three suborders are known (Kalkman et al., 2020). The Western Ghats, Western and Eastern Himalaya has maximum number of species. State wise species diversity and endemism is provided in Table 1." (Authors)] Address: Subramanian, K.A., South. Regional Centre, Zool. Survey of India, 130, Santhome High Road, Chennai- 600 028, Tamil, Nadu, India. Email: subbuka.zsi@gmail.com

**23418.** Sviben, S.; Matonickin Kepcija, R.; Vilenica, M.; Krušlik, I.; Micetic Stankovic, V.; Kružić, P.; Kucinic, M. (2024): Benthic macroinvertebrate communities change along a karstic barrage-lake system. *Natura Croatica* 33(1): 105-121. (in English, with Croatian summary) ["Barrage-lake systems are a rare natural phenomenon with specific ecological characteristics that are greatly affected by tufa formation. Our main goal was to investigate benthic macroinvertebrate communities and their longitudinal variations within the lakes arranged in cascades in the Dinaric karst hydrosystem. Each lake within the Plitvice Lakes system studied presented with a distinct community, showing the effects of the barrage-lake system on the macroinvertebrates in these lakes. We observed a downstream decrease in taxa richness, abundance and Shannon diversity index along the longitudinal profile of the studied barrage-lake system. This pattern is most probably a result of decreased organic matter and increased tufa deposition. Overall, our results suggest that the hydrosystem studied represents a sequence of sediment sinks in which lakes retain and accumulate organic matter and fauna. Therefore, each lake acts as a filtering screen and consequently appears to be a small ecosystem.

Each lake has its own community characteristics, regardless of the fact that water flows from one lake to the next, connecting them and creating very similar abiotic conditions in each lake along the system." (Authors) Ten odonate taxa are listed.] Address: Vilenica, Marina, University of Zagreb, Faculty of Teacher Education, Trg Matice Hrvatske 12, 44250 Petrinja, Croatia. Email: marina.vilenica@ufzg.hr

**23419.** Telli, S.; Salur, A. (2024): A study on Odonata larvae inhabiting Yedigöller National Park (Bolu province, Türkiye). *Munis Entomology & Zoology* 19(2): 1040-1048. (in English) ["In this study, Odonata larva specimens collected from 13 different locations in Yedigöller National Park between 2012-2013 were examined in terms of faunistics. A total of 203 samples were obtained during the research. As a result of the diagnosis processes, it was determined that these specimens belonged to 12 genera and 13 species group taxa of 7 different families of the Odonata. The larvae of all species were recorded for the first time from the research area." (Authors)] Address: Salur, A., Hitit Univ., Faculty of Arts and Sciences, Biology, Çorum, Turkey. E-mail: alisalur@gmail.com

**23420.** Theischinger, G.; Orr, A.G. (2024): *Plagulibasis richardsi* sp. nov., a new damselfly from Papua New Guinea (Zygoptera: Coenagrionidae). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 42: 43-52. (in English) ["*Plagulibasis richardsi* sp. nov. (Holotype male: P'nyang Camp 4, 1-viii-2013), a new damselfly from southern Papua New Guinea, is described. Diagnostic characters of both sexes are illustrated. Similarities with *Plagulibasis ciliata* (Ris, 1913), the hitherto only other known species of *Plagulibasis* Lieftinck, 1949, and with two similar species of *Teinobasis* Kirby, 1890 are discussed, with all being compared in detail." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: theischinger@gunther@gmail.com

**23421.** Tolman, E.R. (2024): Systematics and comparative genomics of the Petaluridae (Odonata: Anisoptera). A dissertation submitted to the Graduate Faculty in Biology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York: 183 pp. (in English) ["The Anisoptera exhibit diverse life histories and diversification patterns, with the family Petaluridae standing out as particularly unique. Comprising only 11 extant species, all of which inhabit increasingly threatened fen habitats, Petaluridae are known for their longevity, which can exceed five years, semi-terrestrial lifestyle, and remarkable physical size, ranking among the largest insects on Earth. Despite the evolutionary peculiarities of this family, no previous genomic studies have investigated the Petaluridae. This work presents two high-quality genome sequences and a targeted enrichment dataset to explore the chromosome architecture of Petaluridae, identifies genomic adaptations associated with their distinctive life history, and resolves the phylogenetic relationships within the Petaluridae. By identifying regions of synteny between the genome of the petalurid *Tanypteryx hageni* and three other species from across the Odonate tree of life, this work reveals few changes in genome architecture across 250 million years of Odonata evolution and highlights the unique role of repetitive elements in shaping Petaluridae genomes. Comparative genomics work including *T. hageni*, another Petaluridae *Uropetala carovei*, and five other Odonata uncovers shared expansions in gene families unique to the Petaluridae. These uniquely expanded gene families are related to biological functions such as taste perception and apoptosis regulation, which can potentially be linked to their semi-terrestrial lifestyle and longevity of the Petaluridae.

Furthermore, integration of target enrichment data with genome sequences and previously sequenced transcriptomes allows for the resolution of the Petaluridae phylogeny, confirming the ancient origins of lineages within this family and historical correlation with continental drift, the closing of seaways, and the development of mountain ranges. In totality, this work lays the foundation for future study of the evolution of this model family." (Author) [https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=6873&context=gc\\_etds](https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=6873&context=gc_etds)] Address: Tolman, E.R., American Museum of Natural History, Dept of Invertebrate Zoology, New York, USA. E-mail: [etolman@amnh.org](mailto:etolman@amnh.org)

**23422.** Türe, F.; Çiçek, E. (2024): Checklist of larval level Odonata species (Insecta) in Türkiye, distribution and identification keys. *Munis Entomology & Zoology* 19(2): 899-947. (in English) ["In this study, we created a checklist of larval Odonata (Insecta) species in Türkiye. The distribution of the species according to their original description, synonyms, habitat, general distribution, and distribution in Turkish river basins is provided. 75 species and 12 subspecies, 10 families, and 30 genera were found in 25 river basins in Türkiye. We created identity keys for the families listed in the checklist." (Authors)] Address: Çiçek, E., Nevşehir Hacı Bektaş Veli University, Faculty of Ait and Sciences, Dept of Biology, Nevşehir, Türkiye. E-mail: [erdogancicek50@gmail.com](mailto:erdogancicek50@gmail.com)

**23423.** Vega-Sánchez, Y.M.; Oyama, K.; Mendoza-Cuenca, L.F.; Gaytán-Legaria, R.; González-Rodríguez, A. (2024): Genomic differentiation and niche divergence in the *Hetaerina americana* (Odonata) cryptic species complex. *Molecular Ecology* 33(2), e17207: 13 pp. (in English) ["The evolution of reproductive barriers, that is, the speciation process, implies the limitation of gene flow between populations. Different patterns of genomic differentiation throughout the speciation continuum may provide insights into the causal evolutionary forces of species divergence. In this study, we analysed a cryptic species complex of the genus *Hetaerina*. This complex includes *H. americana* and *H. calverti*; however, in *H. americana* two highly differentiated genetic groups have been previously detected, which, we hypothesize, may correspond to different species with low morphological variation. We obtained single nucleotide polymorphism (SNP) data for 90 individuals belonging to the different taxa in the complex and carried out differentiation tests to identify genetic isolation. The results from STRUCTURE and discriminant analysis of principal components (DAPC), based on almost 5000 SNPs, confirmed the presence of three highly differentiated taxa. Also, we found FST values above 0.5 in pairwise comparisons, which indicates a considerable degree of genetic isolation among the suggested species. We also found low climatic niche overlap among all taxa, suggesting that each group occurs at specific conditions of temperature, precipitation and elevation. We propose that *H. americana* comprises two cryptic species, which may be reproductively isolated by ecological barriers related to niche divergence, since the morphological variation is minimal and, therefore, mechanical barriers are probably less effective compared to other related species such as *H. calverti*." (Author)] Address: González-Rodríguez, A., Instituto de Investigaciones en Ecosistemas y Sustentabilidad, Universidad Nacional Autónoma de México (UNAM), Morelia, Michoacán, 58190, Mexico. Email: [agrodriag@cieco.unam.mx](mailto:agrodriag@cieco.unam.mx)

**23424.** Veseli, M.; Rožman, M.; Kokotovic, I.; Brigic, A.; Petrovic, M.; Previšic, A. (2024): Bridging boundaries: exploring aquatic-terrestrial contaminant transport via emerging aquatic insects. *Book of Abstracts. 4th Central European*

*Symposium for Aquatic Macroinvertebrate Research (CESA-MIR 2024)*. Bratislava: Plant Science and Biodiversity Centre, Slovak Academy of Sciences, 2024: 95. (in English) [Verbatim: Aquatic insects serve as vital inter-habitat linkages between aquatic and terrestrial ecosystems due to their life cycle encompassing both environments. They facilitate the flow of energy and nutrients and play a crucial role in transporting waterborne contaminants to terrestrial environments. Our project focused on investigating the environmental fate of emerging contaminants (ECs), particularly pharmaceuticals (PhACs) and endocrine disrupting compounds (EDCs), originating from wastewater effluents and accumulating in aquatic insects. Conducting in situ studies in NW Croatia, we demonstrated the bioaccumulation of multiple PhACs and EDCs in the aquatic stages of Odonata and Trichoptera. Subsequently, we observed their transfer across the aquatic-terrestrial ecosystem border via emerging adults. Comparison of EC concentrations in aquatic and terrestrial life stages indicated bioamplification, or increased body burden of many compounds, particularly in Trichoptera emerging adults. Furthermore, our results suggest that differences in biological traits between taxa, such as type of metamorphosis and feeding behaviour, play a defining role in bioaccumulation and bioamplification patterns of PhACs and EDCs in aquatic insects. Additionally, our results revealed the presence of waterborne PhACs and EDCs in terrestrial invertebrates in the riparian zone (e.g., Aranea, Iso-poda, Coleoptera), shedding light on contaminant transfer in aquatic-terrestrial food webs across different trophic levels. Notably, trophic transfer of PhACs and EDCs was observed extending beyond a 3-meter distance from the river, underscoring the necessity for further research into the extent of waterborne contaminants in riparian zones. In summary, our findings contribute significant insights into contaminant transport mechanisms dependent on ecological processes linking aquatic and terrestrial ecosystems.]

**23425.** Vilela, D.S.; Jacqus, G.; de Souza, M.M. (2024): *Argia sertaneja* sp. nov. (Odonata: Coenagrionidae) from Northern Minas Gerais state, Brazil. *Zootaxa* 5471(1): 125-133. (in English, with Portuguese summary) ["*Argia sertaneja* sp. nov. (BRAZIL, Minas Gerais state, Chapada Gaúcha, Grande Sertão Veredas National Park, Vereda lodging (15.iv.2023, 15°11'14.7"S 45°41'01.7"W, 807 m asl, M.M. Souza leg., Coleção Biológica de Vespas Sociais—CBVS) is described, illustrated, and diagnosed. The new species can be separated from its congeners by the wide morphology of male cercus, and shape of female hind lobe of prothorax and mesostigmal lobes." (Authors)] Address: Vilela, D.S., Instituto Federal de Educação; Ciência e Tecnologia do Sul de Minas – Campus Inconfidentes; Inconfidentes; Minas Gerais; Brazil. Email: [diogo.vilela@ifsuldeminas.edu.br](mailto:diogo.vilela@ifsuldeminas.edu.br)

**23426.** Vorob'eva, L.V.; Borisov, R.R.; Kovacheva, N.P.; et al. (2024): Food spectrum of the Australian Redclaw Crayfish *Cherax quadricarinatus* (Von Martens, 1868) (Decapoda, Parastacidae) in the ponds of Astrakhan Oblast. *Russian Journal of Biological Invasions* 15: 146-157. (in English) ["For the first time, the data on the feeding habits of the Australian red claw crayfish *Cherax quadricarinatus* in water bodies of Russia are presented. The studies were carried out during the cultivation of crayfish in three ponds of the scientific and experimental complex of aquaculture BIOS of the Volga-Caspian branch of the Russian Federal Research Institute of Fisheries and Oceanography (VNIRO) in Astrakhan oblast in 2022. The food spectrum of *C. quadricarinatus* was dominated by plant remains and detritus (mainly rotting parts of cane), they were noted in all stomachs with food, and their share in the virtual food bolus constituted 82.4% on average. The share of the animal component in

the virtual food bolus was 12.8% on average, and it was represented mainly by macrobenthos. Planktonic crustaceans did not make up a significant proportion in the virtual food bolus. In total, 20 taxa of invertebrates were found in stomachs. Among the benthic species, larvae of Odonata, chironomids, and larvae and imagoes of Coleoptera predominated. A preliminary assessment of the possible impact of crayfish *Cherax quadricarinatus* on ecosystems when it penetrates into natural water bodies of the South of Russia has been carried out." (Authors)] Address: Vorob'eva, L.V., Russian Federal Research Institute of Fisheries and Oceanography, 105187, Moscow, Russia

**23427.** Welti, E.A.R.; Bowler, D.E.; Sinclair, J.S.; Altermatt, F.; Álvarez-Cabria, M.; Amatulli, G.; Angeler, D.G.; Archambaud, G.; Jorrín, I.A.; Aspin, T.; Azpiroz, I.; Baker, N.J.; Bañares, I.; Barquín Ortiz, J.; Bodin, C.L.; Bonacina, L.; Bonada, N.; Bottarin, R.; Cañedo-Argüelles, M.; Csabai, Z.; Datry, T.; de Eyto, E.; Dohet, A.; Domisch, S.; Dörfinger, G.; Drohan, E.; Eikland, K.A.; England, J.; Eriksen, T.E.; Evtimova, V.; Feio, M.J.; Ferréol, M.; Floury, M.; Forcellini, M.; Eurie Forio, M.A.; Fornaroli, R.; Friberg, N.; Fruget, J.-F.; García Marquez, J.R.; Georgieva, G.; Goethals, P.; Graça, M.A.S.; House, A.; Huttunen, K.-L.; Jensen, T.C.; Johnson, R.K.; Jones, J.I.; Kiesel, J.; Larrañaga, A.; Leitner, P.; L'Hoste, L.; Lizée, M.-H.; Lorenz, A.W.; Maire, A.; Manzanos Arnaiz, J.A.; Mckie, B.; Millán, A.; Muotka, T.; Murphy, F.F.; Ozolins, D.; Paavola, R.; Paril, P.; Peñas Silva, F.J.; Polasek, M.; Rasmussen, J.; Rubio, M.; Sánchez Fernández, D.; Sandin, L.; Schäfer, R.B.; Schmidt Kloiber, A.; Scotti, A.; Shen, L.-Q.; Skuja, A.; Stoll, S.; Straka, M.; Stubbington, R.; Timm, H.; Tyufekchieva, V.G.; Tziortzis, I.; Uzunov, Y.; van der Lee, G.H.; Vannevel, R.; Varadinova, E.; Várбірó, G.; Velle, G.; Verdonschot, P.F.M.; Verdonschot, R.C.M.; Vidinova, Y.; Wi-berg-Larsen, P.; Haase, P. (2024): Time series of freshwater macroinvertebrate abundances and site characteristics of European streams and rivers. *Scientific Data* 11(601): 8 pp. (in English) ["Freshwater macroinvertebrates are a diverse group and play key ecological roles, including accelerating nutrient cycling, filtering water, controlling primary producers, and providing food for predators. Their differences in tolerances and short generation times manifest in rapid community responses to change. Macroinvertebrate community composition is an indicator of water quality. In Europe, efforts to improve water quality following environmental legislation, primarily starting in the 1980s, may have driven a recovery of macroinvertebrate communities. Towards understanding temporal and spatial variation of these organisms, we compiled the TREAM dataset (Time seRIes of European freshwAter Macroinvertebrates), consisting of macroinvertebrate community time series from 1,816 river and stream sites (mean length of 19.2 years and 14.9 sampling years) of 22 European countries sampled between 1968 and 2020. In total, the data include >93 million sampled individuals of 2,648 taxa from 959 genera and 212 families. These data can be used to test questions ranging from identifying drivers of the population dynamics of specific taxa to assessing the success of legislative and management restoration efforts." (Authors)] Address: Welti, Ellen, Dept of River Ecology and Conservation, Senckenberg Research Institute and Natural History Museum Frankfurt, Gelnhausen, 63571, Germany

**23428.** Wildermuth, H.; Estermann, K. (2024): Mass influx and unusual roosting behaviour of *Anax ephippiger* on the island of Lanzarote (Odonata: Aeshnidae). *Notulae odonologicae* 10(3): 67-72. (in English) ["A mass influx of migrating *Anax ephippiger* was observed on Lanzarote, an island of the Canaries lacking surface waters. Individuals of both sexes roosted close together on palm leaves, all of them with

their abdomen conspicuously curved upward. We suggest that this posture may be the result of a trade-off between roosting together as close as possible and obtaining enough spatial freedom for rapid simultaneous take-offs of the individuals when disturbed." (Authors)] Address: Estermann, Katharina, Unterdorfstr. 25, 6247 Schötz, Switzerland. Email: kaethi.estermann@gmail.com

**23429.** Wilson, K.D.P. (2024): A review of the Indomalayan genera *Onychogomphus*, *Lamelligomphus* and *Ophiogomphus* (Odonata: Onychogomphinae) and a redescription of *Onychogomphus thienemanni* Schmidt, 1934. *Agrion* 28(1): 11-25. (in English) ["In recent years there have been many taxonomic revisions to members of the odonate subfamily Onychogomphinae, especially species found within the Indomalayan biogeographical realm. The majority of Indian and Burmese *Onychogomphus* species, that were treated by Fraser (1934), have been transferred to other genera by various authors, sometimes without explanation. The taxonomic changes to the Indian and Burmese members of *Onychogomphus* and *Lamelligomphus*, since the publication of Fraser (1934), are catalogued here with brief explanations. It had also been noted by several authors that Chinese gomphid species treated by Hsiu-fu Chao (1990) in the genus *Ophiogomphus* did not belong to this genus. The recent subsequent changes in nomenclature to the Asian tropical and subtropical *Ophiogomphus* are detailed and briefly explained. A brief review is given for the remaining Indomalayan species of *Onychogomphus* and their close congeners. A redescription is also provided for the poorly known *Onychogomphus thienemanni* Schmidt, 1934." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Road, Brighton, BN1 5DB, UK. Email: kdpwilson@gmail.com

**23430.** Xian, C.; Leong, C.; Luo, J.; Jia, F.; Han, H.; Xie, Q. (2024): Diversity pattern of insects from Macao based on an updated species checklist after 25 years. *Biodiversity Data Journal* 12: e118110. 1-209. (in English) ["Insects represent one of the most diverse groups in the organism world with extremely rich species and morphological diversity, playing important roles in natural and city ecosystems. Regional compilation of insect species lists helps to clarify the richness of insect species in a region, enhances our understanding the structure and function of a local ecosystem and promotes the protection and development of insect resources. Moreover, it also serves as a valuable reference for cities with small area, large population and high urbanisation like Macao. Macao (Macau) Special Administrative Region (SAR) is situated at the Pearl River Delta on the southeast coast of mainland China. With urban development accelerating at great rate in a quite restricted area, Macao still has rich fauna, within which the insect diversity is surprisingly high. In this study, we systematically sorted out major references items of manuals or handbooks, monographs, articles, dissertations, official websites and other publicly available information sources about the insects recorded in Macao and, thus, generated a checklist of 15 orders, 166 families, 868 genera, 1,339 species and 118 subspecies. During this process, the preliminary summarised list was re-examined to eliminate synonyms and invalid species, based on many more extensive literature reviews. Besides, spelling errors of scientific names, authors and years were corrected. Meanwhile, the catalogue revealed a different composition pattern of species diversity between orders from those of the world and China. Even based on the most conservative estimates, the number of insect species in Macao should not be lower than 3,340 species, which hints at the necessity of deeper investigations with adequate collecting in the future to achieve more comprehensive recognition and understanding of Macao's insect biodiversity."

(Authors) Odonata are treated/checklisted at pages 176 to 183.] Address: Xian, C., School of Life Sciences, State Key Laboratory of Biocontrol, Sun Yat-sen University, Guangzhou, China

**23431.** Yu, X.; Rivas-Torres, A.; Cordero-Rivera, A. (2024): A red flag: an experimental analysis of the function of pink colouration in males of *Calopteryx haemorrhoidalis asturica* (Odonata: Calopterygidae). *Royal Society Open Science* 11(6): 12 pp. (in English) ["Males display phenotypic characteristics that may be associated with their quality, allowing non-random mating and post-copulatory female choice. In *C. haemorrhoidalis asturica*, males have a conspicuous pink colouration in the underside of abdominal segments 8–10, which they exhibit during pre- and post-copulatory courtship. We hypothesized that this colouration functions to increase male mating success and/or to elicit females to oviposit. We estimated mating and oviposition success of 27 males, and on the following day, treated males had their segments 8–10 painted black and control males the seventh segment. We recorded the number of male–male fights and courtships, whether the courtship ended in copulation, and whether the female remained in the territory and laid eggs. Our results indicate that the mating success of male *C. h. asturica* was not significantly affected by the removal of the pink colouration of the abdominal tip, but this colouration clearly affected their success in enticing females to oviposit. Courtship frequency, fat content and muscle mass were positively correlated to male mating rate, and the number of aggressive encounters was negatively correlated. Our study yields experimental evidence for the function of pink colouration of male *C. h. asturica*, in the context of post-copulatory sexual selection." (Authors)] Address: Cordero-Rivera, A., Univ. de Vigo, ECOEVO Lab, E. E. Forestal, Campus Universitario, Pontevedra 36005, Spain

**23432.** Zhang, J.; Wu, C.; Gao, Q.; Zhang, K.; Wang, L.; Wang, T.; Ma, C.; Qiu, R. (2024): Crashworthiness analysis of Dragonfly inspired tubes under multiple load cases. *International Journal of Mechanical Sciences* 271, 109085: (in English) ["Highlights: • Bionic thin-walled tubes are designed inspired by dragonfly wings. • Parametric Analysis Inspired by Dragonfly Wings Morphology. • The theoretical model of bionic tube is established. • Bionic tube under multi-angle impact is optimized by NSGA-II algorithm. Abstract: Nature's creatures have developed remarkable geometric structures for environmental adaptation. Dragonflies have evolved a rapidly flipping symmetrical four-wing system to enhance hunting efficiency. Inspired by the unique double-symmetric wing structure of the dragonfly, a group of multi-cell elliptic tubes (METs) are developed to enhance the energy absorption capacity of thin-walled tube for multiple load cases. The finite element models of MET with different cross-sectional configurations are established and validated by quasi-static axial crushing tests. The crashworthiness of MET under different load angles  $\theta$  have been explored and extensively studied by simulation method through LS-DYNA. The results indicate that the crashworthiness of MET could be influenced by the number of basic corner elements. Moreover, MET demonstrates higher energy absorption efficiency in oblique compression as compared to axial compression. Theoretical models of axial and oblique compressions are developed to predict the mean crushing force, which are obtained by summarizing the deformation modes of MET and employing simplified super folded unit theory. Finally, multi-objective particle optimization (MOPSO) algorithm is adopted to explore the MET crashworthiness optimization under oblique impact, with peak crushing force (PCF) and specific energy absorption (SEA) as targets and geometric parameters  $L$ ,  $a$ ,  $F$  and thickness

$t$  regarded as design variables. A new knee-point selection method is used to select MET from the pareto set of solutions of different schemes. The results show that different weight coefficients have great influences on the optimization results and further study is needed." (Authors)] Address: Gao, Q., School of Mechanical Engineering, Southeast Univ., Nanjing, China. Email: gaoqiangsir@163.com

**23433.** Zurlyte, K.G. (2024): Morphology and mechanical behaviour of dragonfly *Aeshna cyanea* wing: experimental investigations and simulation. MSc thesis, Kaunas University of Technology, Faculty of Mechanical Engineering and Design: 66 pp. (in Lithuanian, with English summary) ["This final project focused on the application of bionics in aviation, and the use of micro aerial vehicles for civil and military applications. The literature review discussed the anatomy of the dragonfly body and wing, and the protein resilin in the wing that adds elasticity to it. The materials and properties of the veins and membrane were also described. The sections on dragonfly biology, the physics of dragonfly flight and numerical models of the dragonfly wing discussed research carried out by other scientists on aspects of the dragonfly wing that were investigated in this study. The theoretical part of this project described the aerodynamic formulae that can be used to explain dragonfly flight, the Navier-Stokes equations that explain the flow of liquids and gases, the methods and algorithms used to construct a geometric model of the wing's morphology, the Finite Element Method, deformation and the interaction between a fluid and a deformable body. One of the studies carried out in this project is a scanning electron microscope study on the forewing of *A. cyanea*. During this study, various areas of the wing were observed: the root, the mechanosensors, the leading-edge vein and its serrated structure, the nodus, and various veins. The project led to the development of a mathematical and numerical model of the dragonfly forewing. Static analysis of the wing model was carried out by applying the properties of chitin to the veins and the properties of the membrane found in the literature to the membrane. The wing root was rigidly fixed and the wing leading-edge vein was loaded with a force of 6,7 N from the nodus towards the wing tip. The analysis showed that the maximum displacements were 0,66 mm and the maximum stresses were 6,98 MPa. The next study was carried out to determine the first resonant frequency of the wing by two tests: impact, and forced excitation. Two dragonfly wings of the same species were tested. The results of the two tests were similar, with the first wing having a first resonant frequency of 81,57 Hz by the impact method and 78,67 Hz by the forced excitation method, while the second wing had 101,57 Hz and 96,15 Hz respectively. In this study, it was found that the first resonant frequency of one wing is not representative of the overall performance of the species, but a reasonably clear range of frequencies can be obtained depending on the wing area. The last study of this project was to investigate the force generated by a dragonfly during flight and its variation with time (with the change of the flight cycle). The study shows that the mass of the dragonfly has no direct influence on the force generated, as the dragonfly with the lowest mass generates the highest force and the dragonfly with the second highest mass generates the second highest force. It can also be argued that mechanical damage to the wing has a significant effect on the magnitude of the force generated by the dragonfly during flight. This final project aimed to investigate the different mechanical properties of the dragonfly wing and its possible application for the development of micro aerial vehicles in the future." (Author)] Address: <https://epubl.ktu.edu/object/elaba:198409237/198409237.pdf>