

Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

Editor:

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Published in Zerf, Germany

ISSN 1438-0269

2000

23434. Prasad, M.; Kulkarni, P.P.; Talmale, S.S. (2000): New record of andromorphic females in two species of *Neurothemis* dragonflies (Odonata: Libellulidae) from central India. *Bionotes* 2(3): 54- (in English) [One specimen each is described of *N. i. intermedia* (Jogdalpur district) and *N. t. tullia* (Pench National Park, Nagpur district).] Address: Prasad, M.; Zool. Surv. India, M-Block, New Alipore, Calcutta-700053, India

23435. Seino, M.; Kakazu, Y.; Aoki, D. (2000): Pattern analysis for packing cells of wings of Pterygota. *Progress of Theoretical Physics Supplement* 138: 600-601. (in English) ["The vein and cell patterns for the fore and hind wing of Lepidoptera, Hemiptera, Orthoptera and Odonata are analyzed and discussed. For vein patterns of them, the fractal properties are shown and the inequality between four orders is obtained. The nature of wings observed by mass distributions for fractal dimensions of the vein pattern is presented." (Authors)] Address: Seino, M., Fac. Sci., Univ. of the Ryukyus, Okinawa 903-0129, Japan. Email: seino@sci.u-ryukyu.ac.jp

2001

23436. Endersby, I. (2001): More nomenclatural changes affecting Victoria's dragonflies. *Victorian Entomologist* 31(2): 26-27. (in English) [Australia; two odonate taxa are added to the Victorian dragonfly fauna: *Austrocordulia refracta* jurzitzi Theischinger and *Archaeosynthemis orientalis*] Address: Author deceased

23437. Hildreth, R.W. (2001): Encounter with the Dragonhunter. *Mainensis* 2(1): 5. (in English) [*Hagenius brevistylus*, 24 June 2000, Moosehorn National Wildlife Refuge (the Edmunds Unit) in Edmunds, Maine, USA] Address: <https://drive.google.com/open?id=0B985dSJVRA1mVzFTWEN0-SXpzclE>

2002

23438. Aagaard, K.; Baekken, T.; Jonsson, B. (red) (2002): Biologisk mangfold i ferskvann. Regional vurdefing av sjø- og dyr og planter. NINA [Norsk institutt for naturforskning] Temahefte 21: 48pp. (in Norwegian) [On page 35, 45 odonate species are checklisted, differentiated according to the five Norwegian regions Østlandet, Sørlandet, Vestlandet, Trøndelag, and Nord Norge.] Address: <https://niva.brage.unit.no/niva-xmlui/handle/11250/211860>

23439. Endersby, I. (2002): Corrigendum to Victorian Dragonfly Common Names. *Victorian Entomologist* 32(2): 25- (in English) [Verbatim: Corrigendum to Victorian Dragonfly Common Names. The article by Ian Endersby on Victorian Dragonfly Common Names [Vic Ent 32(1): 14-15 (2002)] inadvertently omitted the common name of *Telephlebia brevicauda*. It is the Southern Evening Damer. Also, please delete *Austrogomphus bifurcatus* (Dark Hunter) and replace with *Austrogomphus australis* (Inland Hunter). The author regrets these errors.] Address: Author deceased

2003

23440. Faton, J.M.; Deliry, C.; Pissavin, S.; Blasco, A.; Tron, F.; Bernier, C. (2003): Inventaire des libellules (Odonata) de la "Crau humide" / site Natura 2000 PR100. *Espaces naturels de Provence, Conservatoire Etudes des Ecosystèmes de Provence / Alpes du Sud*, Siège: B.P. 304 13609 Aix-en-Provence Cedex 1. 50 pp. In French [https://domlibs.fr/-libs/docs/FRA_13_CrauHumide_Odonates_2003.pdf] Address: Faton, J.-M., Les Garis, F26120 La Baume Comillane, France.

23441. Lahiri, A.R. (2003): On a new species of the genus *Bayadera* Selys (Odonata: Euphaeidae) from India with notes on its Indian representative. *Record of the Zoological Survey of India*, 101(3/4): 39-42. (in English) [*Bayadera chittaranjani* spec. nov. is described from Manipur and *B. indica* (Selys) reported from Mon area of the Nagaland state. A revised key for identification of all five species of the genus known from India is provided in the text." (Author) Taxonomic notes on *Bayadera chittaranjani* Lahiri, 2003 taken from Hämäläinen, M. (2013): Description of *Bayadera kinnara* sp. nov. from Burma, with taxonomic notes on its congeners (Odonata: Euphaeidae). *Tombo* 55: 45-49; „Lahiri (2003) described *B. chittaranjani* based on a male specimen collected from Chandel district in Manipur, North-east India. Some details in the description, such as the relative lengths of abdomen (53.0 nun) and hind wing (35.0 mm) suggest the species might be placed in *Schmidtphaea* rather than a *Bayadera*. Lahiri's description includes illustrations of anal appendages and genitalia, but the wings were not figured. Due to courtesy of Dr. K. A. Subramanian I received photographs of the holotype specimen preserved at NZC, Kolkata. The photos show that in *chittaranjani* the fore and hind wings are equally long, with the pterostigma in the hind wing situated abnormally apicad. These two characters are unique in the family, and enable an easy way to separate the genus *Schmidtphaea* from *Bayadera* and other euphaeid genera (Hämäläinen, 2003). Therefore I propose the following new

combination: *Schmidtphaea chittaranjani* (Lahiri, 2003), comb. nov.]" Address: Lahiri, A. R., Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053, India.

23442. Sharma, G.; Talmale, S.S. (2003): Predation on dragonfly *Ictinogomphus rapax* (Rambur) (Odonata: Anisoptera) by robberfly *Stenopogon pradhani* Joseph & Parui (Diptera: Asilidae). *J. Bombay nat. Hist. Soc.* 100(2/3): 632- (in English) [A detailed description of the observation on 20-III-2001, in the Sanjay Gandhi Natn. Park, Mumbai, India.] Address: Sharma, G., High Alt. Tool. Fid 1 Stn, Zool. Surv. India, Opp. Saproon Gurudwara, Solan-173211, HP, India

2005

23443. Cao, L.-z.; Yang, M.-f. (2005): Faunistic faunal study on Odonata from Guizhou. *Guizhou Agricultural Sciences* 33(2): 7-10. in Chinese, with English summary [The 90 odonate species recorded from Guizhou (China) can attributed to four zoogeographic regions: 33 species in the Oriental region, accounting for 36.67%, 55 species in the Oriental-Palaearctic region, accounting for 61.11%, 1 species in the Oriental-Palaearctic-Australasian region, accounting for 1.11%, and 1 species in the Oriental-Palaearctic-African-Australasian region, accounting for 1.11%.] Address: Cao, L.-z., Dept of Plant Protection, Agricultural College, Guizhou University, Guiyang 550025, China

23444. Kézér, K.; Móra, A.; Müller, Z.; Olajos, P. (2005): Faunistic data on dragonflies (Odonata) from the backwater Boroszló-kerti-Holt-Tisza. *Studia odonatologica Hungarica* 8: 45-55. In Hungarian, with English summary ["The paper presents faunistic data on dragonflies collected (larvae, exuviae and adults) and observed (adults) by the backwater Boroszló-kerti-Holt Tisza, situated in the ancient floodplain area of River Tisza over the administrative area of the settlements Gulács and Panyola. In the case of the backwater we had five different and characteristic localities. Collections were made with the participation of 6 specialists on 21 days and 5 localities altogether. All the localities are found in the FU 02 cell of the UTM grid map. In the faunistic report data on 255 larvae (67 males, 91 females and 97 specimens with undecided sex), 17 exuviae (1 male, 1 female and 15 specimens with undecided sex), 308 adults (222 males and 86 females), and altogether 580 specimens (290 males, 178 females and 112 specimens with undecided sex) are given in detail, representing 226 data (80 larvae, 13 exuviae and 133 adults). The number of observational data without the number of individuals is 46, thus the total number of data is 272. By this study 31 species (13 Zygoptera and 18 Anisoptera) were found to occur in the area, out of which 1 comes from the very frequent, 16 from the frequent, 10 from the less frequent, 2 from the rare and 2 from the sporadic class of country-wide occurrence frequency." (Authors)] Address: Kézér, Krisztina, Dept Hydrobiology, Fac. Natural Sciences, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

23445. Schlegel, J. (2005): Erfolgskontrolle in ökologisch aufgewerteten, bisher intensiv genutzten Kulturlandflächen (Gemeinden Altstätten und Oberriet SG). Schlussbericht Untersuchungszeitraum 1994 - 2004. Im Auftrag: Verein Pro Riet Rheintal, Schwalbenweg 16, 9450 Altstätten; www.pro-riet.ch: 82 pp. (in German) ["In the mapping years 1994-1998 (Eich, Burst, Baumgartner plots) and 1995-1998 (Golderen alt, Oberer Dreier, Unterer Dreier plots), a total of 38 dragonfly species were identified in the six study plots. According to the Red List (Gonseth & Monnerat 2002), one species is considered to be threatened with extinction, one species is

considered to be critically endangered, one species is considered to be vulnerable and five are considered to be potentially endangered. Reproduction evidence (observation of egg laying, mating wheel or "tandem position") was found for 27 species." (Author/google translate) <https://pro-riet.ch/wp-content/uploads/2020/08/Schlussbericht-EK-SSVG-2004-aktuell-1.pdf>] Address: Jürg Schlegel, Ökobüro Hugentobler AG, 9450 Altstätten, Switzerland

2006

23446. Andrikovics, S.; Nosek, J.N.; Oertel, N. (2006): The Odonata fauna of Szigetköz on the basis of larval investigations. *Acta Biol. Debr. Oecol. Hung.* 14: 9-19. in Hungarian, with English abstract [In the years 2002-2004 33 Odonata larvae taxa (27 species and 6 higher taxa) were collected in the Szigetköz region, which means the 40,5 % of the Hungarian Odonata fauna. Regarding the whole region *Ischnura elegans* was the most frequent species. There were great differences among the different water bodies regarding the number of taxa, taxon composition and relative frequency of the separate taxa. The spatial pattern of Odonata taxa was random. The fauna of the abandoned main arm was very poor. The different waters of the protected area have the most diverse Odonata fauna." (Authors)] Address: Andrikovics, S., Károly Eszterházy College, Dept Zoology, 3300 Eger, Leányka u. 6. Hungary. E-mail: hidrobiosz@axelero.hu

23447. Horcicko, I.; Celechovsky, A. (2006): The occurrence of dragonflies (Odonata) in the area of Cernovir Moorlands. *Zpravy Vlastivedneho Muzea v Olomouci* 285-287: 70-76. (in Czech, with English summary) ["During the research of dragonflies (Odonata) at the Cernovir moorland, 14 species were recorded, belonging to 6 families. Table 1 shows not only the species diversity, but at the same time it gives the chronological information of adult occurrence in the course of the whole vegetation period. The species *Calopteryx virgo* and *Coenagrion puella* began to fly as the first at the locality, as early as in the first half of May. The highest species diversity (13 species) was recorded in the second half of July. The last recorded species were *Enallagma cyathigerum* and *Aeshna cyanea* in the late September. More abundant populations were those of the species of the suborder Zygoptera. Within the suborder Anisoptera, comparatively higher abundances were recorded for *Aeshna cyanea*, *Libellula depressa* and *Orthetrum cancellatum*. A single specimen of *Aeshna mixta* was record." (Authors)] Address: Horcicko, I., Katedra zoologie a anthropologie, Přírodovědecké fakulty, Univerzity Palackého v Olomouci, tr. Svobody 26, 771 46 Olomouc, Czech Republic

23448. Krech, M.; Biele, S. (2006): Teichwirtschaft und Libellenartenschutz in Mecklenburg-Vorpommern: Ergebnisse odonatologischer Untersuchungen im NSG Hütter Klosterteiche (Landkreis Bad Doberan). *Archiv der Freunde der Naturgeschichte in Mecklenburg* 45: 79-92. in German [In 2005/2006 at the Hütter Klosterteichen, a recently renovated, extensively managed pond complex in the district of Bad Doberan. A total of 30 dragonfly species were found on the ground at the eleven ponds surveyed. Just a few months after stocking, the rehabilitated ponds showed a uniform colonisation pattern with the eurytopic dragonfly species *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans* and *Libellula quadrimaculata*. Exuviae were found for the normally semivoltine dragonfly species *Brachytron pratense* and *Leucorrhinia pectoralis*, indicating a univoltine life cycle. With regard to the future management intensity of the pond facility (stocking regime, fish stocking), the preservation of the

occurrence of the highly endangered dragonfly species *Coenagrion lunulatum* and *Leucorrhinia pectoralis* is of particular nature conservation interest. To protect amphibian and aquatic insect larvae, it is recommended that the majority of the ponds be used as pre-stretching ponds for fish fry (age class KO/Kv) or thinly stocked with AK K1 fish. Regular wintering of individual ponds can promote the colonisation of stenotopic astatic dragonfly species (*Lestes virens*, *L. dryas*, *Sympetrum flaveolum*)" (Authors/DeepL)"Address: Krech, M., Auf der Großen Mühle 7, 99198 Erfurt-Linderbach, Germany

2007

23449. Bachalany, Y.; Cabestaing, F.; Ambellouis, S. (2007): Suivi de libellules par analyse de séquences d'images. Schedae, 2007, prépublication n° 33, (fascicule n° 2): 229-237. (in French) ["The application objective of this thesis is the tracking of a dragonfly in a sequence of images in order to precisely reconstruct the parameters of its trajectory during the capture of a prey. We approached this problem from different points of view. We considered reconstructing the trajectory by accumulating the successive positions of an articulated 3D model whose parameters are determined by comparing it to its projection in the images. When matching the proposed model with each image, we encounter several problems such as the imprecision of the images due to motion blur and the difficulty of taking into account the pseudopupil phenomenon. Therefore, we propose to separate the processing into two stages: the incremental estimation (between successive images) of the 2D movement (Lucas Kanade) followed by a reconstruction of the 3D movement of the global model. We present more precisely the principle of the incremental estimation of the movement." (Authors/google translate) For more details see: <https://pepite-depot.univ-lille.fr/LIBRE/Autres/2009/50376-2009-Bachalany.pdf>] Address: Bachalany, Yara, LAGIS – UMR CNRS 8146, Cité Scientifique, 59655 Villeneuve d'Ascq Cedex, France

23450. Dijkstra, K.-D.B. (2007): Demise and rise: the biogeography and taxonomy of the Odonata of tropical Africa. PhD Thesis, Leiden University: 204 pp. (in English) [Contents: Chapter 1 A review of the taxonomy of African Odonata: finding ways to better identification and biogeographic insight: 9, Cimbebasia 18: 191-206, 2003; Chapter 2 Tropical African Platycnemis damselflies (Odonata: Platycnemididae) and the biogeographical significance of a new species from Pemba Island, Tanzania: 27, Systematics & Biodiversity 5(2), 2007, in press; Chapter 3 The Pseudagrion split: molecular phylogeny confirms the morphological and ecological dichotomy of Africa's most diverse genus of Odonata (Coenagrionidae): 41, International Journal of Odonatology 10: 31-41, 2007; Chapter 4 Gone with the wind: westward dispersal across the Indian Ocean and island speciation in Hemicordulia dragonflies (Odonata: Corduliidae): 55, Zootaxa 1438: 27-48, 2007; Chapter 5 Two new relict Syncordulia species found during museum and field studies of threatened dragonflies in the Cape Floristic Region (Odonata: Corduliidae): 79, Zootaxa 2007, in press; Chapter 6 The Atoconeura problem revisited: taxonomy, phylogeny and biogeography of a dragonfly genus in the highlands of Africa (Odonata, Libellulidae): 97, Tijdschrift voor Entomologie 149: 121-144, 2006; Chapter 7 Taxonomy and biogeography of Porpax, a dragonfly genus centred in the Congo Basin (Odonata, Libellulidae): 123, Tijdschrift voor Entomologie 149: 71-88, 2006; Chapter 8 Demise and rise: the biogeography and taxonomy of the Odonata of tropical Africa: 199, Samenvatting Vergaan en verrijzen: de biogeografie en taxonomie van de Odonata van tropisch Afrika: 189; A word of gratitude: 199;

Curriculum vitae: 200; Publications: 202; <https://scholarly-publications.universiteitleiden.nl/handle/1887/11969>] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. Email: dijkstra@nnm.nl

23451. Endersby, I. (2007): World Wide Dragonfly International Symposium. Victorian Entomologist 37(3): 43-44. (in English) [Report from the fifth biennial International Symposium of Odonatology of Worldwide Dragonfly Association held at Swakopmund, Namibia, from 16-10 April 2007. Over 100 delegates and partners attended. The National Museum of Namibia had offered to host the Symposium as part of its centenary celebrations.] Address: Author deceased

23452. Kuprian, M.; Winkel, S. (2007): Auswirkungen des Klimawandels auf die heimische Tier- und Pflanzenwelt. MKK-Mitteilungsblatt. Zentrum für Regionalgeschichte 32: 52-55. (in German) ["Dragonflies Winners: While heat-loving, Mediterranean dragonfly species such as *Crocothemis erythraea*, *Sympetrum fonscolombii* or *Erythromma viridulum* were still considered rare in the 1970s and only reproduced in a few warm locations in the Upper Rhine Plain in Hesse, these species can now also be regularly found in the higher elevations of the Hessian low mountain ranges (e.g. in the Voglsberg). Losers On the other hand, species that have a more boreal or continental distribution and can tolerate cold are in decline. In recent dragonfly mapping, species such as *Sympetrum danae*, *Sympetrum flaveolum* or *Erythromma najas* were found. In many locations only a few specimens are found or not found at all." (Authors/google translate)] Address: Winkel, Sibylle, Pommernstr. 7, 63069 Offenbach, Germany. E-mail: Si-winkel@t-online.de

23453. Mathews, J.; Yong, K.K.; Nurulnihar B. E. (2007): Preliminary Investigation on biodiversity and its ecosystem in oil palm plantation. In Proceeding of: PIPOC 2007 International Palm Oil Congress (Agriculture, Biotechnology & Sustainability), At Kuala Lumpur, Malaysia, Volume 2: 1112-1159. (in English) ["The Roundtable of Sustainable Palm Oil (RSPO) had set 8 principles and 39 criteria, of which principle 5 is on environmental responsibility and conservation of natural resources and biodiversity. During the survey, a two year trial of the principles and criteria, naturally occurring waterways like streams were identified that were rich in biodiversity and also provides quality water for the plantation community. Surveying mature, immature oil palm plantings, riparian banks of streams, orchard and gardens within randomized selected plots of the plantation indicated that oil palm cultivation has a unique ecosystem, probably much superior to any annual crop farming. Among flora, a total of 333 species were collected, comprising of 279 angiosperms, 5 gymnosperms, 25 pteridophytes, 2 bryophytes and 18 fungi. Under fauna, 262 species were collected which includes 202 arthropods, 20 avian, 12 mammals, 2 reptiles, 1 amphibian (in tadpole form) and 15 aquatic specimens mainly of pisces and a few crustaceans. Many of the birds, reptiles and mammals captured or observed were categorized as protected wild animals under Malaysian law of protection of wild life act 1972 (Act 76). The biotic chain of the flora and fauna in the oil palm plantation has been demonstrated in the present study. There were a few introduced species in the gardens of plantation classified under IUCN as critically endangered, endangered, vulnerable to endanger, lower risk and or near to threat status. Majority of the flora and fauna were common either to South East Asia or S. Asian tropical forest conditions and its possible exploitation in the oil palm ecosystem are also described." (Authors)

Three odonate species are listed: *Orthetrum sabina*, *Crocothemis servilia*, and *Neurothemis fluctuans*.] Address: Matthews, J., IOI Research Centre, 73309 Batang Melaka, Negeri Sembilan, Malaysia

2008

23454. Arulprakash, R.; Gunathilagaraj, K. (2008): 16. Abundance and diversity of Odonata (Insecta) in some hilly regions of Tamil Nadu. *J. Bombay Nat. Hist. Soc.*, 105 (3), Sep-Dec 2008: 352-354. (in English) [23 odonate species are documented.] Address: Arulprakash, R., Dept of Agricultural Entomology, Tamil Nadu Agricultural Univ., Coimbatore 641 003, Tamil Nadu, India. Email: avrarulprakash@gmail.com

23455. Bezmaternykh, D.M. (2008): Zoobenthos of the Upper Ob River tributaries (English resume). Barnaul: Altai state University press: 186 pp. (in English) ["Composition, structure and functioning of zoobenthos in tributaries of the Upper Ob River were investigated. To do research standard hydrobiological methods were used. Data on structure of zoobenthos resided in flat areas of tributaries of the Upper Ob are presented. Its taxonomic compound that includes 177 species of benthic invertebrates from 11 classes was specified. Characteristics of structure and production of bottom communities were investigated, typification of the Upper Ob River ecosystems by biocenotic attributes was made." (Author) The following odonate taxa are listed: *Anax* sp., *Brachytron pratense*, *Coenagrion amatum*, *Gomphus flavipes*, *Erythromma najas*, *Libellula quadrimaculata*, *Leucorrhinia rubicunda*, *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *Sympetrum sanguineum* O.F. Müller +] Address: Bezmaternykh, D.M., Institute for aquatic and ecological problems, Siber Branch of the Russian Academy of Sciences, 656038 Barnaul, ul. Molodjeshnaja 1, Russia

23456. Catling, P.M.; Kostiuk, B. (2008): Massive road kill and migration of Variable Darners, *Aeshna interrupta lineata* in southern Manitoba. *Argia* 20(2): 4-5. (in English) [Verbatim: East of Brandon approximately between Hughes and Carberry, the Trans Canada highway passes through a region of sand hills. Much of the area is included within Spruce Woods Provincial Forest. The landscape includes a mosaic of woodlands, prairie and ponds. At 6:45 PM on a mild evening of 22 July 2007, we noticed numerous Variable Darners crossing the road for a stretch of about 5 km. Approximately 200 were seen to cross while we travelled at 100 km/hour along a 2 km stretch of highway. Stopping at 49.9019° N 0993641° W, we observed the flight for one hour. In a 50 m length of highway, one dragonfly crossed every second. All of the dragonflies were flying south 2 to 6 feet above ground and all that we caught (approx. 30) and all that we found dead on the gravel road shoulder (150) were *Aeshna interrupta lineata*. Considering that the movement appeared to be occurring evenly over a 2 km stretch of highway, it appears that approximately 144,000 dragonflies crossed that section of highway in one hour (40 lengths * 60 per minute x 60 minutes) and it could be a much larger number if the movement had occurred over a longer time period. The next day we returned to the section of highway at noon and made observations for 2 hours. The flight was continuing but at 6 observation points the average number of individuals crossing over a 50 m section was 5 per minute and again 99% were flying south. All that we observed appeared to be *A. interrupta lineata*. There were thousands of dead dragonflies along a 4 km stretch of highway and of hundreds closely examined all were *A. interrupta lineata*. They were all mature (not teneral) and both males and females were present

but females represented 65% of the road kills. This mortality would seem likely to have an impact, but possibly not to the extent anticipated. Since the dragonflies were crossing the road, rather than using the road area as a habitat, the mortality was less than it might have been. We estimated, based on direct observations, that only one in a hundred dragonflies crossing the road was actually hit. If this is the case then the actual number of dragonflies passing through this 4 km wide flyway (based on road kills), presumably over a few days, was 100,000 * 100 - 10,000,000. This remarkable number alone suggests the importance of dragonflies in the ecosystem and compares with the magnitude of major migrations in eastern North America (Russell et al., 1988), although the individuals were not in close contact (swarming).] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

23457. De Marmels, J.; Clavijo A., J.; Sharpe, C. (2008): Mass migration of the Spot-winged Glider (*Pantala hymenaea*) in Venezuela. *Argia* 20(2): 6. (in English) [Verbatim: On 10 August 2007, while driving on the road from Barinitas to Merida, in the Venezuelan Andes, a large dragonfly, presumably a darner, hit the windshield of the first author's car, just a few kilometers above the small town of Santo Domingo. It was 10:00 in the morning, but this came as a surprise, as the sky was overcast, there was dense fog and light drizzle, the temperature was an estimated 20° C, or less. At this spot the road passes through a narrow canyon, not more than 40 m wide. A few kilometers further up on the same road, near Los Frailes (2800 m elevation), the valley opens. Dense fog still persisted, and temperature averaged 15° C. Here, thousands of male and female *Pantala hymenaea* were observed flying from west to east along the road, with moderate tail wind, between two and twenty meters above the ground, together with some interspersed *Anax amazili*. For seconds, the fog let through a few sun rays, which augmented the mass of passing *P. hymenaea*. These observations were made at an important migration route for birds. During the boreal autumn, between August and November every year, large numbers of individual birds cross the Andes from west to east by this route. The birds belong to diverse families from vultures (*Cathartidae*) to shorebirds (*Scolopacidae*) and swifts (*Apodidae*) to swallows (*Hiruninidae*) and warblers (*Parulidae*), the latter three families being especially numerous. We believe, that the dragonflies (all specimens of both species collected were mature adults with their gut variably filled), ascended through the Rio Chama valley from the Lake Maracaibo lowlands to cross the Andes and reach the Orinoco plains, but we don't know the place of emergence of these dragonflies, nor what may have been their future route and ultimate destination. On 15 August 1981, wandering *P. hymenaea* had also been caught also at another well known migration route, this time in the Coastal Cordillera, viz. Portachuelo Pass (1100 m elevation), at Rancho Grande Biological Station, Aragua State (the famous working place of William Beebe). Here they moved from north (Caribbean coast) to south (Orinoco plains). Otherwise, *P. hymenaea* is rather uncommon in Venezuela, and only about 25 specimens are stored in the collection of the MIZA. These were collected in Zulia, Barinas, Falcón, Lara, Miranda and Delta Amacuro States, as well as in Bolívar, the last one located south of the Orinoco River. The data are from February, April, May, but mostly from August, September and October. *Anax amazili* has also been captured migrating through Portachuelo Pass, this time together with Striped Saddle-bags (*Tramea calverti*): 21 October 1998 (1 female was collected). Other specimens were caught there in May and June, but no information about possible wandering activity is included with these

specimens (two males from 1977 and 1983, respectively).] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demamjc@hotmail.com

23458. Heppner, J. (2008): Odonates in Vietnam, 2008. *Argia* 20(4): 18- (in English) [The following species are listed resulting from a trip between June and early July, 2008: Ba Be National Park: *Diplacodes trivialis*, *Gynacantha subinterrupta*, *Gynacantha bayadera*. Ba Vi National Park: *Aristocypha fenestrella*, *Coelicia yamasakii*, *Euphaea masoni*, *Indocnemis orang*, *Protosticta khasoidaeoensis*, *Diplacodes trivialis*, *Orthetrum sabina*, *Orthetrum testacea*, *Rhythemis variegata*] Address: Heppner, J., Florida State Collection of Arthropods, Gainesville, Florida, USA. Email: JBHATL@aol.com

23459. Ihobe (2008): *Oxygastra curtisii* (Dale, 1834) (Insecta: Odonata: Corduliidae) en la Reserva de la Biosfera de Urdaibai. FASE I. Estudio de las poblaciones y medidas de conservación de una libélula de interés comunitario, Bilbao: 48 pp. (in Spanish, with Basque summary) ["The results and conclusions of the first phase of the research on the presence and ecological requirements of the protected dragonfly *Oxygastra curtisii* in the Urdaibai Biosphere Reserve (Bizkaia) are presented. The main objective is to provide scientific criteria for the correct management of the environment, so as to promote the survival of the species and, in any case, not interfere with its habitat. A diagnosis is made of the potentially optimal habitats for the species, proposing the protection or strict protection of some river sections (perspective of the complete biological cycle), as well as the strict temporary protection of some areas of the environment (perspective of the adults). Recommendations are offered, including the acceptance of this proposal." (Authors/google translate); https://www.euskadi.eus/documentacion/oxygastra/es_doc/adjuntos/2008.pdf] Address: Ihobe, Sociedad Pública de Gestión Ambiental, Depto de Medio Ambiente, Planificación Territorial, Agricultura y Pesca, Gobierno Vasco, Alda. Urquijo, 36 – 6º Planta, 48011 Bilbao, Spain

23460. Kulkarni P.P.; Talmale, S.S. (2008): Insecta: Odonata. Fauna of Goa, State Fauna Series, Zoological Survey of India 16: 173-194. (in English) ["The present account contains 39 species, thus 17 species are recorded for the first time from Goa State." (Authors)] Address: Talmale, S.S., Zoological Survey of India, Western Regional Centre, Vidyanagar, sector 29, Akurdi, Pune 411 044, India. Email: s_talmale@yahoo.co.in

23461. Paulson, D.R. (2008): Mites prevent sex. *Argia* 20(2): 7. (in English) [Verbatim: While photographing odonates at Bamber Lake, Ocean County, New Jersey, on 7 June 2008, I noticed a pair of Skimming Bluets, *Enallagma geminatum*, in tandem. The male was attempting to transfer sperm from his eighth to his second abdominal segment but was unable to do so because of a heavy load of water mites (presumably *Arrenurus*) beneath his abdomen. He had about 12 mites attached to the undersides of segments 6-10, effectively keeping the two abdominal segments from contact. He also had two or three mites at the base of his legs. The female also had two mites under segment 6 (numbers and location determined from photos). Corbet (1999), in his extensive discussion of parasitism of odonates by water mites, gives no mention of this negative consequence of parasitism, but with the mite loads that some odonates carry, it may not be uncommon. This male would have been

unable to reproduce, at least until he shed the mite load. Mites generally leave their host when the sexually mature odonate returns to the water to breed, but this is quite variable, and many mature odonates carry mite loads, so some individuals may be permanently unable to breed although otherwise in good condition.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

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23462. Ihobe (2009): *Oxygastra curtisii* (Dale, 1834) (Insecta: Odonata: Corduliidae) en la Reserva de la Biosfera de Urdaibai. Estudio de las poblaciones y medidas de conservación de una libélula de interés comunitario, Bilbao: 70 pp. (in Spanish) ["The results and conclusions of the second phase of the research on the protected *O. curtisii* in the Urdaibai Biosphere Reserve (Bizkaia) and in the Basque Autonomous Community are presented. It is confirmed that the species maintains a breeding population in the Oka River and its tributaries, with two large nuclei of greater density (Ajangiz and Muxika). This is a population of considerable size and relevance but requires rigorous protection of its habitats, both in its nymphal stages and in the adult stage. This is recommended for the sectors and areas where it lives. At present, this is the only known breeding population in the Basque Autonomous Community. Previous records in the province of Araba have not been confirmed, while there are recent records of the presence of adults in two points in Gipuzkoa. In Urdaibai, the species shares the spotlight with a very notable odonata diversity that needs to be protected." (Authors/google translate); https://www.euskadi.eus/documentacion/oxygastra/es_doc/adjuntos/2009.pdf] Address: Ihobe, Sociedad Pública de Gestión Ambiental, Depto de Medio Ambiente, Planificación Territorial, Agricultura y Pesca, Gobierno Vasco, Alda. Urquijo, 36 – 6º Planta, 48011 Bilbao, Spain

23463. Kipping, J.; Dijkstra, D.-D.B.; Clausnitzer, V.; Suhling, F.; Schütte, K. (2009): Odonata Database of Africa (ODA). *Agrión* 13(1): 20-23. (in English) ["Present status: Currently the database contains over 58,000 records of 738 species (subspecies not considered), which should increase in the near future to 100,000. Fig. 1 shows all the records currently entered, classified roughly in "pre-Pinheyian" (early colonial), "Pinheyian" (late colonial) and "post-Pinheyian" (independence) periods. Parts of southern Africa were studied relatively constantly through time, whereas research in countries like Angola, Congo-Kinshasa, Mozambique and Somalia was impeded by political unrest. The surge of records in the 1950s and its decline in the 1970s demonstrates the huge contribution of Elliot Pinhey to African odonatology. As expected, Libellulidae provide the bulk of records with 51%, Coenagrionidae follow with 23%. The ten most-recorded species are: *Crocothemis erythraea* (1508), *Trithemis arteriosa* (1497), *Pantala flavescens* (1322), *Ischnura senegalensis* (1206), *Ceriagrion glabrum* (1139), *Orthetrum julia* (1113), *O. chrysostigma* (1080), *Brachythemis leucosticta* (1038), *Diplacodes lefebvrei* (1011) and *Trithemis kirbyi* (970). However, *B. leucosticta* was recently found to consist of two species. Fig. 3 shows the density of records in a 100x100km grid. Probably the best-studied grid square on the African continent is the southern Okavango Delta with Maun (2696 records), with records collected by Pinhey in the early 1960s to some just a few weeks old. This square is followed by Durban, South Africa (1376); Mt. Kupe, Cameroon (1296); Victoria Falls, Zambia/Zimbabwe (1277); Popa Falls, Namibia (1269); Upper Zambezi, Zambia (628); Makokou, Gabon (576) and Capetown/Stellenbosch, South Africa (570). These

rather coarse statistics will change with new research and the ongoing digitalisation of literature and collection data." (Authors)] Address: Kipping, J., Naturkundemuseum Mauritium Altenburg, Parkstr. 1, 04600 Altenburg, Germany. Email: biocartkippping@email.de

23464. Pieczynska, E.; Rybak, J.I. (2009): [Mobility and feeding of Odonata larvae inhabiting accumulations of littoral filamentous algae]. In: R. Kornijow, M. Tarkowska-Kukuryk, T. Mieczan (eds), 21st Congress of Polish Hydrobiologists, congress materials, Lublin, September 9-12, 2009: 194. (in Polish) [Verbatim/DeepL: The littoral communities of filamentous algae often contain numerous invertebrates. The living conditions among the algae as well as the relationships between the animals that inhabit them are still very poorly understood. In the present laboratory experiments, the activity (movement and feeding) of dragonfly larvae (*Aeshna cyanea*, Anisoptera and *Coenagrion pulchellum*, Zygoptera) in filamentous algae (*Mougeotia* sp.) was evaluated and compared with that of macrophytes (*Elodea canadensis*) and in water without plants. The larvae of Chironomidae, Ephemeroptera and Zygoptera as well as *Asellus aquaticus* and Cladocera were fed to these dragonflies. All the studied animals were recorded in the clusters of filamentous algae in the littoral of the Masurian lakes. Both species of dragonflies freely penetrated the filamentous algal communities. The mean movement rate of *A. cyanea* was lower among the algae than in the water without algae, while no significant differences were found for *C. pulchellum*. Among the algae and among the macrophytes the dragonflies moved with similar intensity. The dragonflies fed on all tested prey. *A. cyanea* usually fed less intensively on algae than on non-algae. The feeding of both dragonfly species among algae and among macrophytes was similar. In general, it can be concluded that the studied dragonfly larvae find a rich food supply in filamentous algal communities, can move freely among the tangled algal threads and can successfully hunt for prey] Address: Pieczynska, Ewa, Zakł. Hydrobiologii, Uniwersytet Warszawski, ul. Banacha 2, 02-097 Warszawa, Poland: E-mail: piecz@hydro.biol.uw.edu.pl

23465. Seiter, S. (2009): Predator presence suppresses immune function in larval amphibians. MSc thesis, School of Natural Resources and Environment, University of Michigan: 18 pp. (in English) ["Life-history theory predicts that energetically costly activities, such as growth, reproduction, or predator defenses should trade off against immunity. However, the effects of predator induced phenotypes immune system are relatively unexplored. I experimentally tested the effect of natural predators on the immune system of wood frog tadpoles (*Rana sylvatica*) by exposing half of the tadpoles to caged dragonfly larvae predators, and half to empty cages. I then administered a standard immunoassay, the phytohemagglutinin (PHA) assay to a randomly selected group of animals from each treatment. These results reveal that exposure to predators reduces the response to PHA in larval *R. sylvatica*. Furthermore, predator-exposed larvae lack the typical decline in immunocompetence during metamorphosis that is found in normal amphibian larvae and have a weaker response to PHA throughout their development. Thus, predators have an effect on both immunocompetence and developmental patterns of immunity. Generally, predator exposure may facilitate parasitic infection in amphibians by reducing immune function, and thereby render amphibian populations vulnerable to co-exploitation by both predators and parasites." (Author) <https://deepblue.lib.umich.edu/handle/2027.42/62085>] Address: Seiter, Sarah, Curriculum in Ecology, University of North Carolina - Chapel

Hill, 217 Miller Hall, CB 3275 Chapel Hill, NC sseiter@mail.unc.edu

23466. Vieira, C. (2009): Avaliação da ordem Odonata na Ribeira do Vasco para estatuto Ramsar. Relatório de Estágio, Curso de Biologia, Escola Superior Agrária, Instituto Politécnico de Beja: VI + 38 pp. (in Portuguese) ["Odonata are among the oldest living creatures on Earth, yet little is known about this order and the Odonatofauna of Portugal is one of the least studied in Europe. The Ribeira do Vasco, a tributary of the Guadiana River, deserves to be preserved, as it has been little disturbed, with large areas of pristine habitats and also has great aesthetic and landscape value. It has good riparian galleries in the upstream sector of the river, which exhibits a temporary regime, with water retention in pools during the summer season. The objective of this work was to evaluate the order Odonata and to investigate the presence of the species *Coenagrion mercuriale* and *Oxygastra curtisii* in the Ribeira do Vasco. The presence of species with threatened status will be an added value for the classification of this river with Ramsar status. Between February and June 2009, 14 sampling points were sampled in the Ribeira do Vasco, using a trawl net to capture nymphs and an aerial entomological sleeve to capture adults. Twelve species were identified, four of which are new to the region: *Sympecma fusca*, *Coenagrion caerulescens*, *Gomphus graslinii* and *Libellula quadrimaculata*; *G. graslinii* is in danger of extinction and *C. caerulescens* has vulnerable status." (Author)] Address: <https://cat.biblioteca.ipbeja.pt/cgi-bin/koha/opac-retrieve-file.pl?id=f9b23cc4bc831fa113e41d96c629f20>

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23467. Arnet, H. (2010): Vier Lektionen im fliegenden Klassenzimmer. Der pensionierte Gymnasiallehrer Hansruedi Wildermuth beobachtet Libellen, um das Leben besser zu verstehen. Tages-Anzeiger – Freitag, 3. September 2010: 19. (in German) ["Four lessons in the flying classroom. Retired high school teacher Hansruedi Wildermuth observes dragonflies to better understand life. Hansruedi Wildermuth is a teacher by any other name. He has also written such books, one for biology classes, of course. Generations of secondary school students have learned how life works with "Wildermuth". "My most important concern was to convey how fragile life is," says Wildermuth. We like to let the now retired grammar school teacher give us a lesson in life lessons: because he almost always has a smile on his lips. Because his enthusiasm is contagious. And because he teaches in a flying classroom. Lesson 1 - The flying classroom: We are standing in Oberhöflierriet, where dragonflies flit around your ears. 51 dragonfly species have already been sighted in the area, 27 species regularly reproduce there. Oberhöflierriet is located between Wetzikon and Dürnten in the Zurich Oberland and is a prime example of applied environmental protection. Lesson 2 - The fragility of life: When Wildermuth stood in this reedbed for the first time a good 40 years ago, some parts looked more like a scrub forest than the raised bog it once was. The peat used to pile up 5 to 6 metres high before it was extracted on a large scale in the 17th century. Afterwards, the moor was drained for agriculture, and later it became overgrown. In 1998, the canton placed the area under nature conservation. The drainage channels were equipped with weirs to prevent the water from running off too quickly and the ditches from drying out. The land was cleared of bushes; about 30 ponds were created, some of them small, which are maintained on a rotating basis, then half-silt up and - before they completely overgrow - are cleared again. Wildermuth says: "Zurich and Aargau are model cantons in

terms of nature and moor protection." No one can show how successful these measures are as well as Wildermuth, who regularly - and voluntarily - monitors the area. Species diversity has increased significantly in the last ten years alone. What's more, a landscape has emerged that is beautiful to the human eye. How beautiful it must be for the 56,000 eyes of a dragonfly! Lesson 3 - The dragonfly's eye: Wildermuth waves the net briefly through the air, carefully picks out a common dragonfly and holds it under the magnifying glass: iridescent mother-of-pearl wings, shiny gold back and deep blue glittering eyes. Facetted eyes, which consist of thousands of individual eyes and allow a panoramic view. Four-fifths of the dragonfly's brain is occupied with optics alone. As Wildermuth was able to prove for the first time through creative experiments with black plastic film and shattered car windows, dragonflies can see horizontally polarised light, which enables them to detect even the smallest water surfaces. "The more I study dragonflies, the more exciting they become," says Wildermuth. Two years ago he wrote a book about the twelve species of European damselflies. "It's 500 pages thick, and I still had a long way to go before I could write down everything worth knowing." He points to a whimsical aerial ballet: two damselflies forming a wheel together in the air. Lesson 4 - The Kamasutra of dragonflies: There is probably no other animal that performs the mating act as acrobatically as dragonflies: A female approaches the pond and the male grabs her behind the head with his pincers at the end of his body. When the female now stretches out, she signals: Good, we can give it a try. The two first gondola through the air as a tandem. Then the female curls up, guides her sexual orifice at the end of her body to the male's mating organ, which is located at the front of the abdomen, and thus closes the mating wheel. In order to secure his paternity, the male now removes the sperm of his competitors from the female with his mating organ, like a bottle washer, in order to then place his own genes. This cleaning action can take several hours. Egg-laying is often still done in tandem, with the female carving small holes in aquatic plants and depositing the eggs one at a time or dropping them bobbing above the water in a graceful dance. The bell rings. The break bell of the flying classroom is the barrier of the nearby railway overpass. But we don't want to interrupt the lessons, because we are learning for life. Biologist Hansruedi Wildermuth catching dragonflies in Oberhöflierriet near Wetzikon." (Author/google translate)] Address: <https://www.tagesanzeiger.ch/vier-lektionen-im-fliegenden-klassenzimmer-564409699372>

23468. Matsimoto, K.; Nakatani, M. (2010): Insects fauna of Akan National Park IV. Hokkaido. *Sylvicola* 28: 11-20. In Japanese [Tsubetsu Pass is a 746m high pass that connects the towns of Oryokutsu, Kawakami District, and Tsubetsu Town, Abashiri District, Japan. In 2009-2010, 85 insect species were collected including two odonate species: *Aeshna subarctica* and *Somatochlora japonica*, both collected at 7-VII-2010.] Address: Nakatani, M., 085-0805 6-22-2 Sakura-gaoka, Kushiro-shi, Hokkaido, Japan

23469. Paparisto, A.; Pepa, B.; Halimi, E.; Hamzaraj, E.; Laknori, O. (2010): The water quality of Shkumbini River Albania based on the diversity of macroinvertebrates during the period 2007-2009. *BALWOIS 2010 - Ohrid, Republic of Macedonia* - 25, 29 May 2010: 1-7. (in English) [North-Macedonia; "Based on the water framework directive and on the different studies of water systems especially river systems, macro-invertebrates represent an important key for a fast and exact water quality assessments. The results of this study are taking in consideration the data collected between 2007-2009. The water macroinvertebrates are parts of water

ecosystems during different stages of their lives being in this way a great indicator of water quality. The goal of this research is the evaluation of water quality for Shkumbini River during 2009 and the comparison of those data's with the data of 2007. During our study we identify 1134 individuals. Results obtained from the calculation of EPT-Biotic Index for all the 4 stations studied during 2007 – 2009, show a change of classification of water quality for the third and the fourth station from 2007 up to 2009. As a conclusion we can say that for 2009 Shkumbini river is slighted more polluted at its down stream." (Authors) Taxa are treated at family level, and include "Gomphidae".] Address: Paparisto, Anila, Faculty of Natural Sciences, Tirana University, Albania. E-mail: anila_paparisto@yahoo.com

23470. Reels, G.T. (2010): Underwater oviposition by *Euphaea decorata* Selys in Hong Kong. *Insect news - Hong Kong Entomological Society Newsletter* 1: 12-13. (in English) [Verbatim ([http://hkentsoc.org/newsletter/HKES_newsletter_2010\(1\).pdf](http://hkentsoc.org/newsletter/HKES_newsletter_2010(1).pdf)): Introduction: In recent years I have developed an interest in the oviposition habits of *Euphaea* - a damselfly genus in the family Euphaeidae. I have published two papers on the subject (Reels & Dow, 2006; Reels & Wilson, 2009). Here, I give a summary of those two papers, with particular emphasis on the common Hong Kong species, *E. decorata*. The oriental genus *Euphaea* Selys contains about 31 species, of which the majority occurs in southeast Asia, Indo-China or Southern China. Records of oviposition behaviour by members of the genus are scarce in the published literature; indeed, it seems that ovipositing euphaeids are not commonly observed. Species of *Euphaea* typically inhabit clean, moderate to fast-flowing forest streams, and their robust larvae are found amongst coarse gravel, pebbles and cobbles on the stream bed, often in mid-channel, where the current is at its fastest. This presents adult females with a major problem: how to ensure their eggs are deposited within the larval habitat or as close to the larval habitat as possible? Observations: [Reels & Dow, 2006] At 1243h on 8 June 2005, I was at 250m asl on the Ng Tung Chai stream when I saw a female *E. decorata* fly down to the water surface in the middle of the stream, in the lee of a large boulder where the current was much reduced, directly above a submerged aquatic macrophyte (*Acorus* sp.) with narrow, elongate leaves. The plant was rooted on rock at a depth of 10 cm, and the stream depth was approximately 20 cm. The submerged *Euphaea* slowly crawled down a leaf blade, to a depth of 10 cm. Complete submergence was achieved within 30 seconds. For 38 minutes the insect proceeded to crawl along several submerged leaf blades, repeatedly inserting its ovipositor into leaf tissue. At 1321h, the insect ascended to the surface along a leaf blade, and floated on its side at the surface for 20 seconds (whilst retaining contact with the leaf blade), presumably to replenish its plastron, prior to descending again. The insect resumed underwater ovipositing amongst the leaves for a further 15 minutes. At 1336h the insect again crawled to the surface up a leaf blade and exposed its thorax to the air for five seconds. It then re-submerged and oviposited for a further six minutes. At 1342h, almost exactly one hour after its original descent, the female again ascended, floated at the surface for a period of 80 seconds, and then took flight. [Reels and Wilson, 2009] At 1035h on 23 July 2008, I was at 150m asl at a small stream at Hok Tau, when I observed a female *E. decorata* fly upstream slowly, about 5 cm above the water, until reaching a patch of semi-submerged *Acorus* in a Cascade section. She then alighted on the semi-submerged leaves, clinging on against the fast current and commencing oviposition. The female was observed clambering over the intermittently submerged

leaves and ovipositing for ca 10 minutes, including three minutes when she was completely submerged beneath the leaves, before I had to move on. Remarks: Completely submerged oviposition has been reported for many species of Zygoptera, in several families (Calopterygidae Euphaeidae, Lestidae, Coenagrionidae and Platycnemididae), while a single family, Aeshnidae, contains the very few representatives of Anisoptera which are known to oviposit underwater. It has been regarded as a behaviour restricted to species which oviposit endophytically, most frequently in Standing water habitats, although Hawking et al. (2004) reported an Observation of the Australian aeshnid *Notoaeschna sagittata* ovipositing on bare rock (the larval habitat), in a fast-flowing river whilst completely submerged. The benefit to the female of this dangerous behaviour is enhanced survivorship of her offspring, due to the placement of eggs at, or in close proximity to, the ultimate larval habitat. However, this benefit is achieved at the cost of higher risk of female mortality due to drowning (particularly in the fast currents favoured by Euphaea), or predation by aquatic organisms. It is likely that underwater oviposition is a common behaviour amongst Euphaea species, because it is the only way by which the female can lay her eggs in or near to the larval habitat (mid-channel bottom of fast-flowing streams). Females of Euphaea spp. are very stout. Their robust build undoubtedly helps several species within this genus to withstand the severe physical stresses encountered during oviposition in cascades and riffles, either from diving headlong into riffle sections and struggling against the current, or from exposure at torrential splash zone sites.] Address: Reels, G., 31 St Anne's Close, Winchester SO22 4LQ, Hants., United Kingdom. Email: gtreels@gmail.com

23471. Striniqi, A.; Misja, K.; Oga, J. (2010): Larvae of Odonata as indicators of water pollution in Lake Shkodra. Water Observation and Information System for Balkan Countries - BALWOIS 2010 - Ohrid, Republic of Macedonia - 25, 29 May 2010: 7 pp. (in English) ["Odonata and Trichoptera are indicators are truly aquatic environments. If Insect larvae order Trichoptera, has been recognised as indicators of environmental pollution, or Odonata larvae are presenting now an interesting too in this area. This relates to the fact that the larvae of dragonflies to use their breath to the air dissolved in water. Branchiate of these insects are at the end of abdomen or within the rectum, are very fragile and are affected more by the chemistry of the water. we are to explore several types of order that have accumulated in Odonata shore of Shkodras' Lake and River Drin, near the Baçalleku bridge. Our material consists from several species belonging to Calopterygidae, Lestidae, Libellulidae, Gomphidae, and Coenagrionidae. For each type of data are: for the biology and ecology of species, grouping zoogeographic, a brief description of the type, place and time where it is met. Also provided data for several endangered species of dragonfly for extinction. In Shkodra lake water flow coming from the land with chemical waste phosphoric, with Insecticides and pesticides that during spraying plants and trees fall in land and irrigation water or rainfall in the lake end. Composition of current lake water charge carries a damaging chemical elements vital activity of the larvae of Odonata." (Authors)] Address: Striniqi, Arjana, Dept of Biology & Chemistry, "Luigj Gurakuqi" University, Shkoder, Albania

23472. Tsuji, N.; Muramatsu, N.; Nakatani, M.; Nakamura, I.; Satô, T. (2010): Insects of Okukussharo Onsen in Tsubetsu Town, Hokkaido. Sylvicola 28: 1-10. (in Japanese) [Nine odonate species are documented: *Sympetma paedisca*, *Coenagrion lanceolatum*, *C. hylas*, *Aeshna juncea*, *Anotogaster*

sieboldii, *Somatochlora japonica*, *S. graeseri aureola*, *S. viridiaenea*, *Sympetrum infuscatum*] Address: Tsuji, N., 085-0042 6-2 Wakakusacho, Kushiro City, Highness Wakakusa II, Room 102, Japan

2011

23473. Dow, R.A. (2011): Stephen Stone anak Singki and new records of *Linaeschna polli* Martin from Sarawak. Agrion 15(2): 48-49. (in English) [Verbatim: When people such as myself write articles for publications such as Agrion, we tend to concentrate on the Odonata, or the habitat in which we find them, or on ourselves and our scientific colleagues. Frequently we are assisted by people from the country in which we are working, and, at least in my case and in Sarawak, often these people become my friends. However they are typically treated at best as peripheral characters in accounts of our travels, which seems rather unfair to me. Their names may become immortalised in a minor way as "leg. so and so" in lists of specimens in taxonomic publications; I have often seen such names and found myself wondering who this person was. So here I will tell the tale of the odonatological exploits of Stephen Stone anak Singki, and leave the Odonata as peripheral characters. Stephen is employed as a field assistant by the Conservation Office of Grand Perfect (GP) Sendirian Berhad, a plantation company in Bintulu Division, Sarawak. He is an Iban, the largest native group in Sarawak, and was born on the 16th of June 1956 at Rumah Guna Sungai Besai, Selanjan, Sri Aman division. He served in the Malaysian army from 1976 until 1986, with postings in Sibul, Johor and Melakka. After that he worked as a scaffolder, then a security guard, before joining GP Conservation on 1 December 2005. He regards the last job as the best, which is immediately obvious on a visit to his house, where the walls hold many photographs of the people he has worked with while with GP Conservation. He is married to his second wife Mesah anak Wang; they have three children. We first met in 2006, on my first trip to the area now known as the Sarawak Planted Forest Project, when he accompanied me to Binyo Penyilam, a low pH swamp forest area (see Dow & Unggang 2010 for more information on Binyo). On that trip I don't think Stephen swung a net once, but he suffered for Odonatology: at Binyo one has to collect from boats much of the time, and because the channels are narrow and winding, the boats have to be short, making it dangerous for anyone sitting in them whilst someone is trying to swing a net – I hit Stephen hard in the head twice on the trip, and to make matters worse, I did not even realise that I had done it the first time! Luckily he is a tough guy, and thankfully he forgave me. I put a net in his hands for the first time in 2007, in the Tubau area of Bintulu division. I hope he will not mind me saying that his first attempts to catch dragonflies gave no hint of what was to come later. On that trip he suffered as well – something bit or stung him on one of his hands, which swelled up to the point where I had to insist we go back to Bintulu early so that he could get medical assistance; he did not want to go back. By 2009 Stephen had developed into a good catcher, taking particular delight in the capture of large dragonflies. That August Stephen, Ollince Tateh (a very able project officer with GP Conservation) and I made our first visit to an area known as "Camp C" in Kakus district in the south of Bintulu division. It was on a stream in this area that Stephen made his most remarkable catch. The stream runs through a buffer of disturbed kerangas forest; beyond the buffer, everything has been cleared for plantation, except for a water catchment area on a hill on one side. The streambed is mostly sandy, but in some sections it consists of sheets of rock. We were working on one of the rocky sections and I had got ahead

of Ollince and Stephen. As it was late in the day I decided to turn back. As I came into sight of my companions I saw that they were excited and that Stephen was holding a large dragonfly; even from a distance I could tell he had something that I had never seen before. It was a male of a striking patterned, mostly brown and black aeshnid and I immediately suspected the very poorly known *Linaeschna*, a genus known from only two specimens of one species, *L. polli* Martin, 1909, collected nearly a century apart (see von Ellenrieder 2002). More detailed examination confirmed my suspicions; in fact it appears to be *L. polli* although there are some differences in markings from the type specimen (which is in the collection of Naturalis). Stephen had caught it flying on the main stream. The next year, he caught another male a bit further up the same stream. I have yet to find this species at any other location, and attempts to find the larva either on the Camp C stream itself or in small tributaries and pools around the stream have failed; the female remains unknown. Stephen's sufferings for Odonatology have continued – in 2010 one of his feet swelled up alarmingly whilst we were at Kapur Camp, another location in Kakus district. This time he actually needed to have surgery when we returned to Bintulu! Perhaps it is some consolation to him that the next time we visited Kapur Camp (aka Kemp Kembai Kaki – Camp Swollen Foot) it was my turn, after a combined bee and wasp sting on the sole my foot swelled nastily, but luckily I did not need hospital treatment. Aside from doubling the number of specimens of *L. polli* known, other notable catches of Stephen's include: the first record of *Heliaeschna bartelsi* Lieftinck, 1940 from Sarawak; several *Tetracanthagyna plagiata* (Waterhouse, 1877), including the elusive and hard to catch male (I have never even seen a male in life); *Anax panybeus* Hagen, 1867; and *Dysphaea lugens* (Selys, 1873), a species that seems to be very scarce in Sarawak. Stephen might be retiring this year, but I hope not; apart from the dragonflies I would like to drink more of his *tuak* (rice wine) and lose more money to him at cards.] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

23474. Lambret, P. (coord.) (2011): Plan Régional d'Actions en faveur des Odonates de Provence-Alpes-Côte d'Azur (2011-2015). Amis des Marais du Vigueirat, Arles: 86 pp. (in French) [The following species are treated in detail: *Sympecma paedisca*, *Coenagrion mercuriale*, *C. caerulea*, *Gomphus graslinii*, *G. flavipes*, *Cordulegaster bidentata*, *Somatochlora meridionalis*, *S. alpestris*, *S. arctica*, *Oxygastra curtisii*, *Sympetrum depressiusculum*] Address: https://odonates.pnaopie.fr/wp-content/uploads/2011/12/PRAO.paca_csprn20111206.pdf

23475. Semenov, E.M. (2011): Zoobenthos of the middle reaches of the Yenisei River as a food source for the Siberian grayling (*Thymallus arcticus*. Pallas). Youth and Science: Proceedings of the VII All-Russian Scientific and Technical Conference of Students, Postgraduates and Young Scientists, dedicated to the 50th Anniversary of the First Manned Space Flight, Krasnoyarsk, April 19-25, 2011: [in 3 volumes] / Ministry of Education and Science of the Russian Federation, Siberian Federal University; [responsible for the issue O. A. Kraev]. - Krasnoyarsk: SFU. - Vol. 1. - Pp. 126-129. - ISBN 978-5-7638-2329-5: 126-129. (in Russian) [A total of 12 zoobenthos taxa was collected in July 2010. The list of taxa includes *Ischnura elegans*. Larvae of Diptera and Amphipoda accounted for 85% of the biomass.] Address: <http://elib.sfu-kras.ru/handle/2311/6047>

23476. Veling, K. (2011): Libellenreservaat Kuinderbos. Vlinders 3 2011: 22-23. (in Dutch) [The Vlinderstichting has

declared the Kuinderbos a dragonfly reserve. This was announced during the symposium on the occasion of the fifty years of management of the Kuinderbos by Staatsbosbeheer on 21 June.] Address: <https://edepot.wur.nl/340605>

23477. Yoshida, K. (2011): Fauna of the Odonata (Insecta) in Ichu area, Tsurugi Cho, Mima Gun, Tokushima Prefecture, Eastern Shikoku, Japan. Proceedings of Awagakkai 57: 71-72. (in Japanese) ["As part of the comprehensive academic survey of Ichu, Tsurugi Town, I was in charge of surveying dragonflies as a member of the insect group. This area is a mountainous region that occupies the upper reaches of the Sadamitsu River. The dragonfly survey was centered on the flowing water area including the Sadamitsu River and its tributaries, and on Meoto Pond, which is thought to be the only still water area. From this survey and literature, we were able to record 29 species of dragonflies from 10 families that inhabit the area. ... Conclusion: From this survey and literature records, 29 species of dragonflies from 10 families were identified. As expected, the number of species and individuals of dragonflies in flowing waters was low. Many rivers have rapids, so the riverbed and vegetation are very variable, making it difficult for dragonflies to live. In the only still water area, Meotoike Pond, we were able to observe many dragonflies, including Nekitombo, Takanetombo, and Squirrel Akane. However, many red fish that appear to be goldfish were released into the pond, and we also saw anglers. Artificial migration of organisms has a negative impact on the ecosystem. In particular, the release of black bass and Nishikigoi carp can cause fatal damage to the environment, so caution is required." (Author/google translate) The following species are documented: *Calopteryx cornelia*, *Mnais pruinosa*, *Rhipidolestes hiraoui*, *Indolestes peregrinus*, *Aciagrion migratum*, *Epiophlebia superstes*, *Planaeschna milnei*, *Gynacantha japonica*, *Aeshna juncea*, *Anax parthenope julius*, *A. nigrofasciatus nigrofasciatus*, *Anisogomphus maacki*, *Davidius nanus*, *D. fujiama*, *Lanthus fujiacus*, *Stylogomphus suzukii*, *Sinogomphus flavolimbatus*, *Sieboldius albardae*, *Anotogaster sieboldii*, *Macromia amphigena amphigena*, *Somatochlora uchidai*, *Lyriothemis pachygastra*, *Orthetrum albistylum speciosum*, *O. melania*, *Crocothemis servilia mariannae*, *Sympetrum frequens*, *S. risi risi*, *S. speciosum speciosum*, *Pantala flavescens*] Address: Yoshida, K., 49-1 Hisamitsu Omata, Ichiba-cho, Awa City, Japan

2012

23478. Bota-Sierra, C.A. (2012): Rediscovery of *Proneura prolongata* (Zygoptera: Protoneuridae) and other new Odonata records from Colombian Amazon. *Agrion* 16(2): 34-41. (in English, with Spanish summary) ["As with most taxa present in Colombia, the study of dragonflies is still in its exploratory phase. This paper reports the results of a trip to the Amazon region in order to collect dragonflies. Seven new records for the country were found, including the rediscovery of *P. prolongata* and an undescribed species in the genus *Calvertagrion* St. Quentin." (Author) *Acanthagrion lancea*, *Aeolagrion inca*, *Mesoleptobasis incus*, *Neoneura rufithorax*, *Perithemis bella*] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología (INECOL A.C.), Xalapa, Mexico. Email: cornelio.bota@posgrado.ecologia.edu.mx

23479. Brummer, R. (2012): Gestreifte- und „Südliche Quelljungfer“. Schutzgemeinschaft Ammersee - Jahresbericht 2011: without pagination- (in German) [Bugojno, Bosnia, *Cordulegaster heros*; Ammer near Rottenbuch, Bayern, Germany: *Thecagaster bidentata*] Address: <https://wp.schutzgemeinschaft-ammersee.de/wp-content/uploads/2017/03/Quelljungfer.pdf>

23480. Fliedner, H. (2012): Wie die Libelle zu ihrem Namen kam. *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 15(1): 5-9. (in German) ["In summary, the name dragonfly for the Odonates is based on the similarity that a 16th century scientist saw between a zygoptera larva and a now obsolete tool for precisely determining the horizontal. The Latin name of this tool had already been used in the 15th century to translate the Greek name for the hammerhead shark. Derivatives of this name are still used in several European languages to name the most important part of the successor tool, which today serves the same purpose." (Author/google translate)] Address: Fliedner, H., Louis-Seegelken Str. 106, 28717 Bremen, Germany. Email: H.Fliedner@t-online.de

23481. Gilgen, R.; Wildermuth, H. (2012): Natur vernetzt – Rüti im Landschaftswandel (1). *Rüti* 66: 30-31. (in German) [Brief description of local landscape, flora and fauna amendment in Rüti, Switzerland. The note includes a photograph of *Calotperyx virgo*.] Address: http://www.ruetnerduerntner.ch/PDF/Ausgabe_66.pdf

23482. Gouagna, L.C.; Rakotondranary, M.; Boyer, S.; Lempérière, G.; Dehecq, J.-S.; Fontenille, D. (2012): Abiotic and biotic factors associated with the presence of *Anopheles arabiensis* immatures and their abundance in naturally occurring and manmade aquatic habitats. *Parasites & Vectors* 2012, 5:96: 12 pp. (in English) [Reunion; "Background: *A. arabiensis* (Diptera: Culicidae) is a potential malaria vector commonly present at low altitudes in remote areas in Reunion Island. Little attention has been paid to the environmental conditions driving larval development and abundance patterns in potential habitats. Two field surveys were designed to determine whether factors that discriminate between aquatic habitats with and without *An. arabiensis* larvae also drive larval abundance, comparatively in man-made and naturally occurring habitats. Methods: In an initial preliminary survey, a representative sample of aquatic habitats that would be amenable to an intensive long-term study were selected and divided into positive and negative sites based on the presence or absence of *An. arabiensis* larvae. Subsequently, a second survey was prompted to gain a better understanding of biotic and abiotic drivers of larval abundance, comparatively in man-made and naturally occurring habitats in the two studied locations. In both surveys, weekly sampling was performed to record mosquito species composition and larval density within individual habitats, as well as in situ biological characteristics and physico-chemical properties. Results: Whilst virtually any stagnant water body could be a potential breeding ground for *An. arabiensis*, habitats occupied by their immatures had different structural and biological characteristics when compared to those where larvae were absent. Larval occurrence seemed to be influenced by flow velocity, macrofauna diversity and predation pressure. Interestingly, the relative abundance of larvae in man-made habitats (average: 0.55 larvae per dip, 95%CI [0.3–0.7]) was significantly lower than that recorded in naturally occurring ones (0.74, 95%CI [0.5–0.8]). Such differences may be accounted for in part by varying pressures that could be linked to a specific habitat. Conclusions: If the larval ecology of *An. arabiensis* is in general very complex and factors affecting breeding site productivity sometimes not easy to highlight, our results, however, highlight lower populations of *An. arabiensis* immatures compared to those reported in comparable studies conducted in the African continent. Overall, this low larval abundance, resulting from both abiotic and biotic factors, suggests that vector control measures targeting larval habitats are likely to be successful in Reunion, but these could

be better implemented by taking environmental variability into account. ... On the other hand, the range of habitats where *An. arabiensis* larvae were absent were characterised by the highest frequency of sighting of predator fauna such as *Tilapia* fish (*Oreochromis* sp.), dragonfly larvae including *Anax imperator mauricianus*, *Ischnura senegalensis*, *Pantala flavescens*, *Orthetrum* sp. and *Diplacodes lefebvrii*, and tadpoles. In aquatic habitats positive for mosquito larvae the numbers of other organisms present (for example, fish and aquatic macroinvertebrates) were generally either very low or absent, thereby providing safe conditions for mosquito larvae to thrive." (Authors)] Address: Gouagna, L.C., Institut de Recherche pour le Développement (IRD), UM1-CNRS 5290-IRD 224: Maladies Infectieuses et Vecteurs – Ecologie- Génétique, Evolution et Contrôle (MIVEGEC), Montpellier, France. Email: louis-clement.gouagna@ird.fr

23483. Groenendijk, D.; van der Ploeg, E.; Brochard, C.; Termaat, T. (2012): Larvenhuidjes: Visitekaartjes van uitgesloten libellen. *Vlinders* 4 2012: 16-19. (in Dutch) ["Although most interest in dragonflies in the Netherlands has always been in the flying imagoes, dragonflies spend by far the largest part of their life cycle under water as larvae. When they leave the water and moult for the last time, a calling card remains: the larval skin. These larval skins tell their own story. In this contribution a little more about the backgrounds of these larval skins and a new book that has been published about this." (Authors/google translate)] Address: http://www.vlindernet.nl/doc/dvs/pdf/201211_Larvenhuidjes_visitekaartjes_van_uitgesloten_libellen.pdf; 09042013

23484. Huber, S.; Braukmann, U.; Neubeck, C. (2012): Salzverträglichkeit von Libellen und Amphibien und ihre Bedeutung für die Revitalisierung der salzbelasteten unteren Werra-Aue. *Jahrbuch Naturschutz in Hessen* 14: 74-124. (in German) ["Dragonflies and amphibians are considered exemplary of the fauna that is to be protected as an object of the conservation and development objectives of the FFH Directive and in the implementation of the Water Framework Directive (WFD), since particularly species-rich populations of these faunal groups are primarily found in near-natural floodplains. Due to the decline in salt pollution in the lower Werra in the 1990s as a result of potash mining, the prospects of success for measures to improve the structure of the Werra and its floodplain have increased and can make an important contribution to ecological improvement. Extensive literature evaluations on the salt tolerance of dragonflies and amphibians as well as the current chemical composition of the waters in the Werra floodplain allow the assessment that the majority of native dragonfly and amphibian species could reproduce in the lower Werra floodplain if suitable habitats were available." (Authors/Google translate)] Address: Braukmann, U., Universität Kassel, FB Architektur, Stadt-, Landschaftsplanung; FG Gewässerökologie / Gewässerentwicklung, Nordbahnhofstr. 1a, 37213 Witzenhausen, Germany. Email: u.braukmann@uni-kassel.de

23485. Lojkova S. (2012): Seventy years of odonatological research of Bratislava. *Folia faunistica Slovaca* 17(3): 231-245. (in Slovakian, with English summary) ["Presented contribution is the first general report about dragonflies of Bratislava and it covers 70 years (1938 – 2008) of odonatological research at localities of Bratislava. In the area of Bratislava there were recorded 51 species of Odonata from year 1938 to year 2008. From 51 species, mentioned above, only 43 species can be found in the covered area up to now. Seven species are mentioned in data by the year 1990 and these species were not recorded again in covered area.

There was totally evaluated a fauna of 61 localities. The evaluation was done by summarizing of results derived from literary records, museum collections and collecting samples in a field. All species were processed according to their presence in covered area, number of records for individual localities, zoogeographical distribution of the species and classification based on threat category. Based on revision of museum collections there is one species which was found in covered area for the first time. It is *Onychogomphus forcipatus* (Linnaeus, 1758). The record in this contribution is the first record of presence of this species in covered area and the presence of this species should be verified." (Author/Google translate)] Address: Lojková, Sona, Katedra zoológie, Prírodovedecká fakulta UK v Bratislave, Mlynská dolina B-1, 84215 Bratislava. Slovakia. E-mail: lojkova@fns.uniba.sk

23486. Manger, R. (2012): Onderzoek variabele en azuurwaterjuffer Vrijwilligers gezocht. Vlinders 2 2012: 22-23. (in Dutch) ["2012, volunteers are conducting research in the Netherlands and Flanders into two common damselfly species, namely the variable damselfly and the azure damselfly. People are being sought to participate in this project. The aim of the project is to gain a good picture of the habitat choice of the variable damselfly (*Coenagrion pulchellum*) and the azure damselfly (*Coenagrion puella*). The following research questions were asked, among others: • When does the variable damselfly occur together with the azure damselfly? • Is there a connection between the presence of both species and water quality/nutrient richness? • Is there a geographical variation in external forms and what is the relative abundance of forms within the species? • To what extent does the relative occurrence of the female colour forms of both species relate to the co-occurrence and densities of both species? The research is voluntary (non-commercial) for both researchers and participants and takes place during their free time. Participants are kept informed of developments via the internet. It will be a low-threshold study and will not take up too much time for the participants. Eventually, publication will follow in one or more journals." (Author/google translate)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

23487. Theischinger, G.; Jacobs, S.; Mawer, D. (2012): Murray Darling Icon *Apocordulia macrops* closes the gaps (Anisoptera: Austrocorduliidae). *Agrion* 16(2): 42-46. (in English) ["The rare and enigmatic Australian dragonfly species *A. macrops*, the nighthawk, is introduced with the inclusion of hitherto unpublished photos of adults and exuvia. The relatively poor collecting record and the subsequent rise to iconic status for *Apocordulia* in the Murray-Darling Basin are described. On the occasion of the latest record in the Macquarie River the distributional information available in publications and data bases is revised and discussed. The updated information is presented by locality-maps and a complete list of records. Habitat photos are also provided. A photo of an exuvia of a *Synthemis* species is presented for comparative purposes." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

23488. van der Poorten, N. (2012): Correction of the identification of a *Libellago* specimen from Sri Lanka. *Agrion* 16(2): 52- (in English) ["In Hämäläinen et al. (2009), a specimen at the Sri Lanka National Museum that had been originally identified as *Libellago indica* was re-identified (by myself) as *Libellago adami*. This reidentification has proven to be incorrect. My colleague Karen Conniff and I had the opportunity to re-examine the specimen in June 2011 and it is clear

that the specimen is actually that of a male *Libellago greeni*. The antehumeral stripe is very short, and though S10 and the anal appendages are missing, the markings on S1-S9 agree with *L. greeni*, not with *L. adami*. However, this error does not change the salient points of the article. Reference: Hämäläinen, M., M. Bedjanic & N. van der Poorten, 2009. *Libellago indica* (Fraser, 1928) deleted from the list of Sri Lankan Odonata (Chlorocyphidae). *Echo* 6: 3-5 [published in *Agrion* 13(1)].] Address: van der Poorten, Nancy; nmgvdp@gmail.com

23489. Wakasugi, K. (2012): Fundamental research on the conservation and mitigation measures for stagnant water dragonflies in consolidated paddy fields. Institute for Rural Engineering Report 51: 36 pp. (in Japanese, with English summary) ["Paddy field land consolidation projects, which started in 1963 in Japan, have made significant contributions, such as promoting rural areas, solving postwar food shortages, and improving agricultural productivity. In the last several decades, however, there has been a decline in wildlife species adapted to the secondary natural areas inherent in rural landscapes. This decline has resulted from changes in farming methods and the use of large quantities of agricultural chemicals, mechanization of farm work using tractors and combine harvesters, and paddy field land consolidation projects undertaken to improve agricultural output and productivity. In response to this decline, a 2001 amendment of the Land Improvement Act provided that the impact on the environment should be taken into consideration when undertaking these projects. From the viewpoint of maintaining biodiversity, however, the measures undertaken so far have been inadequate. In this thesis, I describe achievements made in mitigation systems in some public work projects in Japan and abroad and examine their applicability to paddy field land consolidation projects. Mitigation, which was first emphasized in American environmental assessments conducted in 1969, refers to acts that counteract the negative impact on ecosystems caused by development projects, including (1) avoidance, (2) minimization, and (3) compensation, listed in the order of priority. The aim of this basic research is to investigate how various mitigation measures during paddy field land consolidation would affect dragonflies, which serve as representatives of wildlife in rural areas. For example, acts falling under "avoidance" would involve conserving particularly important habitats (hot spots) when consolidating land. "Minimization" would involve carrying out consolidation in stages and maintaining habitat networks while taking into account metapopulations. As for "compensation" acts, I propose using fallow fields and other sites to establish biotopes, build thriving habitat networks, and implement ecological farming practices. In order to balance the conservation of dragonflies that inhabit stagnant water with farming, I propose an improved version of inundating paddy fields in winter based on chemical-free, zero-tillage cultivation, which combines existing farming techniques with knowledge of the life cycle of dragonflies, the drought resistance of larvae, and other important species traits. In this research, I studied the impact of paddy field land consolidation projects on the habitat quality of dragonflies and proposed countermeasures based on field measurements of drought resistance of larvae and the potential traveling range of adult dragonflies. These basic data can be used to devise sound mitigation practices and improve the quality of conservation measures for dragonflies." (Author)] Address: https://www.naro.go.jp/publicity_report/publication/archive/files/51-1.pdf

23490. Wilson, K.D.P. (2012): *Agrion* 16(2). *Agrion* 16(2): 32-57. (in English) [Editor's notes: 32; Message from the President: 33; Book review - The Dragonflies of Hong Kong:

53; Membership Application Form 2012: 56; Membership Rates for 2013: 57; Sustaining Membership: 57] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

2013

23491. Bailleux, G.; Soulet, D. (2013): Déclinaison régionale du Plan National d'Actions en faveur des Odonates: Aquitaine. Conservatoire d'Espaces Naturels d'Aquitaine/Direction Régionale de l'Environnement, de l'Aménagement et du Logement d'Aquitaine: 167 pp + Annexes - (in French) [The following species are treated in detail: *Coenagrion mercuriale*, *Gomphus flavipes*, *G. graslinii*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Macromia splendens*, *Oxygastra curtisii*, *Aeshna isoceles*, *Cordulegaster bidentata*, *Sympetrum depressiusculum*, and *S. flaveolum*.] Address: https://www.nouvelle-aquitaine.developpement-durable.gouv.fr/IMG/pdf/p-rao_aquitaine_2013_2017.pdf

23492. Cannings, R. (2013): Obituary for Gordon Pritchard (1929-2012). *Argia* 25(2): 25-29. (in English) [Obituary] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

23493. Hutchinson, R. (2013): Five observations of adult *Boyeria* (Anisoptera: Aeshnidae) roosting during the night mostly on outdoor parts of buildings, near streams. *Argia* 25(1): 17. (in English) ["How surprised could one be to discover adult aeshnids, namely *Boyeria*, roosting or spending the night on outdoor parts of buildings situated in the country, near streams? The following are five instances of such observations over the years from summer nature study camps where I have tried to spread the love of insects, especially dragonflies. On 8 August 2000, at a summer camp near Rawdon, north of Montreal, a female *Boyeria vinosa* was completely immobile, suspended on the ceiling clinging by the front legs, just inside a very long wooden building, in the hall leading to the outside door. It was around 10:30 PM. Upon delicate manipulation, it was evident that the dragonfly was not dead, but in a kind of comatose state (Hutchinson, 2001). A couple of years later at Chertsey, also in the Laurentians, north of Montreal, another female *B. vinosa* was observed under similar conditions, but this time dangling from the ceiling of an outdoor washroom; some modest movement showed us that the dragonfly was alive and well, but just roosting around 11 PM (Hutchinson, 2001). As a science camp animator for many years at Port-au-Saumon in the Saguenay River area, I witnessed three more cases of roosting *Boyeria*, this time all *B. grafiana*. On the last day of July 2009, a male *B. grafiana* was suspended on the wooden arm of a balcony, just under two light bulbs that were left shining till mid-night, so that the young entomologists of the nature camp, Ere de l'estuaire, could start building a Collection from insects coming to light, starting around 9 PM. Another *B. grafiana*, this time a female, was found under exactly the same conditions under the light bulbs, on 1 August 2009. Finally, on 13 July 2012, a female *B. grafiana* was observed suspended on the ceiling of a building where campers take their showers before retiring for their night sleep. A light bulb remained shining all night at this spot." (Author)] Address: deceased

23494. Janssens, L. (2013): Stress in damselflies: effects of single and multiple stressors on physiology, behaviour and life history in the larval stage and after metamorphosis. Doctoral theses, Laboratory of Aquatic Ecology, Evolution and Conservation, Leuven: (in English) ["In my thesis I studied

the effects of two natural stressors (predation risk and bacterial exposure) and an anthropogenic stressor, pesticide exposure, in damselflies. I first looked at the effects of the single stressors on life history, behaviour and physiology during the larval stage. Afterwards, I investigated the combined impact of the two biotic stressors and of the pesticide and the biotic stressors during the larval stage and the combined effect of larval exposure to pesticides and two abiotic stressors (suboptimal temperature and food level) after metamorphosis in the adult stage. Single stressor effects Despite the three stressors having a different 'mode-of-action' there were striking similarities in the likely mechanism through which they affected the damselfly larvae, more specifically by altering their energy budget, resulting in a different investment in body functions compared to the situation without stressors. In order to protect themselves and prevent damage, larvae upregulated their defence mechanisms (Hsp70, GST, PO). Despite being beneficial to cope with the stressors, the higher investment in these physiological defence mechanisms had two important consequences. Firstly, the energy used for defence could not be used for other processes, resulting in a decreased growth rate and energy reserves and the occurrence of oxidative stress and damage. Secondly, in order to meet the higher energetic demands, organisms needed to forage more actively, thereby increasing their visibility for predators, hence the chances of being eaten. Multiple stressor effects. The different stressors often interacted with each other in a non-additive way. This was true for each combination studied: (i) the combination of the two biotic stressors, (ii) the combined impact of the pesticide and the biotic stressors, and (iii) the combination of the pesticide and suboptimal environmental conditions. I could identify interactions between the stressors at different levels: survival, other life history traits, behaviour and physiology. Importantly, interactions at one level often did not necessarily translate in the same type of interaction at a different level. In general, most of the non-additive interactions occurred at the physiological level, where non-additive interactions were present for parameters linked with energy reserves, defence mechanisms and damage. For defence, the interactions were often antagonistic whereby animals increased defence when confronted with one stressor, but could not maintain this high defence levels when a second stressor was present, most likely due to energetic constraints. Moreover, animals exposed to multiple stressors invested the major part of their energy in defence and diverted less energy to other nonemergency body functions, such as the antioxidant response, resulting in a synergistic increase in oxidative damage. Those "hidden" interactions can have severe fitness consequences even though they are not directly visible at the life history level. Animals did not have to be exposed to multiple stressors simultaneously in order to suffer from interactive effects. Larval pesticide stress and adult heat stress interacted in a non-additive way for several physiological variables (fat content, PO activity and Hsp70 levels). Moreover, simultaneous exposure to multiple stressors in the larval stage had the potential to bridge metamorphosis and carry-over to the adult stage. I could identify interactions between larval pesticide exposure and suboptimal food conditions on adult mass at emergence, fat content, PO activity and Hsp70 levels. These results indicate that interactive effects between multiple stressors seem to be omnipresent and that investigating the effects of a single stressor in ideal environmental conditions is not sufficient to get insight in the effects of the stressor in more natural conditions where typically combinations of stressors occur. Although it is hard to identify general patterns, energetic trade-offs seem to have played a role." (Author)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology, Evolution &

23495. Knillmann, S. (2013): The influence of competition on effect and recovery from pesticides in freshwater zooplankton communities. PhD Dissertation 02/2013 (ISSN 1860-0387): X + 118 pp. (in English, with German summary) ["Intra- and interspecific competition play an important role in natural communities. In addition, toxicants are reported to alter biotic interactions. However, little is known about the influence of competition on toxicant effects within the aquatic community context. The present PhD thesis contributes to the understanding of how competition alters effect and recovery from pesticides of sensitive taxa under natural conditions. Two microcosm experiments with zooplankton communities were conducted in 2008 and 2009 over a period of 4 and 5 months, respectively. In both experiments, communities were exposed to a pulse of the pyrethroid insecticide esfenvalerate (0.03, 0.3 and 3 µg/L). In the first experiment, the influence of competition on pesticide effects was investigated under an increased range of biotic interactions. For this purpose abiotic and biotic conditions were varied by shading and regular harvesting of the communities. In the second experiment, the combined effect of warming periods and exposure to esfenvalerate on the zooplankton communities was analysed. Following the general introduction in Chapter 1, the results on the interaction of competition and pesticide exposure are described within the first experiment (Chapters 2 and 3) as well as the second experiment (Chapters 3 and 4), focused on the sensitive genus *Daphnia*. The results of Chapter 2 show that the pesticide-related survival of *Daphnia* spp. strongly depended on their densities before contamination, independent of the treatments of shading and harvesting. High densities before contamination were assumed to increase intraspecific competition for food and space and thus to affect the fitness of the organisms at the individual level. Consequently, high intraspecific competition enhanced the pesticide sensitivity of *Daphnia* spp. by a factor of up to 100 within the community context. The recovery of *Daphnia* spp. from the effect of esfenvalerate is described in Chapter 3 (Experiment 1). The time needed for the recovery of populations was up to eight times longer than predicted by models using the population growth rates under optimal single species conditions. Interspecific competition with closely related but less sensitive *Daphniidae* was detected as the underlying process. Following a pesticide-related reduction of sensitive *Daphnia* spp., less sensitive *Daphniidae* benefitted from the resources released and increased in abundance. This indirect increase in less sensitive taxa in turn delayed the recovery of *Daphnia* spp. from esfenvalerate, especially at concentrations leading to partial mortality of the populations (0.03 and 0.3 µg/L). The findings described in Chapters 2 and 3 were enabled by the exceptionally high number of replicates compared to similar experimental outdoor systems ($n = 24$ per concentration level). Chapter 4 is based on the second experiment, showing that the presence of short warming periods alone altered the community structure and thus the long-term biotic interactions. As a result, interspecific competition was prolonged under warming conditions, causing a delay in recovery of *Daphnia* spp. from 3 µg/L esfenvalerate that exceeded the recovery under ambient conditions by a factor of two. This study highlights that changing environmental conditions may further increase the influence of competition on the recovery of populations from toxicant stress. In conclusion, the thesis identifies and quantifies the role of intraspecific competition in increasing pesticide sensitivity, and interspecific competition in delaying the recovery of populations from pesticides in the community context. The

outcomes can be used to reduce uncertainty and improve the predictive quality of the current risk assessment framework." (Author) Taxa - including Odonata - are treated at family level.] Address: <https://publications.rwth-aachen.de/record/229676/files/4762.pdf>

23496. Kybicová, T. (2013): Vážky (Odonata) rybníku u Letín (Západní Čechy) [Dragonflies of ponds near Letiny (West Bohemia)]. Plzeň: Západočeská univerzita v Plzni, Fakulta pedagogická: 70 pp + Suppl.- (in Czech, with English summary) ["The main goals of this research are firstly to find out species composition of dragonflies at monitored localities and secondly to find out population density during the vegetation season. In next phase I supposed to find out seasonal phenology of monitored localities. Three localities were selected for my research. All monitored localities are in area of village named Letiny. First locality is a large pond used for sport fishing, which has approximately 7 hectares area. Second locality is smaller abandoned pond in the woods which has approximately half a hectare area. And third locality is composed of few small decorative garden ponds which has approximately one quarter of hectare area. This research was conducted in the vegetation season od 2012 from 4th May to 30th September. 26 species of dragonflies were found during the research? 12 species of suborder Zygoptera and 14 species of suborder Anisoptera. This results represents approximately 35 % of all species living in the Czech Republic and 60 % of the species that could theoretically live in these types of habitats. Common species of dragonflies were identified at monitored locations, among them several rare species such as *Gomphus vulgatissimus*, *Anax parthenope*, *Sympetrum striolatum*, *Lestes barbarus* and *L. sponsa*." (Author)] Address: https://dspace5.zcu.cz/bitstream/11025/9145/1/bc_prace.pdf

23497. Manolis, T. (2013): Spiders residing in Odonate exuviae: Another update and request for more information. *Argia* 25(1): 24. (in English) ["Back in 2008, I reported on the use of dragonfly exuviae for roosting and nesting by a jumping spider, *Sassacus vitis* (*Argia* 20[3]:19). Since then I have collected over 200 dragonfly exuviae, primarily *Libellula luctuosa*, *Tramea lacerata* and *Anax junius* at a site along the American River in Sacramento, California, and have continued to find frequent use of the exuviae by this jumping spider. Occasionally I have found other arthropods in exuviae, including one nest each of two other jumping spider species, *Peckhamia* sp. and *Sitticus palustris*, but *Sassacus vitis* is by far the most frequently observed occupant. I made a request of ARGIA readers who collect exuviae to report their observations of spiders, especially jumping spiders, and have received a modest but gratifying response so far. As I reported in ARGIA in 2008, Steve Krotzer gave me a male *Sassacus vitis* he found in an exuvia of *Macromia magnifica* in north-eastern Oregon. Since then I have received reports of *S. vitis* in exuviae from four other sites in California and Oregon, suggesting such occupancy is a fairly widespread phenomenon. Gary Suttle found some of these spiders, including a nest sac, in *P. lydia* exuviae at a mountain pond in San Diego County, California in 2011; Jim Johnson found single spiders in exuviae from two sites, one in Josephine County and one in Malheur County, Oregon, in 2012; and Kathy Biggs found an *S. vitis* in a *P. lydia* exuvia at a pond in Siskiyou County, California, in 2012. Jim Johnson also sent me a couple of individuals of *Sitticuspalustris* he found in exuviae in Wasco and Klamath counties, Oregon, in 2011 and a couple of individuals of what I have tentatively identified as a species in the jumping spider genus *Pelegrina* from exuviae he collected in Tennessee in 2012." (Author)] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

23498. Paulson, D.; Smallshire, D. (2013): Perch persistence in a megapodagrionid damselfly. *Argia* 25(2): 11. (in English) ["On 1-IX-2012, one of the participants on a dragonfly nature tour discovered a male *Heteragrion mitratum* at-terminatum Donnelly, 1992, at the Canopy Lodge (elevation 590 m) at El Valle de Antón, Code, Panama. The damselfly was perched on a rock in a river that runs through the grounds of the lodge. The river was about 5 m in width, with a moderate gradient and many exposed rocks, creating a long, tumultuous riffle. The rock used by the damselfly was about 30 cm in diameter, close to one bank, barely protruding above the water and sheltered above by overhanging shrubby Vegetation. The *Heteragrion* was first seen at midday perched in the sun on the downstream edge of the rock, only a few centimeters above the water. It was photographed by numerous people on the tour, remaining on the rock well into the afternoon. Later that afternoon a light rain began, and we were surprised to see the *Heteragrion* persist on the rock during it. Dinner called, and by the next morning the river was in flood, all but the biggest rocks covered by a torrent. The flood waters subsided that day, and the male was back on the same rock when it became exposed. It was seen in exactly the same position again on 2 and 3 September, but on the afternoon of 3 September, a heavy rain fall that flooded the river again through 4 and 5 September. The rock became exposed again on 6 September, and the male was back on it, also on 7 and 8 September, when we departed. It was reported seen throughout the day, easily visible from a bridge over the river. Thus this single male, surely the same one, remained (at least much of the time) in the same position on the same rock for at least eight days, and, lacking studies on marked individuals, this may be the only such record of what might be megapodagrionid territoriality. A single female was seen nearby on a narrow, quiet tributary of the river on 1 September. Other males were seen on another river in the area, possibly the Rio Indio, on 6 September. Their perch sites were on rocks or Vegetation, very close to or over the river, suggesting that the Canopy Lodge individual was typical." (Authors)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. Email: dennispaulson@comcast.net

23499. Vliegthart, A. (2013): Nieuwe natuur voor vlin-
ders en libellen door zand- en grindwinning. *Vlinders* 1
2013: 26-27. (in Dutch) ["In the Netherlands, sand and gravel are extracted in many places. Nowadays, society expects added value from these types of projects. Opportunities for this are offered by projects such as river widening, living on the water and nature development. The quality of the new nature is often not yet well known. Research into this is important because it provides more insight into the (positive) impact of sand and gravel extraction. ... A total of 59 species of butterflies, dragonflies and grasshoppers were found, which were linked to the development and quality of the new nature. The two areas studied differ greatly from each other. At De Omsteg, relatively many indicator species were found of pioneer situations and well-developed grasslands and shrubs. These can occur here because phased management is applied. Fewer of these indicator species were found at Meers. This area has already developed further and has an important value for other species. The location on the Maas ensures a lot of dynamics, which makes it an exciting area to explore." (Author/google translate)] Address: http://www.vlindernet.nl/doc/dvs/pdf/201302_Nieuwe_natuur_voor_vlinders_en_libellen_door_zand-en_grindwinning.pdf; 09042013

23500. Whelan, A. (2013): Finding opportunities for pre-compliance species conservation in North Carolina. Prepared

for: The Environmental Defense Fund, Raleigh, NC. Prepared by: Andrew Whelan, Master of Public Policy Candidate, The Sanford School of Public Policy, Master of Environmental Management Candidate, The Nicholas School of the Environment, Duke University: VIII + 46 pp. (in English) ["Pre-compliance conservation involves landowners working cooperatively with conservation managers to conserve imperiled yet unprotected species. This strategy has the potential to conserve many species by bypassing a long and contentious listing process under the federal Endangered Species Act. The Environmental Defense Fund (EDF) wants to pursue pre-compliance measures in North Carolina. Unfortunately, species require different mitigation strategies on the basis of the stressors they face and their unique suites of life history traits. EDF is unclear which strategies could potentially conserve the greatest number of species. This masters project identifies pre-compliance programs with the potential to protect multiple species. I targeted wetland or aquatic species that are imperiled yet unprotected, and focused on four North Carolina regions that had large numbers of target populations. I conducted a spatial threat analysis to identify the main stressor within each region, and identified potential mitigation techniques for each of these stressors. I then analyzed policy tools that might be used to implement these mitigation techniques. Finally, I conducted a literature review on the life history characteristics of the target species to ensure that the chosen mitigation techniques and policy tools aligned with the dominant species traits in each region. In western North Carolina, landowners should retrofit dams to naturalize stream flow conditions. In southern North Carolina, landowners should establish riparian buffers to limit runoff, reduce stream temperatures, and restore woody debris to aquatic ecosystems. In eastern North Carolina, landowners should establish riparian buffers and improve their management practices and technology. Threats in central North Carolina are more varied, and a combination of mitigation strategies may be needed. Several tools are available to implement these strategies, including Farm Bill conservation programs and federal guidelines to incorporate ecosystem services. This project hopes to provide a tool to aid EDF in its ability to optimize preemptive species conservation." (Author) Target species of this study among others are *Gomphus septima* and *Ophiogomphus edmundi*.] Address: <https://duke-space.lib.duke.edu/server/api/core/bitstreams/04449964-26-a4-4db8-b5a0-8d50dbac207/content>

2014

23501. Bachinskiy, A.I. (2014): Znakhidki babok (Odonata) u Nacionalnomy prirodnomu parku "Dnistovskiy kanyon". [Records of dragonflies (Odonata) in the Regional Landscape Park "Dnistovskiy Canyon"]. In: I.V. Skilskiy (ed.) 2014. Regionalni aspekti floristichnik i faunistichnik doslidzhen. Materiali pervoy mizhdunarodnoy naukovopraktichnoy konferencii, 10-12 kvitnya 2014 r., m. Khotin [Regional aspects of floristic and faunistic researches. Materials of the First International Scientific and Practical Conference, 10-12 April 2014, Khotin]. Druk Art, Chernivtsi: 107-110. (in Ukrainian) [Verbatim/google translate: The most numerous among the registered species of dragonflies is *Platynemis pennipes*. It is found in many biotopes - from wet river areas to fairly dry meadows. Such species as *Calopteryx splendens* and *Sympetrum sanguineum* are sporadically observed. There are species that occur in isolated specimens: *Leucorrhinia caudalis*, *Aeshna viridis*, *Orthetrum cancellatum*. In 2013, the beginning of flight of dragonfly adults was observed in the third decade of May, in particular *P. pennipes*. The maximum number of dragonflies in the imaginal stage occurs in July—

August. It was then that it was possible to register the largest species and quantitative composition of the odonatofauna of the Dniester Canyon NPP. Taking into account the rather favorable climatic conditions of 2013 (high autumn temperatures), the summer of the dragonfly imago was fixed until the first decade of October [3]. The length of the flight time is probably related to the low number of most species and the impossibility of accurately recording the dates of the start and end of the flight because of this. This especially applies to rare species [2]. Water ecosystems of the Dniester Canyon NPP are directly adjacent to anthropogenic landscapes. Here, like nowhere else, you can observe the fauna of dragonflies under conditions of anthropogenic influence. Therefore, together with the study of the species and quantitative composition of the odonotofauna, it is relevant to study the impact of anthropization on this group of insects. The specific structure of the NPP "Dniester Canyon" (the boundary of the park runs along the Dniester fairway and the cluster type of the territory) does not allow to carry out scientific research and environmental protection activities as efficiently as possible. A rational solution to such a situation can be the creation of an association of adjacent national parks and nature reserves for the coordination of research and environmental protection activities [1]. The presented information reflects the results of the initial stage of studying the odontofauna of the Dniester Canyon NPP and does not pretend to be complete.] Address: Bachynskyi, A.I., Dniester Canyon National Nature Park, Ukraine: Email: Andrij03554@i.ua

23502. Blüml, V.; Melter, J.; Schweiger, M. (2014): Evaluation des abgeschlossenen Naturschutzgroßprojekts „Ochsenmoor“ (Landkreis Diepholz, Niedersachsen). *Natur und Landschaft* 89(1): 7-16. (in German, with English summary) [The Ochsenmoor large-scale conservation project, which is mainly financed by the federal government of Germany, was undertaken in the meadow landscape south of Lake Dümmer in Lower Saxony between 1987 and 1994. This project was evaluated in 2011/12. The project's principal goals were to conserve and re-establish a fen meadow with wet grasslands, especially as an important breeding and resting site for birds. Evaluation involved checks of measures, notably land purchase, copse clearing, re-wetting and protection by directive, and checks of the ecological effects of the project, particularly on flora and vegetation, breeding and resting birds, grasshoppers, dragonflies, groundwater and surface water levels, as well as socio-economic (agriculture) and climate protection issues. Economic assessments were also carried out. The evaluation delivers a very good result: Nearly all measures were carried out, with later support from an EU-LIFE project. The investigated organism groups show benefits caused by the project. Farmers, mostly working conventionally, manage the grasslands at almost no external cost. ... In 2011, dragonflies were recorded in six small bodies of water and five ditches that had already been examined in 1999. 25 dragonfly species were identified, 21 of which were native. The species composition has hardly changed compared to previous studies, but the rewetting measures have had a largely positive effect on the egg-laying substrates and larval habitats (continuous damming of ditches with good development of reeds and underwater plants), which is also reflected in the high proportion of recorded native species." (Authors)] Address: Blüml, V., BMS-Umweltplanung, Freiheitsweg 38 A, 49086 Osnabrück, Germany. E-Mail: v.bluemi@bms-umweltplanung.de

23503. Clarke, S. (2014): From Shoe-crops to Mosquito hawks: Labrador English in the online dialect atlas of Newfoundland and Labrador. *Regional Language Studies...*

Newfoundland 25: 33-44. (in Labrador; English; Dialect Atlas of Newfoundland and Labrador) ["Newfoundland English is without doubt the best-described of any variety of Canadian English. Yet though this observation may be true for the island portion of the province, research into the English spoken in Labrador has lagged considerably. Fortunately, this situation is changing, as for example in the recent and ongoing work of Memorial university Linguistics graduate students (e.g. Thorburn 2014; Edwards this volume). Likewise, the new online Dialect Atlas of Newfoundland and Labrador (www.dialectatlas.mun.ca), launched by the English Language Research Centre in October 2013, offers insights into the traditional spoken English of Labrador. In this paper, I present some Labrador findings from the online Atlas. ... At least two other items that the Atlas suggests to be unique (or almost unique) to Labrador can be attributed to differences in European settler origins. The first is "mosquito hawk" for what in Standard English is referred to as a dragonfly, and which in much of southwest-English-settled Newfoundland is called a horse stinger. Mosquito hawk was given as a variant only in North West River, which suggests it may have Scottish or northern British origins. The same term is documented in volume III of the Dictionary of American Regional English, or DARE (Cassidy and Hall 1996: 664), which associates it particularly with the southern USA." (Author)] Address: Clarke, Sandra, Professor Emerita in the Department of Linguistics, Memorial University Canada

23504. Demolder, H.; Peymen, J.; Anselin, A.; Adriaens, T.; De Beck, L.; Boone, N.; De Keersmaecker, L.; De Knijf, G.; Devos, K.; Everaert, J.; Jansen, I.; Laurijssens, G.; Louette, G.; Maes, D.; Meiresonne, L.; Neirynck, J.; Simoens, I.; Stevens, M.; Onkelinx, T.; Van Daele, T.; Van der Aa, B.; Van Landuyt, W.; Van Uytvanck, J.; Vermeersch, G.; Verreycken, H. (2014): *Natuurindicatoren 2014. Toestand van de natuur in Vlaanderen: cijfers voor het beleid. Mededeling van het Instituut voor Natuur- en Bosonderzoek, INBO.M.2014.521558: 53 pp.* (in Dutch) [See page 36 for the chapter 'Trend southern dragonflies in Flanders': Trend Zuid-Europese libellensoorten: "This indicator shows the trend in the number of locations of southern European dragonfly species and the number of observed species in Flanders since 1980. There are increasing clear indications that climate change is having an impact on biodiversity, both species and habitats in Flanders. This is reflected in both temporal change, e.g. phenology (flowering period, arrival of migratory birds, flight time, etc.) and spatial shifts. For example, several southern European dragonfly species are expanding northwards. Populations of these species were unknown in northwestern Europe until 1980. Here we analysed the evolution of the number of locations of nine Mediterranean dragonfly species in Flanders since 1980, and the number of observed Southern European dragonfly species. The figure shows that both the number of locations for each of these nine species and the number of Southern European species increased since 1980. A first increase dates from 1994, followed by a second strong increase from 2006, and this for both the number of locations and the number of species. Despite annual fluctuations, usually due to unfavourable weather conditions during the flight period, this trend is clear and significant. Never before have these Southern European dragonfly species been observed at so many locations in Flanders as in 2013. Species such as the *Crocothemis erythraea* and *Coenagrion scitulum* used to only occur in Flanders as vagrants, but have had different populations here for several years now (De Knijf et al. 2006, 2010)." (Authors/Google translate)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

23505. Ostrovskiy, A.M. (2014): Ekologo-faunisticheskoe izucheniye strekoz (Insecta, Odonata) jugo-vostochnoy Belarusi. [Ecological and faunistic study of dragonflies (Insecta, Odonata) in the south-western Belarus]. In: I.V. Skil'skiy (ed.) 2014. Regionalni aspekti floristichnikh i faunistichnikh doslidzhen. Materiali pervoy mizhdunarodnoy naukovopraktichnoy konferencii, 10-12 kvitnya 2014 r., m. Khotin [Regional aspects of floristic and faunistic researches. Materials of the First International Scientific and Practical Conference, 10-12 April 2014, Kotyn]. Druk Art, Chernivtsi: 200-204. (in Russian) ["Conclusion. Thus, the studies have shown that 28 species of dragonflies live in the ecosystems of southeastern Belarus, of which 15 species are dominant and are found everywhere. Three species of dragonflies are classified as rare and have a narrow distribution, occurring only in species-specific biotopes. The remaining species are common and relatively constant in the odonatofauna of the southeast of the republic. (Google translate)] Address: Ostrovskiy, A.M., Gomel State Medical University, Gomel, Republic of Belarus. Email: Arti301989@mail.ru

23506. Shukla, A.H.; Solanki, D.; Dodia, P.P.; Mehta, D. (2014): Diversity of dragonflies in the Victoria Park Reserved Forest, Bhavnagar, Gujarat, India. Periodic Research 3(2): 3 pp. ["...Victoria Park provides a good habitat for biodiversity of dragonflies. Dragonfly variety in Victoria Park Reserve Forest was observed, where recorded a total of 17 species of Odonates. Libellulidae family is consisting of maximum number of genera and species followed by Aeshnidae, Gomphidae. Total 15 species of dragonflies are recorded belonging to 12 genera and 3 families. This is the first surveyed systematic record of dragonfly diversity in Victoria Park Reserve Forest, Bhavnagar District, Gujarat (21°44'48"N 72°7'54"E). Dragonfly observations on and recorded by transects once a week. Out of total dragonfly species examined, 9 (52.94%) are common and 8 (47.75%) are occasional the present study encourages the conservation of a wide range of dragonfly species in this area." (Authors)] Address: Shukla, A.H., Associate Prof. & Head, Zoology Department, Sir P.P. Institute of Science, M.K Bhavnagar University, India

23507. Staufer, M. (2014): Erhebung potenzieller Vorkommen der Vogel-Azurjungfer *Coenagrion ornatum* in Wien. im Auftrag der Wiener Umweltschutzabteilung – MA 22: 9 pp. (in German) [In summary, it can be stated that the Vienna River retention basins do not currently represent a suitable breeding habitat and that there is currently no native population of *C. ornatum* in Vienna.] Address: Staufer, Martina, Department für Biodiversität der Tiere, Fakultät für Lebenswissenschaften, Universität Wien, Rennweg 14, A-1030 Wien, Austria. E-mail: m_staufer@web.de

23508. Suchkov, S.I.; Zolotova, G.V. (2014): Poperedni rezultati inventarizacii ta deyaki aspekti ochorony komach Natsionalnogo prirodnogo parku "Khotinskiy". [Preliminary result of an inventarisation and some aspects of the protection of insects in the National Nature Park "Khotinskiy"]. In: I.V. Skil'skiy (ed.) 2014. Regionalni aspekti floristichnikh i faunistichnikh doslidzhen. Materiali pervoy mizhdunarodnoy naukovopraktichnoy konferencii, 10-12 kvitnya 2014 r., m. Khotin [Regional aspects of floristic and faunistic researches. Materials of the First International Scientific and Practical Conference, 10-12 April 2014, Kotyn]. Druk Art, Chernivtsi: 223-226. (in Ukrainian) [Ukraine; the study includes references to *Calopteryx virgo* and *Stylurus flavipes*] Address: Suchkov, S.I., Pryazovsky National Natural Park, Interdepartmental Azov-Black Sea Ornithological Station Institute of Zoology named after I.I. Schmalhausen of the National

Academy of Sciences of Ukraine and Melitopol State Pedagogical University sereban.melit@mail.ru

23509. Zhang, J.; Bai, Y.; Wang, G. (2014): Using geometric morphometric techniques to analyze wing variation of common dragonflies. Journal of Ningxia University (Natural Science Edition) 2014(1): 66-70. (in Chinese, with English summary) ["This study uses geometric morphometric techniques to analyze the wing morphological characteristics of four common species of dragonflies in Linhai, Zhejiang Province, and to discuss the variation regulation of wing shape and venation. The study also explores the phylogenetic relationships among the four species. The results of principal component analysis (PCA) show the fore and hind wings of the four species of dragonflies *Deilolia phaon* and *Crocotermis servilia* have high similarity in the shape of fore and hind wings. However, *Pantala flavescens* species is significantly different from the other types of dragonflies. The main wing difference can be shown by the wing type mesh contour map, which includes the pterostigma, nodus, radius area, cubitus area, and anal area near the base of the wing. Clustering analysis provides further evidence for the morphological relationship among dragonflies. Based on clustering results, it is determined that *D. phaon* and *C. servilia* have the closest phylogenetic relationship. Meanwhile, *P. flavescens* has the farthest relationship with the other dragonflies. *Trithemis aurora* is very different in terms of its fore and hind wings." (Authors)] Address: Zhang, J., School of Life Sciences, Taizhou University, China

2015

23510. Kohl, S. (comp.) (2015): Libellen-Beobachtungen in Südafrika - 28.12.2014 bis 16.01.2015. privately published: 84 pp. (in German) [18 localities in South Africa studied between 28.12.2014 and 16.01.2015 resulted in 21 Zygoptera and 52 Anisoptera.] Address: Kohl, S., Fuchsgasse 5, CH-8610 Uster, Switzerland. Email: stefan.kohl@bluewin.ch

2016

23511. Bouniol, J.; David, G. (2016): Inventaire des Odonates de l'espace nature des îles et lône du Rhône entre Pierre Bénite et Grigny. FRAPNA Rhône: 24pp. (in French) [33 species, i.e. 6 fewer and 2 new species than in 2009, were observed during the 2016 surveys. These species are divided into 9 families, the same number as in 2009. Two new species were observed, including *Ceragrion tenellum*, which may have bred on the site, and *Lestes sponsa*, whose only sighting was probably a stray from eastern Lyon, where a few breeding sites are thought to exist. Note the absence of *Coenagrion mercuriale*, which has been proven to breed in previous years in the small woodland marsh fed by the Vernières stream (site 19). The lack of sightings of this species is certainly linked to the poor weather conditions at the start of the year. The same applies to *Gomphus flavipes* and *Gomphus vulgatissimus*, whose exuviae could not be found due to the high water levels in the spring. While the reproduction of the former has yet to be confirmed, that of the latter is highly probable on the Rhône." (Authors/-DeepL)] Address: https://www.smiril.fr/wp-content/uploads/2019/12/Suivi_SMIRIL_Odonates_FRAPNA_2016.pdf

23512. Evangelio Pinach, J.M.; Díaz Martínez, C.; Pérez, I.S. (2016): Primeros registros de *Orthetrum chrysostigma* (Burmeister, 1839) (Odonata, Libellulidae) y confirmación de su reproducción en la provincia de Cuenca (este de

España). First records of *Orthetrum chrysostigma* (Burmeister, 1839) (Odonata, Libellulidae) and confirmation of its reproduction in Cuenca province (Eastern Spain). Boln. Asoc. esp. Ent. 40(1-2): 225-228. (in Spanish) [Three records of *O. chrysostigma* in Cuenca province (Spain) are documented (1) "Mirasol is a dam located on the Cabriel River, downstream from the Contreras dam. It is an area where the water is still and there is both herbaceous and shrub vegetation, especially on the Valencian bank (the river is the provincial border). The specimen was perched on a rock on the bank. (2) The town of Carboneras de Guadazaón is a deep pond of more than 1000 m² in surface area and surrounded by abundant reed beds (*Phragmites australis*). Along with *O. chrysostigma*, other species of Odonata were observed, such as *Aeshna mixta*, *Trithemis annulata* and *Erythromma lindenii*. (3) The specimen from San Antón (a neighbourhood in the city of Cuenca) was photographed by Nicolás Hernández Monedero in an urban source of chlorinated water located 30 m from the banks of the Júcar River. No exuviae, odonate nymphs or other aquatic invertebrates were found in the source, so the specimen probably came from the Júcar River. This record confirms the reproduction of the species in the province of Cuenca. It is also worth highlighting the altitude of the towns of Carboneras de Guadazaón and Cuenca, which is higher than that known for the species in the Iberian Peninsula. In recent decades, *O. chrysostigma* has expanded its distribution area northwards in the Iberian Peninsula thanks to a greater availability of suitable habitats of artificial origin and the observed increase in temperatures (Boudot & Kalkman, 2015). New localities such as those described in this note or the recent detection of the species in Castilla y León (Casaneva et al., 2015) confirm this trend." (Authors/google translate)] Address: Evangelio Pinach, J.M., Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjevanach@hotmail.com

23513. Sansault, E.; Baeta, R. (2016): Inventaires faunistiques sur l'Espace Naturel Sensible des Rouchoux. Odonates et Éphémères. Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS: 14 pp. (in French) [https://www.anepe-caudalis.fr/wa_files/CAUDALIS_CR_-_Rouchoux_2016.pdf] Address: Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS, 9 rue du Nouveau Calvaire, 37100 Tours, France. E-mail: anepe-caudalis@gmail.com

23514. Staufer, M. (2016): Aktualität, Bedeutung und Gefährdung ausgewählter Vorkommen der Vogel-Azurjungfer *Coenagrion ornatum* (Selys, 1850) in Niederösterreich. Auftraggeber: Amt der Niederösterreichischen Landesregierung, Gruppe Raumordnung, Umwelt und Verkehr, Abteilung Naturschutz, 3109 St. Pölten, Landhausplatz 1: 40 pp. (in German) [[https://www.noel.gv.at/noel/Naturschutz/Vogel-Azurjungfer_\(Coenagrion_ornatum\)_in_NOel.pdf](https://www.noel.gv.at/noel/Naturschutz/Vogel-Azurjungfer_(Coenagrion_ornatum)_in_NOel.pdf)] Address: Staufer, Martina, Dept für Biodiversität der Tiere, Fakultät für Lebenswissenschaften, Universität Wien, Rennweg 14, 1030 Wien, Austria. E-mail: m_staufer@web.de

23515. Viza Sánchez, A. (2016): Predicting future species distribution of Odonata in westernmost Mediterranean region under climate change. Master in Ecology, Environmental Management and Restoration, Department of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona: 42 pp. (in English, with Spanish summary) ["A critic question in biodiversity conservation is how species will response in front of current rates of Climate Change.

Such environmental alterations have the potential to modify habitat characteristics and, consequently, it is predicted that many species may shift their ranges to higher latitudes or altitudes to remain in a constant environmental niche. On another hand, those species with high evolutionary adaptation, phenotypic acclimation or plasticity are expected to have the ability to face new conditions. Finally, species with poor strategies are vulnerable and can become extinct. In this project, I focus on the evolutionary history, functional traits characteristics and Species Distribution Models (SDM) of Odonata to elucidate how species distribution of odonates in Iberian Peninsula and Morocco will be affected by Climate Change and the role that traits would play in future species responses. In general, I found that odonates potential distribution will be altered by an increase of temperature seasonality and drought events, as a result of anthropogenic impact. High emissions scenarios were dominated by a reduction of species potential distribution, while low emissions scenarios showed a trend to subtle displacement from current species distribution. The ecological distance between species including also closely related species was decoupled to their phylogenetic divergence. Therefore, phylogeny cannot predict the ecological requirements of species. Moreover, none clear pattern was found between traits (ecological and life-history), current habitat occupancy and future potential distribution under several models of climate change. Hence, I cannot elucidate species response based on the probability of their lineage to neither extinction, northward range expansion nor shift in its distribution range. Further studies modelling multispecies distribution considering intraspecific traits and genetic variability will be needed to infer future species-specific distribution and extinction risk in order to do a correct management of freshwater biodiversity under climate change." (Author.) Address: https://www.ub.edu/fem/docs/treballs/TFM_AidaViza.pdf

2017

23516. Fontana Bria, L. (2017): Odonats del País Valencià: diversitat, factors implicats en la composició de les seues comunitats i respostes als senyals de risc durant la fase d'ou. Tesi Doctoral, Departament de Zoologia, Facultat de Ciències Biològiques, Universitat de València: XII + 190 pp. (in Catalan or English) ["Order Odonata is the group of insects chosen for the accomplishment of this doctoral thesis. Two diagnostic features highlights in this group. The copulating organ of adult males, located in the second abdominal segment; a feature which determines an exclusive reproductive behaviour: during mating the male bends the abdomen to reach the female genitalia. The other characteristic is the modification of the lower lip of the larvae, similar to an articulated arm, which is called as mask; this structure with hooks allows larvae to capture the food (Lorenzo Carballa & Cordero Rivera, 2012; Torralba-Burrial, 2015). Currently, odonates include the suborders Zygoptera, Anisoptera (both present in all continents except in Antarctica) and Anisozygoptera (present only in Asia) (Boudot & Kalkman, 2015), and approximately 6,000 species described throughout the World. They are ubiquitous in such opposing habitats as alpine lagoons and desert wadis (Riservato et al., 2009). But despite being a seemingly known group, many species remains uncatalogued, as patented with the discovery of new species of dragonflies for science around the world, allowing the update of inventories of both local and global odonates. In this sense, listing species makes also possible to implement conservation assessments and actions, as well as long temporary datasets, allowing the establishment of phylogenetic relationships, biogeographic assessments and the study of global phenomena

such as climatic change. For these reasons, the objectives present in chapter 3 of the thesis are to update the Valencian odonates, to evaluate the biogeography of these different species and compare it with odonates of Catalonia and Aragon (two neighbour territories of the Valencian Country). Also, to discuss the current status of species that have not been found in the Valencian territory since the beginning of the 20th century, and to give potential explanations to the currently observed distribution in the Valencian species. Abundance and diversity are the key measures to understand how the communities of living organisms are structured. The first is limited to study the total number of individuals in a community, while the second one takes into account not only the number of individuals, but also the number of species (Morin, 2011). Among the different types of diversity defined by Whittaker (1960, 1972), alpha diversity corresponds to the diversity studied at a local community level, while beta diversity is the variation in the composition of species between different local communities. This implies different communities throughout space and time among places in a particular area. The interest to study beta diversity has increased in recent years (Juen & De Marco, 2011; Heino, 2011; Saulino et al., 2014; Wezel et al., 2014; Sueyoshi et al., 2016), and in the case of odonates there are many evidences that their communities are dynamic and suffer high rates of change throughout space and time. In fact, there are important recent findings about the structure of communities of odonates in Mediterranean systems and about the influence that these local and regional factors have on them (Soler Monzó, 2015). However, there are still many aspects to explore about the configuration of the Odonata communities and their implied phenomena and processes, about the combination of new methodologies for the analysis of these, and about how the impact of environmental factors on the beta diversity can be key in defining bioindicator species. For all the aforementioned, the objectives formulated for chapter 4 of this thesis are to determine the diversity and the factors responsible for the composition of the communities of adult dragonflies and damselflies in six transects of Valencian localities (Bicorb, Quesa, Sumacàrcer, Antella, Manuel and Alboi), all of them belonging to the basin of the Xúquer River. Also, to establish the relationships among Odonata species, type of landscape and physicochemical variables of water, and to identify potential bioindicator species. Dragonflies and damselflies have a complex life cycle in which the larval phase and the adult phase are of opposing habitats (aquatic and terrestrial, respectively). However, this separation of environments does not imply independence between the phases, since the environmental conditions in each one of them affect the later phases. Thus, the effects that are generated and that are transmitted through different phases are known as carryover effects. As explained by Stoks & Córdoba-Aguilar (2012), larval environmental conditions can affect, through carryover effects, the fitness of adults (at the level of size, flight performance or behaviour). This pattern can also be observed in the adult phase: the environmental conditions of adults can reduce longevity and fertility, which reduces the production of eggs throughout life, affecting the number of eggs and larvae of the next generation. Although the carryover effects from the adult stage to the offspring are quite unknown, it is known that they can affect the size of the egg or the selection of the oviposition zone. However, we are still far away to deeply understand the carryover effects in the egg stage, the most unknown stage of Odonata life cycle. Thus, in order to obtain a comprehensive approach to the life cycle, Stoks & Córdoba-Aguilar (2012) proposed to find how the environmental conditions imposed during the egg phase affect the fitness of the following vital phases of odonates. These animals have been considered

as insects useful for devouring many other insects (Colomb, 1933) and it is known that they have great potential in pest control (Simaika & Samways, 2008). However, there is need to know about its beneficial role directly, as pest controllers, and indirectly, as disease controllers through the regulation of the vectors that transmit them. Taking this into account, the objectives set to chapter 5 of the thesis are to explore the antipredator responses at the level of egg stage, using *Ischnura elegans*, and find the costs associated with these responses throughout the rest of the vital stages. Also, to explore the responses of eggs from *Aedes albopictus* (mosquito) to competitors and predators. In addition, to evaluate the existence of subsequent costs associated with these responses and to discuss the role of odonates as providers of the global vector regulation services of human diseases. Because the present thesis covers different odonatological fields and the objectives are configured in three blocks associated with specific chapters, the methodology associated with each one of them is as follows: - To achieve the objectives of chapter 3: Since the publication of the catalogue *Les libèl·lules de la Comunitat Valenciana* (Baixeras et al., 2006), the number of new appointments and new species has been increased, with the inventory registration of Banco de Datos de Biodiversidad de la Comunidad Valenciana (<http://bdb.cma.gva.es/>) and later publications. Therefore, in order to prepare all the knowledge related to odonates of the Valencian Country, a recompilation and evaluation of all odonatological findings has been carried out. Using this collection of information, the biogeography of Valencian dragonflies and damselflies has been analyzed according to the biogeographical elements of Torralba Burrial & Ocharan (2007b). In addition, our results are compared with those from Catalonia and Aragon. - To achieve the objectives of chapter 4: Sampling of adult odonates has been performed in the six transects mentioned, on sunny days and without wind (Sato & Riddiford, 2008), during spring and summer. Visual explorations of the Odonata composition have been made, and the number of individuals of each species has been recorded instantly to obtain abundance (Silva et al., 2010). Species identification has been done through books of Askew (2004) and Dijkstra & Lewington (2006), and Boudot & Kalkman (2015) has been used as the reference to the specific nomenclature. To obtain the landscape data, Google Earth images were used from the sampled areas, after being processed with the GIMP (GNU Image Manipulation Program) program. The physicochemical variables of water have been obtained from the Confederació Hidrogràfica del Xúquer. To establish relationships among species and environmental variables, several statistical methods have been used, mainly multivariate redundancy analyzes (RDA). - To achieve the objectives of chapter 5: The effect of risk chemical cues on the eggs of *Ischnura elegans* Mature females of *Ischnura elegans* have been captured and deposited one by one in plastic glasses. The walls of these have been covered with wet filter paper, which has served as oviposition support (Van Gossum et al., 2003; Stoks & De Block, 2011). The eggs of *I. elegans* have been exposed to chemical cues from larvae of other damselflies. These larvae have been placed in glasses with water to emit chemical cues. To evaluate the effect of these on the eggs and their response to predation risk, treatment replicas have been established (in which the eggs have been exposed to the cues) and the corresponding control replicas (in which the eggs have not been exposed to the cues). Nauplii of *Artemia salina* and annelids of genus *Tubifex* have been used as food source (Sánchez-Guillén et al., 2005). When damselflies have reached the adult stage, sex has been determined, and the wings and dry weight have been measured, and subsequently have been compared between treatment and control. The effect of risk chemical

cues on *Aedes albopictus* eggs *Aedes albopictus* females have been captured and deposited in containers with wet cardboard fibers, which in turn acted as oviposition support. In the same way as in the previous section, mosquito larvae have been placed in containers with water for the emission of chemicals. To evaluate the effect of these chemical cues on the eggs and their response to risk detection, treatment A replicas have been established (in which the eggs have been exposed to cues from *Aedes albopictus* larvae), treatment B replicas (in which the eggs have been exposed to cues from *Ischnura elegans* larvae) and the corresponding control replicas (in which this exposure has not existed). For the feeding of mosquito larvae, a mixture of bovine and tuna flour, yeast and vitamins (Puggioli et al., 2013) has been used. When mosquitoes have reached adulthood, sex has been determined, and the length of the wing and the length of the posterior tibia have been measured, which have been compared between treatments and control. Statistical analysis: R free software (<http://www.r-project.org/>) has been used. In general, these have been possible thanks to the use of different packages of R and they have consisted of different linear models, non-parametric correlations and multivariate analyzes. After the realization of specific methodology for each chapter, the main results and conclusions are: - From chapter 3: The record of 65 species of odonates in the Valencian Country is reported, which represent 82.28% respect to the 79 species of odonates registered in the Iberian Peninsula. Of the 65 species of Valencian odonates, the available records of *Macromia splendens* and *Lindenia tetraphylla* are old. Of these two species, it would be necessary to make exhaustive and consecutive planned searches to know if they are really present or not in this territory. In addition, the *Lindenia tetraphylla* specimens deposited in entomological collections and the information they provide highlights the importance of museums in providing data at the level of confirmation of presence and distribution of species. The contribution of citizen science to odonatology is also relevant, although some changes are needed to optimize the efforts of voluntary groups. The Valencian Country is enriched with odonates classified as Ethiopian elements, if we compare it with the territories of Catalonia and Aragon. This difference is probably due, in addition to the historical patterns of dispersion, to the greater geographic proximity and the climatic similarity with the African continent. Also, in a context of climate change and taking into account the issues of location and climate, it is probable that in the Valencian Country the number of Ethiopian elements will increase in the coming years. It is essential to continue the monitoring of the species of odonates to be aware of their real distribution in temporary series, in order to be able to empirically verify the effect of climate change and to improve existing biogeographic classification systems (or to create new ones). - From chapter 4: In 2011 samples were detected, in only six localities of the province of València (Alboi, Antella, Bicorn, Manuel, Quesa and Sumacàrcer), 29 species of odonates (almost 50% of the Valencian species). A clear negative effect has been found on the proportion of urban landscape that surrounds the sampled localities on the diversity of odonates. A positive effect of the surrounding urban landscape on the abundance of individuals has been found too, possibly due to high number of individuals of those species that are tolerant of anthropic activities. A positive correlation has been detected between the biochemical oxygen demand and the abundance of individuals, possibly resulting in a cascade effect from the high microbial activity associated with contamination to higher trophic levels. Through the different values of diversity and the different statistical analyzes employed (cluster, redundancy analysis (RDA) and principal response curve (PRC)), two groups of Odonata communities have been found in the area studied: one of the

lowest zones of the river basin or "downstream" (Alboi, Antella and Manuel) and one of the highest or "upstream" zones (Bicorn, Quesa, Sumacàrcer). This distinction is linked to a gradient of anthropization, which is higher in the lower zones. Among the different relationships established between environmental variables (landscape or water) and particular Odonata species, the marked link between anthropized environmental conditions and *Ischnura elegans*, *Platycnemis latipes*, *Erythromma lindenii* and *Trithemis annulata*, agrees with the proposal of these odonates in adulthood as bioindicators of the human impact on the environment. - From chapter 5: *I. elegans* eggs have hatched earlier in response to chemicals cues of predation risk from damselfly larvae of the Coenagrionidae family. It has also been noted that the individuals from eggs that have been under these cues have developed smaller wings. The hatching time of mosquito eggs *Aedes albopictus* has not been affected by the presence of chemicals cues of predation risk from *I. elegans* larvae. However, the exposure *Aedes albopictus* eggs to these chemical cues affected the time of larval development based on sex. The results of the experiment suggest that the responses aimed at avoiding risks can be triggered during the egg phase and, although they may vary considerably between species, it is likely that they follow a generalized strategy in insects. Early warning responses can be particularly important in understanding insect ecology with some aquatic phase, some of which (like the *Aedes albopictus* mosquito) are global vectors of human diseases." (Author)] Address: <https://core.ac.uk/download/pdf/84752029.pdf>

2018

23517. Baeta, R. (2018): Animation de la déclinaison régionale du Plan National d'Actions en faveur des Odonates en Région Centre Val de Loire. Rapport d'animation 2017. Association Naturaliste d'Etude et de Protection des Écosystèmes, Mars 2017: 7 pp. (in French) [The PRA Odonates is planned for a duration of 5 years and covers the period 2013-2017. It provides for 18 actions in favor of the preservation of 30 priority species of odonates. In accordance with the PNA Odonates guidelines, these actions are divided into four main areas: AXIS 1: IMPROVING REGIONAL KNOWLEDGE: Action 1: Improving knowledge on the distribution of *Leucorrhinia caudalis*; Action 2: Improving knowledge on the functioning of *Leucorrhinia caudalis* metapopulations; Action 3: Improving knowledge on *Leucorrhinia pectoralis*; Action 4: Specifying the distribution and conservation status of *Coenagrion mercuriale*; Action 5: Specifying the distribution and conservation status of *Coenagrion ornatum*; Action 6: Specifying the distribution and conservation status of *Gomphus graslinii* and *Oxygastra curtisii*; Action 7: Studying the distribution and densities of *Gomphus flavipes* and *Ophiogomphus cecilia*; Action 8: Specifying the distribution and conservation status of priority species 2a; Action 9: Specify the distribution of priority PRA species 2b and 3; AXIS 2: CONSERVATORY MANAGEMENT / ADMINISTRATION: Action 10: Spatial strategy for the conservation of priority Odonata in the Centre region; Action 11: Ensure regulatory protection and/or land control of sites with high odonatological value in the Centre region; Action 12: Consultation for the conservation of the Loire populations of *Gomphus flavipes* and *Ophiogomphus cecilia*; Action 13: Revision of the regional red list of Odonata; Action 14: Revision of the list of determining ZNIEFF odonates; AXIS 3: TRAINING & AWARENESS: Action 15: Raise awareness and train environmental stakeholders; Action 16: Raise awareness among owners of ponds, pools and waterways; Action 17: Raise awareness among the general public

about Odonata and their environments; AXIS 4: ANIMATION OF THE REGIONAL ACTION PLAN: Action 18: Coordinate the actions of the PRA Odonates and animate the network of actors." (Author/Google translate) https://www.anepe-caudalis.fr/wa_files/Rapport_AnimationPRAO_2017.-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

23518. Krieg-Jacquier R. (2018): Le statut d'*Oxygastra curtisii* dans l'Ain et le Jura méridional (Odonata: Anisoptera). Bourgogne-Franche-Comté Nature 27: 31-36. (in French) [Verbatim/Google Translate: ...Endemic to the southwest of the Western Palearctic, with an essentially Ibero-Atlantic distribution, the species is listed in Appendices II and IV of the Habitat Directive and considered "near threatened" (NT) on a global and European scale. In France (map 1) it is protected, included in the national action plan for odonates (PNAO). In Rhône-Alpes, it is one of the target species of the regional version of the PNAO just as in Franche-Comté and is classified "vulnerable" (VU). It is present in the eight departments constituting the former Rhône-Alpes region, with very variable distributions. (map 2). Ardèche, Savoie and Ain are home to the most beautiful populations. Haute-Savoie reveals only one site, as for Isère, only two mentions of imagoes have been noted there. In the Rhône and the Loire, populations are well known and monitored, while in the Drôme, they remain very circumscribed and still poorly known. For the departments of Ain and Savoie, the species is considered quite threatened. From 2008, after a series of accidental observations in three sectors in Bresse and in the lower Ain valley, more systematic odonatological surveys in the Ain department led to the discovery of several populations of *O. curtisii* in a department where only two observations of erratic individuals had been made until then. These surveys were focused on environments which presented landscape analogies with the sites where the species had been observed accidentally and on sites where possible observations had been reported. The search for exuviae was favored with the aim of identifying larval breeding sites and the resulting conservation issues. The discovery of at least one exuvia was considered necessary and sufficient to attest to the presence of the species. This prospecting effort made it possible to recognize 17 population groups of the species. The coalescing or very neighboring bodies of water were considered as belonging to the same population, and the different strings of observations along the length of the watercourses treated as a single population, with the exception of Suran whose populations of the south of the Jura and the north of the Ain are separated from those close to the confluence with the Ain river by several kilometers of watercourses that dry up in summer. Departmental surveys were extended to the southern ends of the Jura chain outside the Ain department and to sectors of the Jura department in connection with the Idanian populations. (table I) These new observations highlight plasticity of the species in the choice of larval habitats. The latter are presented here both from the angle of hydrological typology (watercourses, bodies of water, graph 1) and from a typology taking into account the appearance and characteristics of the coastal zone. where exuviae or larvae have been observed (graph 2) particularly with regard to vegetation, the species being known to inhabit root hairs. Figures 1, 2 and 3 illustrate some of these coastal environments. A wider spatial distribution was highlighted (map 3) confirming a fairly well dispersed presence over the study area which underlies the need to continue surveys, particularly with the search for exuviae. This distribution

differs from that presented in the Illustrated Atlas of Dragonflies of the Rhône-Alpes region (JULIAND 2008) and is due to the exploration of hitherto under-prospected sectors and a systematic search for exuviae. This focus on exuviae is certainly the best way to detect this species which seems curiously inconspicuous as soon as we find ourselves outside the areas of Ardèche and should be at the heart of future prospections concerning *O. curtisii*. Future investigations should be carried out on rivers and bodies of water that still need to be explored in the three departments and assess the possibility for the species to reproduce in pools or ponds. It is likely that an altitudinal limit will emerge at least for larval breeding sites and that sectors above 600 m altitude will remain unwelcoming for the species but this leaves significant reception potential for the territory and a margin significant increase in the number of known sites. In the Auvergne-Rhône-Alpes region, more surveys should be carried out in the department of Isère, which, curiously, has seen virtually no sightings of the species. Additional surveys in the Rhône, Loire and Haute-Savoie, as well as in the Drôme but also the Drôme will undoubtedly see a very comfortable increase in the number of sites the species in the next few years, and the dynamics of the regional versions of the will certainly contribute to this. The endemism of the species, its unique phylogenetic position in France and the responsibility of the people responsibility of those involved in the areas where it is present for its conservation make the conservation of *O. curtisii* a national priority.] Address: Krieg-Jacquier, R., 18 rue de la Maçonne, 73000 Barberaz, France. E-mail: regis.krieg.jacquier@gmail.com

23519. Lemmens, M. (2018): Bosbeek- en Weidebeekjuffer. natuurhistorisch maandblad 107(7): 141-142. (in Dutch) [Verbatim/Google translate: In June we will take a closer look at two particularly beautiful damselflies: *Calopteryx virgo* and *C. splendens*. The flight of the males of these species is striking and is reminiscent of the pattern of a butterfly due to the relatively slow wing beat and dark wings (Dijkstra & Lewington, 2006). *C. virgo* almost disappeared from Limburg in the early 1980s, and *C. splendens* also experienced a significant decline (Bos & Wasscher, 1997). This was caused by the strong decline in water quality in those years and cultural interventions in streams (Hermans, 1990). The major efforts in recent decades to improve the water quality and natural morphology of the streams have now paid off. *C. splendens* is now common in Limburg and *C. virgo* is also recovering (Bos & Wasscher, 1997). *C. splendens* occurs in fairly oxygen-rich and unshaded streams and rivers. Because *C. splendens* exhibits wandering behavior, it can also be found far outside the breeding areas and can therefore even be found regularly in gardens (Bos & Wasscher, 1997). *C. virgo* is much rarer (Bos & Wasscher, 1997). This is due to the more stringent habitat requirements of this species, especially with regard to water quality (Hermans, 1990). *C. virgo* occurs in cool, oxygen-rich, clear streams with plenty of shade. Recent observations show that the species occurs in the extreme south of Limburg mainly along the Gulp and Geul [figure 1]. In Central Limburg the species can mainly be found along the Roode Beek near the Meinweg and in the vicinity of Weert. Only a few sightings are known from North Limburg (Waarneming.nl, consulted May 10, 2018). Both damselflies fly from May to early August (Bos & Wasscher, 1997). Although *C. virgo* and *C. splendens* look a lot alike, the males in particular are easy to tell apart. The male of *C. virgo* has almost entirely dark blue metallic shiny wings [figure 2]. In *C. splendens*, the wing is approximately half dark blue and transparent at the base and apex [figure 3]. *C. virgo* also has broader wings. This distinction is not always easy to see in flight, so wait until the damselfly sits still and then look carefully. Both males have

a metallic blue body of 45-49 mm long (Bos & Wasscher, 1997). The females of both species are less spectacularly colored and more difficult to distinguish. The female demoiselle has a metallic green body, with brown to brown-green translucent wings [figure 4]. The female *C. splendens* has green to green-brown colored wings, with the hindwing often darker than the forewing [figure 5]. Distinction based on these characteristics is very difficult. A clearer feature is the location of the pseudoptero stigma. This is a light-colored spot near the tip of the wings, which only occurs in females. In *C. virgo* this spot is located before the rounding of the wing tip [inset figure 4], in the *C. splendens* it is located at the beginning of the wing tip rounding [inset figure 5] (Bos & Wasscher, 1997). This distinction is also difficult to make, especially in flight, so always look for males. Submit your observations of *C. virgo* and *C. splendens*, preferably with a photo, via Waarneming.nl. You can also send your photos with GPS data to the e-mail address: Natuurbank@nhgl.nl. You can also contact us at this address if you have any questions about entering observations. We will raffle a Veldshop.nl gift voucher worth 20 euros among the observers. For more information about *C. virgo*, *C. splendens* and the announcement of the winner, follow the Facebook group: www.facebook.com/groups/onderdeloep.] Address: not stated

2019

23520. Aguilar Baldosea, W.; Delgado Mosquera, J. (2019): Ensamblaje de macroinvertebrados acuáticos y contaminación minera en un humedal de la cuenca media del río Atrato. MSc. thesis, Universidad de Manizales Facultad de Ciencias contables, Económicas y administrativas Maestría en Desarrollo sostenible y Medio ambiente manizales: 74 pp. (in Spanish, with English summary) ["The objective of this research was to study the assemblage of aquatic macroinvertebrates and their relationship with mining (auriferous) pollution in a marsh in the middle basin of the Atrato River, Chocó (Colombia). The structure and dynamics of the assembly of aquatic macroinvertebrates were analyzed, as well as the main physicochemical and hydrological parameters in the studied marsh. The research was conducted in the swamp of Plaza Seca, Quibdó-Chocó, four sampling points were located for the collection of aquatic macroinvertebrates, in the different substrates present. The values were fixed with 70% alcohol, as well as the physicochemical parameters (pH, water temperature, electrical conductivity, alkalinity nitrites and nitrates) and hydrological (depth). A total of 175 organisms were collected, distributed in 2 classes, 7 orders, 22 families and 27 genera. The Odonata order [Telebasis, Macrothemis, Tramea, Coryphaeschna, Boyeria] was the most representative in the assembly of macroinvertebrates (34.86%), followed by Coleoptera (28.0%). The diversity index showed low values (1.92 bits / ind). The physicochemical variables were strongly influenced by the mining activity that was used in the areas surrounding the swamp and there were associations in the aquatic macroinvertebrates and physicochemical variables analyzed, showing the effect that mining had on the assembly of aquatic macroinvertebrates." (Author)] Address: https://ridum.umanizales.edu.co/xmlui/bitstream/handle/20.500.12746/4788/WILMAR%20BIOLOGIA-InformeFin_al_Wilmar_Noel...corregido%2022-10-2019.pdf?sequence=1&isAllowed=y

23521. Bakour, S.; Moulai, R. (2019): Dietary analysis across breeding seasons of Eleonora's Falcon *Falco eleonora* on the western coast of Algeria February 2019. *Ostrich* 90(1): 63-72. (in English, with French summary) ["The study of the contents of 318 Eleonora's Falcon *Falco eleonora* pellets,

collected from three islands off the western coast of Algeria, allowed us to identify 134 prey items. These are divided into 55 families, 21 orders and five classes. These represent 92 insect species, 39 birds, one mammal, one gastropod and one fish. In terms of abundance, insects constituted the main part of the diet (80.7%), followed by birds (18.5%), mammals (0.7%), and fish and gastropods (0.1% each). Among the insects, the Hymenoptera were the most numerous (45.2%), with ants being the most frequent family. In the class of birds, passeriforms were most frequently found (12.3%). The dominant family in the bird class was the Apodidae with a frequency of 5%. In terms of biomass, birds dominated with 98.1% of the total biomass, followed by insects with 1.2%. The diet of these Eleonora Falcons of Algeria was thus diverse, but varied with breeding status. The study of the dietary variation of the Eleonora Falcon during the breeding period shows that insects were most frequently encountered during the three breeding stages, whereas birds were highly consumed during the fledging stage, with frequencies of 43.9%." (Authors) The list of prey items includes "Platycnemis sp.".] Address: Bakour, S., Laboratoire de Zoologie Appliquée et d'Écophysiologie Animale, Faculté des Sciences de la Nature et de la Vie, Université de Bejaia, Bejaia, Algeria. Email: bakoursimou@hotmail.fr

23522. Choudhury, K.; Daimary, M.; Khakhlary, R. (2019): Habitat utilization of dragonflies and damselflies (Odonata: Insecta) in Gaurang Eco-park-cum-Cultural complex, Kokrajhar, Assam, India. In: Dr. Hemanta Kumar Sahu, J. Sathy, R.K. Mishra (eds.): Biodiversity Conservation, Research and Management. Himalaya Publishing House Pvt. Ltd: 68-72. (in English) ["Frequent survey from March 2012 to February 2013 in Gaurang Eco-park-cum-Cultural Complex of Kokrajhar, Assam resulted in identification of 31 species belonging to 24 genera and six families. Family Libellulidae with 23 species dominates in all odonates. Marked variations were observed in their habitat utilization. Maximum numbers of species were recorded in weedy ponds while minimum numbers of species were recorded from shrub land. However, nine species were found to be habitat specific." (Authors)] Address: Choudhury, K., Department of Zoology, Science College, Kokrajhar, BTAD, Assam, India

23523. Chovanec, A. (2019): Buchbesprechung: Wildermuth, H. & Martens, A. 2019: Die Libellen Europas / Alle Arten von den Azoren bis zum Ural im Porträt. – Quelle & Meyer, Wiebelsheim, 958 pp., 927 Abb., 179 Tab., 141 Verbreitungskarten, ISBN 978-3-494-01690-0, € 39,95. Beiträge zur Entomofaunistik 20: 261-262. (in German) [review] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

23524. Dai, Y. (2019): The influence of stroke-plane-angle on aerodynamic force of a damselfly during forward flight. Degree Thesis of the Institute of Engineering Science and Ocean Engineering, National Taiwan University; 2019 (2019 / 01 / 01), DOI: 10.6342/NTU201902071 DOI: 91 pp. ["In this study, we used high-speed cameras to measure the motions of flapping-wings of damselflies in the case of free flight (forward flight). The results showed that the stroke-plane-angle (β) was closely correlated with the flight slope, and two modes of β of wings could be concluded. In first mode, β forewing is fixed at 25°, while β hindwing is between 30° and 50°. In the second mode, β forewing and β hindwing is the same. Using the measured wing motions, a 3-D numerical simulation was established, and the influence of the stroke-plane-angle on aerodynamic force was investigated by changing β in simulation. The simulation results showed that

the wing at a higher β would generate larger horizontal force and lower vertical force. Lower β would generate lower horizontal force and larger vertical force. The trajectory of free flight simulation showed that the flight slope is highly correlated with β , which indicated that the adjustment of β is an effective way to control the aerodynamic force. In addition, the flow field also showed that the difference between different modes is the influence of wing-wing interaction. In first model, the surface of hindwing is affected by the vortex from the forewing during the downstroke, resulting in the pressure difference of the upper and lower surface dropping, so the vertical force and Negative horizontal force is weakened. Wing-wing interaction increased the average of horizontal force by 20% in a period and decreased vertical force by 15% in a period. In second mode, since the forewing and hindwing flapped at the same stroke-plane-angle, the hindwings were less affected by the vortex from the forewings, and the influence of the wing-wing interaction on horizontal force and vertical force in a period was less than 10%. This study explained the influence of stroke-plane angle on aerodynamic force. The results can be applied to the design of flight control of MAVs." (Author)] Address: not available

23525. Martynov, A.V.; Leshenko, D.A. (2019): Damselflies and dragonflies (Insecta: Odonata) of Ukraine in the collection of the National Museum of Natural History, NAS of Ukraine. *Natural History Museology* 5: 188-190. (in English) ["The collection of Odonata of Ukraine deposited in the Department of Zoology of the National Museum of Natural History, National Academy of Sciences of Ukraine is the largest in our country. It is represented with more than 7000 specimens (imagoes, larvae, exuviae) of 73 species from 27 genera and 9 families. This collection contains 94% of Odonata species that occur in Ukraine (78 species), and includes all common species of Ukraine, all species listed in the Red Data Book of Ukraine, and vast part of rare and/or stenobiotic species." (Authors)] Address: Martynov, A.V., National Museum of Natural History, National Academy of Sciences of Ukraine, Kyiv, Ukraine. Email: martynov_av@ukr.net

23526. Willigalla, C. (2019): Buchbesprechung: Wildermuth, H. & A. Martens (2019) *Die Libellen Europas*. 958 Seiten. Quelle & Meyer Verlag GmbH & Co., Wiebelsheim. ISBN 978-3-494-01690-0. *Libellula* 38(1/2): 126. (in German) [review] Address: Willigalla, C., Willigalla Ökologische Gutachten, Am Großen Sand 22, D-55124 Mainz, Germany

2020

23527. Abdillah, M.M. (2020): Inventarisasi jenis dan studi komposiso pada capung (Anisoptera) dan capung-jarum (Zygoptera) di Kawasan, Kampung Baru, desa tambak sumur, Kecamatan Waru, Kabupaten Sidoarjo, Jawa Timur [Inventory of species and composition of Anisoptera and Zygoptera in Kawasan, Kampung Baru, Tambak Sumur Village, Waru District, Sidoarjo Regency, East Java]. *Jurnal Penelitian Pendidikan Biologi dan Biologi* 3(2): 328-334. (in Indonesian, with English summary) ["...Lowland landscapes are generally urban areas with very rapid development, with the potential to have environmental impacts. Data on biodiversity including dragonflies and damselflies in urban areas are incomplete and not in series due to the lack of research. The Kampung Baru area, Sidoarjo Regency, East Java, has a potential diversity of dragonflies and damselflies that has never been studied before. This study aims to make an inventory and considering the composition of dragonflies and damselflies. The observation was conducted using the photographic approach during March – August 2020. Based on

the research results, there were 16 species from 3 families of dragonflies and damselflies in the Kampung Baru area. A near-threatened (NT) species, *Teinobasis euglena* (Coenagrionidae) was also found." (Author)] Address: Abdillah, M.M., Universitas Islam Negeri Sunan Ampel Surabaya, Indonesia. E-mail: abdillah.kutrik@gmail.com

23528. Pelinson, R.M. (2020): Effects of local processes and spatial isolation on freshwater community assembly: a simulation of land-use intensification. Tese de Doutorado, Instituto de Biociências da Universidade de São Paulo. Departamento de Ecologia: 159 pp. (in English, with Portuguese summary) ["Freshwater environments are among the most affected by land-use change, particularly by the introduction of exotic fish species for aquaculture and contamination by agrochemicals such as fertilizers and pesticides. However, we essentially ignore whether and how land-use change interacts with spatial processes to affect local communities, and, therefore, biodiversity. In this Thesis we aimed at experimentally understanding how the introduction of exotic predatory fish for aquaculture, and contamination by agrochemicals, can affect macroinvertebrate and amphibian community structure in different spatial contexts using an explicit metacommunity framework. Methods: We constructed 1,200-L artificial ponds (24 in the first experiment and 45 in the second) in a savanna landscape at three different distances from a source wetland (30 m, 120 m, and 480 m). Ponds were spontaneously colonized by semiaquatic insects and amphibians dispersing in the terrestrial landscape. In the first experiment, we manipulated the presence and absence of the exotic omnivorous fish, *Tilapia*. In the second experiment, we manipulated agrochemical intensification simulating the conversion of savannas into managed pastures (ponds treated with fertilizers) and sugarcane fields (ponds treated with fertilizers) and a single pulse of the insecticide fipronil and the herbicide 2,4-D following realistic dosages and application schedules). Main Findings: We generally found that spatial isolation can reduce the abundance of dispersal-limited predatory insects, with few exceptions (i.e., *Pantala* and *Orthemis* dragonflies), thus increasing community size (i.e., total abundance of individuals) by favoring insect consumers, which have higher dispersal rates. Spatial isolation can also increase community-to-community variability (i.e., beta-diversity within treatments), by increasing the effects of historical contingency on species with similar dispersal rates. However, these effects can drastically change when predatory fish is present. The stocking of fish can have a strong negative effect on large-bodied predatory insects, and a milder negative effect on insect consumers, dampening the indirect positive effects of isolation on most of them. Fish also appear to override the effects of historical contingency, making community variability decrease because of the increase in community size. Shifting to agrochemicals, fertilization in 'pasture' ponds caused a slight increase in the abundance of few predatory insects via bottom-up effects. The insecticide pulse in 'sugarcane' ponds caused a very strong but temporary negative effect on insect populations, followed by an increase in the abundance of generalist larval amphibians. Different from the effects of fish, the effects of fertilization and pesticide pulses do not change with spatial isolation, likely because they have equally acute effects on all invertebrate taxa across isolation treatments, and their indirect effects are mostly on non-dispersal-limited taxa (i.e., dragonflies and amphibians). Therefore, we show that the potential of local environmental processes to interact with the effects of spatial isolation is highly dependent on the type of land management. More importantly, we show that the interspecific variation in dispersal rates and the multi-trophic nature of freshwater communities must

be considered if we seek to understand the consequences of environmental change on community structure" (Author)] Address: <https://teses.usp.br/teses/disponiveis/41/41134/tde-22062020-093533/publico/RodolfoMeiPelinsonOriginal.pdf>

23529. Ryndevich, S.K.; Lukashuk, A.I.; Zemoglyadchuk, A.V.; Ôiêarchuk, I.V.; Baitchorov, V.M. (2020): Bioindicator insects (Insecta: Ephemeroptera, Odonata, Plecoptera, Hemiptera, Coleoptera, Megaloptera, Trichoptera) and criteria for intact of undisturbed aquatic ecosystems in Belarus. "Baranovich State University". BarSU Bulletin. Quarterly scientific and practical journal 8. Series "Biological sciences (general biology). Agricultural Sciences (Agronomy)": 99-119. (in Russian, with English summary) ["In the article the hydro-landscape and hydrobiological criteria of intact natural water bodies (springs, streams, rivers, old river-beds, lakes, bogs) are considered. Twenty one species of water and amphibiotic insects were proposed as bioindicators of intact natural water ecosystems: 14 species-indicators of intact natural watercourses (mayfly *Siphonurus lacustris* (Eaton), *Cordulegaster boltonii* and *Ophiogomphus cecilia*, stoneflies *Leuctra digitata* (Kempny), *Nemoura cambrica* (Stephens), *Taeniopteryx nebulosa* (Linnaeus), bugs *Velia saulii* Tamanini, 1947, beetles *Deronectes latus* (Stephens), *Hydraena gracilis* Germar, *Nebrioporus assimilis* (Paykull) and *Oreodytes sanmarkii* (Sahlberg), alderfly *Sialis nigripes* Pictet, 1865, caddisflies *Chaetopteryx villosa* (Fabricius) and *Odontocerum albicorne* (Scopoli)), an indicator of intact rivers, old river-beds, lakes and bogs (*Brachytron pratense*), an intact dystrophic lakes indicator (caddisfly *Agrypnia obsoleta* Hagen, 1864), three indicators of intact upland and transitional bogs (beetle *Ilybius wasastjernae* (Sahlberg, 1824), *Aeshna subarctica* and *Somatochlora arctica*)."] (Authors)] Address: Ryndevich, S.K, Education Institution "Baranovich State University", Ministry of Education of the Republic of Belarus, 21 Voykova St., 225404 Baranovich, the Republic of Belarus. Email: ryndevichsk@mail.ru

23530. Sansault, E. (2020): Les Odonates rares d'Indre-et-Loire, prospections 2019. Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS. DREAL Centre-Val de Loire: 23 pp. (in French) [https://www.anepe-caudalis.fr/wa_files/Prospections_PRA_odonates_Saison2019.pdf] Address: Sansault, E., Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS, 3 rue de la Mairie, 37520 La Riche, France. Email: eric.sansault@anepe-caudalis.fr

23531. Vilela, D.S. (2020): Odonata Biodiversity: a study on integrative and morphological taxonomy with emphasis on females" - Biodiversidade de Odonata: um estudo sobre taxonomia integrativa e morfológica com ênfase em fêmeas. PhD thesis, Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Programa de Pós-graduação em Entomologia: 259 pp. (in English, with Portuguese summary) ["Odonata females are, in general, historically neglected in taxonomic descriptions in regard to its morphology, thus, depleted from essential information such as definition of reliable diagnostic characters that allows female identification needless of male association. With the general objective of collaborating with the advance of female taxonomic knowledge in the Order, establishing reliable diagnostic characters and revisiting species, this thesis had the specific objectives: revision of the Neotropical genera *Franciscobasis* Machado & Bede and *Minagrion* Santos; description of the ontogenetic coloration changes in females of *Ischnura capreolus*; description of unknown females with optimized diagnostic characters that allow their identification in the absence of males; description of species new to Science.

The results presented here, shed a new light on the importance of diagnosing and correctly describing females in Odonata, altering the paradigm of coloration as a diagnostic character, and increasing taxonomic information through complete morphological and integrative assessment, all corroborated with evidence." (Author) https://www.teses.usp.br/teses/disponiveis/59/59131/tde-15042024-150550/publico/Vilela_Diogo_Silva.pdf] Address: Vilela, D.S., Univ. São Paulo, Depto de Biologia, Programa de Pós-Graduação em Entomol., Ribeirão Preto, SP, Brasil. E-mail: deeogoo@gmail.com

23532. Wagner, D.L. (2020): Insect declines in the Anthropocene. *Annual Review of Entomology* 65: 457-480. (in English) ["Insect declines are being reported worldwide for flying, ground, and aquatic lineages. Most reports come from western and northern Europe, where the insect fauna is well-studied and there are considerable demographic data for many taxonomically disparate lineages. Additional cases of faunal losses have been noted from Asia, North America, the Arctic, the Neotropics, and elsewhere. While this review addresses both species loss and population declines, its emphasis is on the latter. Declines of abundant species can be especially worrisome, given that they anchor trophic interactions and shoulder many of the essential ecosystem services of their respective communities. A review of the factors believed to be responsible for observed collapses and those perceived to be especially threatening to insects form the core of this treatment. In addition to widely recognized threats to insect biodiversity, e.g., habitat destruction, agricultural intensification (including pesticide use), climate change, and invasive species, this assessment highlights a few less commonly considered factors such as atmospheric nitrification from the burning of fossil fuels and the effects of droughts and changing precipitation patterns. Because the geographic extent and magnitude of insect declines are largely unknown, there is an urgent need for monitoring efforts, especially across ecological gradients, which will help to identify important causal factors in declines. This review also considers the status of vertebrate insectivores, reporting bias, challenges inherent in collecting and interpreting insect demographic data, and cases of increasing insect abundance."] (Author) The study includes Odonata.] Address: Email: david.wagner@uconn.edu

2021

23533. Boukhateem, A.; Esonga, C.; Lesmo, C.; Mbambo, N.R.; Zacharia, F.G. (2021): 2D Aerodynamics of Flapping Wings. BSc. Aeronautical Engineering, Aerospace Project II, School of Engineering, Emirates Aviation University, Dubai - UAE: 88 pp. (in English) ["Flapping the wings of flying animals generates lift and thrust, as well as allowing them to accomplish amazing maneuvers with quick accelerations and decelerations. Insects, bats, and birds are all good instances of unstable aerodynamics. Using study of several flapping airfoils, designers highlight numerous concerns relevant to the aerodynamics of flapping flight in this research. Following that, we'll look at both analytical and computational models, as well as some experimental data and setups that can be used to investigate flapping motion. Then we go through nonstationary airfoil aerodynamics, such as dynamic stall, vortex shedding, and thrust production, while going through flapping airfoil models in terms of Reynolds number, Strouhal number, and reduced frequency. The flapping motion of the NACA 0015 (symmetric) and the NASASc2-0714-il (supercritical) with various aerodynamic parameters, such as oscillation amplitude (changing angle of attack) at a fixed frequency, is the topic of the article. The Ansys Modeler is used

to analyze the airfoils in a flow field that resembles a flapping wing. The goal is to compute the flapping motion while taking into account the unstable, viscous flow fields surrounding the airfoil. The airfoil border is assumed to have a no-slip boundary condition in this model. The impacts of viscosity and Reynold's number on a rigid flapping wing can be avoided if they are established by potential flow theory. This indicates that both leading and trailing edge vortices, as well as vortex transmission through the airfoil surface, will be prevalent. In motion analysis with reduced frequency and speed, reduced frequency is an important dimensionless parameter. It's calculated as the difference between forward and flapping velocity. The lowered frequency can be utilized to analyze the aerodynamic performance of a natural flyer. Instability occurs when the decreased frequency is increased in two-dimensional flapping. The simulation was done using Ansys fluent to compute results for various flapping airfoils. the simulation was done with an association of udf file which create the plunging motion that this report is testing. Finally, the results obtained are verified with theory." (Authors)] Address: https://www.researchgate.net/publication/361070869_Aerodynamics_of_2D_Flapping_Wings

23534. Eslami Barzoki, Z.; Ebrahimi, M.; Clayton, J.; Sadeghi, S. (2021): Phylogenetic beta diversity of Odonata assemblages in the extreme condition of Central Iran. *Journal of Insect Conservation* 25(1): 175-187. (in English) ["Freshwater ecosystems are of the most diverse ecosystems in the world, but anthropogenic disturbance and climate change are threatening the biodiversity of these habitats, particularly in the highly vulnerable arid regions. Understanding the compositional patterns in aquatic biota and discovering factors responsible for these patterns enable researchers to predict the impacts of environmental changes and reduce their destructive effects. As a first step for evaluating the conservation value of freshwater ecosystems in the arid areas of Central Iran, we investigated the phylogenetic beta diversity of Odonata assemblages and their response to climate, landscape, and local predictors. A total of 41 water bodies were surveyed and 42 species of Odonata were recorded. The distance matrices related to the total phylogenetic beta diversity of Odonata and the replacement and richness difference components were computed. Each of the three dissimilarity matrices were modelled by generalized dissimilarity modelling (GDM). The average phylogenetic beta diversity was high, and the replacement component had a higher contribution rather than the richness difference component. GDMs results showed that total phylogenetic beta diversity was strongly associated with climate and local predictors. The most influential variables observed were climate variables. Our findings indicated that even in extreme conditions, the freshwater ecosystems could support species with various phylogenetic histories. We emphasize the importance of man-made water bodies in supporting freshwater biodiversity in arid areas. Given the growing threat of habitat degradation and climate change, with no conservation plan, many vulnerable species may be in danger of localized extinction within the region." (Authors)] Address: Ebrahimi, M., Department of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran & College of Science and Engineering, Flinders University, Bedford Park, South Australia, Australia

23535. Talmale, S.S. (2021): Odonata In Koyna Wildlife Sanctuary, Maharashtra. *Fauna of Koyna Wildlife Sanctuary, Maharashtra, Conservation Area Series* 66: 218-243. (in English) ["An account of Odonata known from Koyna Wildlife Sanctuary, Satara district, Maharashtra is presented here. The species wise detailed account of 69 species belonging

to 43 genera of 11 families is included. Twelve species reported from the sanctuary are Indian endemic of which *Prosticta hearseyi* Fraser, 1922, *Euphaea fraseri* (Laidlaw, 1920), *Pseudagrion indicum* Fraser, 1924, *Gomphidia kodaguensis* Fraser, 1923 and *Heliogomphus promelas* (Selys, 1873) are endemic to the Western Ghats." (Author)] Address: Talmale, S.S., Zoological Survey of India, Western Regional Centre, Vidyanagar, sector 29, Akurdi, Pune 411 044, India. Email: s_talmale@yahoo.co.in

23536. Yi, Z., Huang, Y.; Yi, H.; Zhang, X.; Li, W. (2021): Biodiversity of macrozoobenthos in the Chebaling National Nature Reserve, Guangdong Province. *Biodiversity Science* 29(5): 680-687. (in Chinese, with English summary) ["Purpose: Zoobenthos are important components of local biodiversity, food webs, and biogeochemical circulation processes, and are important water quality indicators. Despite their recognized importance, current research on freshwater macrozoobenthic fauna in forested inland water bodies (reservoirs, lakes, streams) in China is lacking. Method: To better understand macrozoobenthic communities and the ecosystem services they provide, we conducted a two-year (2019–2020) systematic field survey across nine sampling sites of different substrates in Chebaling National Nature Reserve, Guangdong Province. These sites encompassed experimental, buffer, and core zones, and stretched from 345 m a.s.l. to 751 m a.s.l. The surveyed habitats included forested rivers, mountain streams, ponds, reservoirs, paddy fields, and ditches, which contained substrates comprising rock, gravel, sand, hardened riverbed, and silt. We applied multiple methods to survey the various habitats, including dip netting in shallow water, brushes and tweezers to isolate attached species under rocks, and baits and shrimp cages to capture species in deep water. During field surveys, we measured species composition and took preliminary records of population levels. We then analysed metrics of species composition, spatial distribution, environmental indicators, and ecosystem function. Results: In total, we identified 57 species of macrobenthic fauna (belonging to 4 phylum, 6 classes, 18 orders, and 40 families) in the reserve. Eighty percent of species were arthropods, and 90% of arthropods were aquatic insects and their nymphs. We recorded 22 species and eight families of nymphs in Odonata, which constituted 38% of all captured species. Nymphs of EPT species (Ephemeroptera, Plecoptera, and Trichoptera) constituted 22% of all species. We commonly recorded *Semisulcospira libertina* (Gould, 1859) in various flowing water bodies, along with a considerable population of pristine water indicator species in the low-altitude experimental area. Conclusion: Macrozoobenthic fauna in Chebaling National Nature Reserve comprised species typical of subtropical forest freshwater ecosystems. Large proportions of species that favored flowing water conditions were recorded in sites with various water bodies and elevations, and were even recorded in disturbed sites (i.e., in both experimental areas and artificial water bodies). Most species were water quality indicators that reflected the major water forms and overall quality of the reserve. The high diversity of aquatic predatory insects we recorded indicates that there is a sufficient amount of small prey in the ecosystem. Furthermore, our results suggest that the diverse and abundant macrozoobenthos can serve as considerable source of prey to predators in the reserve. Overall, our results provide data to inventory zoobenthic species and perform environmental assessments, which can further be enhanced by continued long-term monitoring of zoobenthos in Chebaling National Nature Reserve." (Authors) *Neurobasis chinensis*, *Calopterygidae* undefined sp. 1, *Calop.* undefined sp. 2, *Calop.* undefined sp. 3, *Euphaea decorata*, *E. opaca*, *Periaeschna zhangzhouensis*, *Periaeschna*

flinti, *Planaeschna skiaperipola*, *P. suichangensis*, *Asiagomphus hainanensis*, *Fukienogomphus prometheus*, *F. promineus*, *Heliogomphus retroflexus*, *Ophiogomphus sinicus*, *Sieboldius deflexus*, *Chlorogomphus papilio*, *Anotogaster sieboldii*, *Macromia malleifera*, *M. berlandi*, *Pantala flavescens*, *Zygonyx iris*] Address: Yi, Z., School of Life Sciences, Guangzhou University, Guangzhou 510006, China. Email: 13533015500@139.com

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23537. Alcantra, E.; Carvalho Costa, H.A.; Ribeiro De Moraes, C.H.; Miguel Teodoro, J.C.; Marques, R.F.; Souza de Oliveira, A. (2022): Avaliação da qualidade da água por meio de insetos bioindicadores em Três Corações, MG. Evaluation of water quality through bioindicator insects in Três Corações, MG. *Conjecturas* 22(6): 150-165. (in Portuguese, with English summary) ["The aim of this study was to evaluate water quality using bioindicator aquatic insects in Três Corações, MG. A survey, identification and analysis of insects was carried out to determine the quality of the water at Unico's Experimental Farm. The trap used for the collections was the type D entomological net. The collections were defined in three points of Foz (P1, P2 and P3) and took place monthly for nine months. The collected macroinvertebrates were taken to the laboratory for screening and insect identification. Insects of the orders Hemiptera, Odonata, Trichoptera, Diptera, Coleoptera and Ephemeroptera were identified, totalling 114 insects. The order that stood out in quantity was Hemiptera. In relation to insects that are sensitive to environmental changes, Trichoptera, Ephemeroptera and Plecoptera, only 4.33% of the collected insects are representatives of these orders in an EPT index that classifies the water in the studied places with poor quality. According to the BMWP-/ASPT indices, P1 presented water with probably polluted quality, and points P2 and P3 presented dubious quality. Thus, it can be concluded that the place where the project was carried out is an environment that undergoes changes." (Authors) Odonate taxa are treated at family level.] Address: Alcantra, Eliana, Faculdade de Administração e Ciências Econômicas. E-mail: lialcantra@yahoo.com.br

23538. Chowdhury, A.J.K.; John, A.; Aqilah, N.S.; Abdullah, R.; Salihah, N.T.; Basir, K.H.; Marsal, C.J. (2022): Macrobenthic community towards sustainable aquatic ecosystem: a systematic review along the coastal waters of Malaysia. *Geology, ecology and landscapes* 88(1): 57-70. (in English) ["Macrobenthos animals are an architect of a variety of roles including as a part of the food web of aquatic ecosystem and improve the structure of the sediment and can determine the quality of the water. Macrobenthos communities have shown their potential role in biomonitoring to analyze contaminant loads due to high sensitivity to organic pollutants along the coastal water area. Besides, it is also used to determine heavy metals and petroleum hydrocarbons in coastal water due to their long sustainability with chemicals are primarily related with industrial calamities and occupational activities. Based on above perspectives, this systematic review has shown interesting findings about the macrobenthic diversity including community composition in the coastal areas of Malaysia. The study has focused on the diversity and abundance of macrobenthos communities along some potential coastal areas of Malaysia which emphasis on the states of Johor, Pulau Pinang, Selangor, Pahang, Terengganu, and Sarawak. Several studies have evidently revealed that pollutants and human activities have contributed to loss of macrobenthos towards abundance (individuals/m²) and species richness. The highest abundance of macrobenthos was Coleoptera

sp. (1650 ind./m² followed by Hemiptera sp. (860 ind./m²) were observed in Sarawak and Crustacea sp. (597 ind./m²) was found in Selangor, respectively. While Crustacea (10 ind./m²) was found as the lowest in the coastal water Pahang only. A major shortcoming among the studies was sampling time along with sampling method which was observed in this systematic review of different studies of macrobenthic assemblages in the coastal waters of Malaysia. However, the existing study reveals the baseline information on macrobenthic community which are still inadequate in Malaysia. Hence, a long-term monitoring for eco-biology and species diversity of macrobenthic assemblages are necessary for their sustainable development in this fascinating tropical coastal water of Malaysia." (Authors) Taxa are treated at order level.] Address: John, A., Inst. of Oceanography & Maritime Studies (INOCEM), Internat. Islamic Univ, Malaysia, Kuantan 25200 Pahang, Malaysia. Email: akbarjohn50@gmail.com

23539. Deliry, C. (2022): Liste des Odonates du Bénin. Mise à jour au 31 octobre 2022. – Abrégé d'odonatologie béninoise - Compendium of Beninese Odonatology (<https://odonates.net/benin/>): 7 pp. (in French) [<https://deliry.net/pdf/ListeOdonatesBenin2022.pdf>] Address: Deliry, C.; Email cyrille.deliry@orange.fr

23540. Echeverría-Sáenz, S.; Ugalde-Salazar, R.; Guevara-Mora, M.; Quesada-Alvarado, F.; Ruepert, C. (2022): Ecological integrity impairment and habitat fragmentation for Neotropical macroinvertebrate communities in an agricultural stream. *Toxics* 2022, 10, 346. <https://doi.org/10.3390/toxics10070346>: 16 pp. (in English) ["The Volcán River watershed in the south Pacific of Costa Rica comprises forests, small urban settlements, cattle fields, and intensive agriculture (mostly pineapple and sugarcane). The ecological integrity and quality of its waters was assessed from 2011–2013 and 2018–2019 by means of physical-chemical parameters (pH, conductivity, temperature, DO, DBO, nitrate, total phosphorus, and pesticide residues) and benthic macroinvertebrate (MI) sampling in eight sites (Volcán, Cañas, and Ángel Rivers, and Peje and Maura streams), resulting in high ecological integrity in all sites except the Peje stream, which is polluted with nitrates and pesticides. Only in this stream was there a marked seasonal variation in the abundance of 16 MI families including Leptohyphidae, Leptophlebiidae, Philopotamidae, Glossosomatidae, and Corydalidae, among others, whose presence was limited exclusively to the dry season (December to April), disappearing from the stream in the rainy season, with corresponding peaks in nitrate (max 20.3 mg/L) and pesticides (mainly herbicides and organophosphate insecticides). The characteristics of the watershed, with large areas of forest and excellent water quality, allow for the re-colonization of organisms into the Peje stream; however, those organisms are incapable of development and growth, providing evidence of a contaminant-driven habitat fragmentation in this stream during the rainy season." (Authors) Taxa - including Odonata - are treated at family level.] Address: Echeverría-Sáenz, Silvia, Central American Institute for Studies on Toxic Substances (IRET), Universidad Nacional, Heredia 86-3000, Costa Rica. Email: silvia.echeverria.saenz@una.ac.cr

23541. Krogh, M.; Gorissen, S.; Baird, I.R.C.; Keith, D.A. (2022): Impacts of the Gospers Mountain Wildfire on the flora and fauna of mining-impacted Newnes Plateau Shrub Swamps in Australia's Eastern Highlands. *Australian Zoologist* 42(2): 199-216. (in English) ["The Gospers Mountain Fire was the largest wildfire on record in New South Wales. All of the swamps on the Newnes Plateau were burnt, with some areas experiencing fire of very high severity. Despite

this severity, the vegetation in all unmined reference swamps recovered relatively quickly, with substantial vegetation cover and biomass returning within 10 weeks. These swamps retained most of their peat and plant species, and both their surveyed endangered fauna species (Blue Mountains Water Skink *Eulamprus leuraensis*; *Petalura gigantea*). This demonstrated the resilience of reference Newnes Plateau Shrub Swamps and their endangered species populations to significant bushfire events. In stark contrast, after the wildfire there was evidence of extensive combustion and oxidation of peat soils in swamps located above the footprint of prior longwall coal mining operations. Populations of endangered species, which were already in significant decline (due to longwall mining impacts on swamp hydrology), are now vulnerable to localised extinctions in these undermined swamps. Mining is ongoing in these areas and failure to protect the remaining Newnes Plateau Shrub Swamps from the hydrological impacts of longwall mining will likely lead to further ecosystem collapse in undermined swamps, and further localised extinctions of endangered species populations in these swamps. ... *Petalura gigantea* monitoring results for the 2020-2021 summer flying season for the Swamped by Threats Project (Baird 2021) have identified that: • No *Petalura* were recorded in Carne West Swamp, Gang Gang West Swamp or Gang Gang East Swamp; • These undermined swamps no longer include any areas of potential breeding habitat for the species; There was no evidence of any burrows of crayfish (*Euastacus australasiensis*) persisting, further confirming the loss of groundwater from these systems; • Budgery Creek (PNP01) and Dinner Gully (PNP04) swamps recorded abundant *Petalura*, including various mating pairs and ovipositing females; and • Both reference swamps are healthy, with extensive seepage areas and abundant active crayfish burrows" (Authors)] Address: Krogh, M., New South Wales Dept of Planning & Environment, Sydney, NSW 2124, Australia. Email: martin.krogh@environment.nsw.gov.au

23542. Liceaga, A.M. (2022): Edible insects, a valuable protein source from ancient to modern times. *Advances in Food and Nutrition Research* 101: 129-152. (in English) ["The current COVID-19 pandemic has demonstrated that we are not prepared to deal with food security amid unexpected situations; the FAO (Food & Agriculture Organization) has stipulated that the future of our food & agriculture looks challenging toward the year 2050; primarily in response to the fact that global population is expected to increase by 9 billion people by 2050. Although entomophagy has been practiced by humans for thousands of years, until recently, edible insects have gained special attention due to their high nutritional value (particularly their high protein and essential amino acid content) and lower environmental impact that could help alleviate the global food demand. Edible insects are classified into eight main orders belonging to Blattodea, Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata, and Orthoptera. Several traditional cooking (e.g., boiling, roasting, sun-drying) and processing technologies (e.g., pasteurization, enzymatic proteolysis, high pressure processing) have shown that it is feasible to prepare safe and nutritious insects and/or foods with insects. Nevertheless, challenges associated with consumers acceptance to eat insects, as well as potential presence of anti-nutritive factors and allergens, need to be carefully evaluated as the industry grows in the coming years. Foreseeing such food shortages during pandemics and future food security concerns, consumers, scientists, and the food industry need to consider the value of farming insects as promising protein sources." (Author)] Address: Liceaga, Andrea, Protein Chemistry & Bioactive Peptides Lab., Dept Food Science, Purdue Univ., West Lafayette, IN, USA. Email: alicceaga@purdue.edu

23543. Moreno-Pallares, M.; Lobo Hernández M.; Gutiérrez-Moreno L.C.; Pérez-Gutiérrez, L. (2022): Relación de las larvas de Odonata con las raíces de *Eichhornia crassipes* en la ciénaga La Larga, Atlántico, Colombia. *Intropica* 17(2): 192-201. (in Spanish, with English summary) ["The purpose of this study was to evaluate the association of Odonata larvae with the roots of *Eichhornia crassipes* in La Larga wetland. For the capture of Odonata larvae, standardized sampling techniques for aquatic macroinvertebrates were used. Six samplings were carried out and in each sampling 100 individuals of *E. crassipes* were collected. The length and volume of each root were obtained. A total of 738 individuals and 10 species of Odonata were collected; *Miathyria marcella* presented the highest abundance, with 83 % of the total sampled. The percentage of occupation of the roots of *E. crassipes* by Odonata larvae was 58 % (346 of the 600 roots collected). The collected roots varied between 5 and 58 cm in length and between 5 and 450 ml in volume. Significant differences were found in the composition and structure of the larvae with respect to the volume of the roots. Larval lengths ranged from 2.4 to 24.3 mm; most of the collected individuals were found in the length range between 5.1 and 10 mm. In conclusion, the size of the root is not a determinant for the distribution of odonates in the roots of *E. crassipes*, while the volume of the roots of *E. crassipes* does influence the composition of larvae." (Authors) *Ischnura capreolus*, *Neoerythromma cultellatum*, *Telebasis salva*, *T. filiola*, *Erythemis* sp., *Dythemis sterilis*, *Miathyria simplex*, *M. marcella*, *Brachymesia herbida*] Address: Monero-Pallares, María, Grupo de investigación Biodiversidad del Caribe colombiano, Universidad del Atlántico, Barranquilla, Colombia

23544. Neha, K.; Kaur, G. (2022): Karyotypic studies on seven Chlorocyphid species based on C-bands, AgNOR's and AT-GC regions with review of the hitherto cytologically examined data of family Chlorocyphidae (Odonata: Zygoptera). *International Journal of Zoological Investigations* 8(2): 944-956. (in English) ["Cytogenetic characterization on seven species of family Chlorocyphidae by carbol-fuchsin staining, Cbanding, silver nitrate staining and DAPI and CMA3 staining has been done. Among these, *Aristocypha quadrimaculata*, *A. trifasciata*, *Helioocypha biforata*, *H. bisignata*, *H. perforata* and *Paracypha unimaculata* are of subfamily Rhinocyphinae and *Libellago lineata* is of subfamily Libellaginae. All the species of subfamily Rhinocyphinae possess $n=12m$, which is the type number of the subfamily and complement is characterized by the presence of one large autosomal bivalent, originated by the autosomal fusion. But *L. lineata* with $n=13m$ is the only species of subfamily Libellaginae. C-bands and NOR's are mostly detected on terminal ends of autosomal bivalents in all the 7 species and also at interstitial regions of large bivalent. X chromosome is entirely C-positive in all the species, while it is NOR-positive in both the species of genus *Aristocypha*, *P. unimaculata*, *H. perforata*, and shows NOR on one terminal end in *H. bisignata* and *L. lineata*. m bivalent is C-negative in *H. biforata* and in both the species of genus *Aristocypha*, while shows C-bands on both the terminals in *H. perforata*, *P. unimaculata* and *L. lineata*, whereas possesses C-band on one terminal end in *H. bisignata*. m bivalent shows NOR on one terminal end in *P. unimaculata* and *L. lineata*, while NOR-negative in all the species of genera *Aristocypha* and *Helioocypha*. Complement of all the species shows bright DAPI and weak CMA3 signals which depicts the presence of more AT rich regions than GC regions." (Authors)] Address: Neha, Kathoria, Department of Biosciences, Division: Zoology, Career Point University, Hamirpur 176041, Himachal Pradesh, India

23545. Selvaraj, P.; & Victor, R. (2022): Notes on Indian Pond Heron *Ardeola grayii* feeding on the dragonfly, Wandering Glider, *Pantala flavescens* from Coimbatore, Tamil Nadu, India. International Journal of Environmental Studies 80(4): 853-855. (in English) ["The Indian Pond Heron *Ardeola grayii* is a medium-sized wader belonging to the family Ardeidae and it is commonly known as the paddy bird. It mainly feeds on fishes, amphibians, crustaceans, and insects. Various foraging behaviours of the Indian Pond Heron include walk slowly and surprise attack, walk fast and strike, fish baiting, scavenging, stand and wait, probing and floating. There have been earlier reports of Indian Pond Heron feeding on bees from a perch in Bangalore and on dragonflies in Rishi Valley, Chittoor District, Andhra Pradesh, but this unique feeding behaviour had not been described in detail. Here, we consider this behaviour as a combination of 'hawking' and 'sit-and-wait' ambush predation. Hawking is a feeding strategy by which birds catch flying insects in the air. The term usually refers to a technique of sallying out from a perch to snatch an insect and then returning to the same or a different perch, although some references tend to treat hawking and sallying as two different strategies. Ambush predators stay concealed and wait for the prey to come close and then launch an attack to capture the prey. Ambush predators employ various strategies like hiding, camouflage, mimicry and traps without active pursuit of prey. On 31 October 2020 at 03:38 pm, we video recorded an Indian Pond Heron feeding on *Pantala flavescens* from the PRS Police Quarters (11° 0'43.67"N; 76°58'42.80"E), Coimbatore, Tamil Nadu, India. A small portion of this residential area has tall shrubs and trees. During this observation, the heron was perched on the top of the shrubs where there was a swarm of *P. flavescens*. Within 30 minutes, the Indian Pond Heron fed on over 15 dragonflies from the same perch. Four video clips were taken during this observation using a Nikon, P900 digital camera and put together as a YouTube video. The total video recording time was 268 seconds and during this period three dragonflies were successfully captured. The average time for each prey was 30 seconds. One attempt was unsuccessful, and the caught prey escaped in two seconds. Ambushing is a random and opportunistic event. The prey capture depends on the density and the activity of the prey. Ambushing a fast-flying dragonfly in a swarm is a difficult task that requires a combination of several sensor' perceptions resulting in quick reaction times to the presence of prey. During this set of observations, the success rate of prey capture was 3/4 (75%)." (Authors)] Address: Selvaraj, P., Salim Ali Centre for Ornithology & Natural History, Coimbatore, India. Email: regvictor@gmail.com

23546. Shah, S.H.R.; Mckinney, M.; Shabbir, Z.; Ahmed, A. (2022): An investigation of varying peak height and leading edge roundness on the aerodynamic performance of corrugated wings at low Reynolds Number. AIAA 2022-0020, Session: Bio-Inspired Aerodynamics I, Published Online:29 Dec 2021<https://doi.org/10.2514/6.2022-0020>: (in English) [Verbatim: Corrugated or pleated wings are common in nature among a variety of moths and bugs. These corrugations suppress the flow separation at higher angles of attack and help achieve better aerodynamic performance. The shape of corrugation is insect-specific and varies in a span wise direction as per the size and flight conditions. This research investigates the static and quasi-static aerodynamic performance of two corrugated airfoils, each with different corrugation peak heights, inspired by the fore wings of a *Aeshna cyanea*, with both flat and rounded leading edges. The direct force and moment measurements were made at Reynolds Numbers of 58,000, 100,000, and 125,000. The results showed that the lift curve slope of each airfoil was insensitive to the Reynolds

number. The leading edge roundness helped in reducing the drag at higher Reynolds numbers but decreased stalling and C1max for certain configurations. Flow visualizing was conducted using fluorescence in the water tunnel to gain an understanding of the eddies trapped in the valleys. It was observed that the vortices initiated from the sharp corner of the flat leading edge were convected downstream and got trapped in the corrugated valleys that helped in delaying the flow separation up to a significantly higher angle of attack.] Address: <https://arc.aiaa.org/doi/10.2514/6.2022-0020>

23547. Spikkeland, I.; Dolmen, D.; Haga, A.; Krogstad, D. (2022): Biologisk mangfold i stiletjern marker. Østfold-Natur nr. 76: 26 pp. (in Norwegian) ["Summary: Stikletjern is a small lake (area 200 daa) which is now part of the Buerelva and the Store Levassdraget, but which before it was sunk in the 19th century had drainage towards Lake Øymarksjøen and the Haldenvassdraget. The greatest depth is 8 m, and the lake has stable temperature stratification in the summer season. It is a nutrient-rich (eutrophic) lake, and with relatively large groundwater and swamp areas in the northern and north-western part. Purely typologically, it can be characterized as a small, eutrophic, humus-rich and moderately calcareous lowland lake. The lake has a rich flora of aquatic and swamp plants. There are large deposits of the rare species of marigold, and in addition, the lake's bladderwort grows in the lake, a species rarely found in Norway. Both species are red-listed in category VU (vulnerable). Among the swamp plants, there is a large occurrence of the fern myrtle, also the one on the red list in category VU. Water snails are very well represented in Stikletjern with 13 species, including the rare ear pond snail *Radix auricularia*. So many snail species have only been recorded in a small number of other lakes in Norway, all in the Store Le and Haldenvassdraget. Of clams, 9 species have been identified, all small clams. *Musculium lacustre* and *Pisidium henslowianum* are both species with a limited south-eastern distribution in Norway. Duck clams have strangely not been detected in Stikletjern. 18 dragonfly species have been recorded in the lake, but based on records in nearby localities there are undoubtedly even more. Stikletjern is therefore among the most species-rich dragonfly lakes in Norway. *Somatochlora flavomaculata* is red-listed in the category vulnerable (VU). The southern species *Brachytron pratense* has been detected in Stikletjern as the only place in Indre Østfold. All the Norwegian *Leucorrhinia* species are also recorded at the lake. The crustacean fauna is very diverse. 76 species of water fleas and jumping crayfish have been detected, which indicates that the lake is at the top of Norway when it comes to small crayfish. Two of the species are red-listed, both in the NT category; *Ceriodaphnia laticaudata* and *Diacyclops bisetosus*. The water flea *Pleuroxus striatus* has only been found in three other places in Norway (Oslo area), and has also been recorded in the nearby Gjølsjøen, while the jumping crayfish *Macrocyclus distinctus* has only been found in one other place in this country, near Oslo. *Oxyurella tenicaudis*, *Eurytemora lacustris* and *Thermocyclops crassus* were on the previous red list from 2010. Some of the other species are also rare and have a south-eastern distribution in Norway. The zooplankton community in Stikletjern comprises a total of 18 species, which is a very high number considering the lake's modest size. The jumping crayfish *Eudiaptomus gracilis* and *Thermocyclops oithonoides* appear most numerous. Examples of rarer species are *Eudiaptomus graciloides* and *Cyclops vicinus*, which were detected in small numbers. *Thermocyclops crassus* and *Heterocope appendiculata* were recorded in the lake in 1998, but were not found in 2019. The fish fauna in Stikletjern only includes roach, perch and pike. There used to be flounder in the lake,

but this species seems to be extinct. Only one species has been found in the lake which is on the list of alien species, the water moss swan food *Ricciocarpus natans*, in category PH (potentially high risk). In addition, two other species have been registered which are now spreading northwards in Norway, but which are not on the alien species list; the rotifer *Kellicottia bostoniensis* and the jumping crayfish *Cyclops vicinus*. In total, 71 bird species have been recorded in and near Stikletjern, of which 30 species are associated with water and wetlands. More species must be expected with more systematic registrations, including more breeding species. As a conclusion, one can say that Stikletjern has an exceptionally high species diversity within certain species groups, especially when you take into account the lake's modest size. The groups that stand out in particular are water snails and small crayfish, and to some extent also mussels and dragonflies. But it is conceivable that greater field efforts will reveal that several other groups also have a similar diversity of species. Important reasons for the species richness are the lake's location in relation to the species-rich Vänern and Baltic Sea area, that it is relatively rich in nutrients from nature's side, and that it is located in an area with a relatively warm summer climate." (Authors/Google translate)] Address: <https://kudos.dfo.no/documents/50836/files/33284.pdf>

23548. Talmale, S.S. (2022): Odonata In Fauna of Navegaon National Park, Maharashtra. Fauna of Navegaon National Park, Maharashtra, Conservation Area Series 68, Zoological Survey of India, Kolkata: 177-191. (in English) [India; "The species wise detailed account of 45 species belonging to 30 genera of 7 families are included. All the species are reported from the national park area for the first time." (Author)] Address: Talmale, S.S., Zoological Survey of India, Western Regional Centre, Vidyanagar, sector 29, Akurdi, Pune 411 044, India. Email: s_talmale@yahoo.co.in

23549. Talmale, S.S. (2022): Insecta: Odonata in faunal diversity of Nauradehi Wildlife Sanctuary, Madhya Pradesh. Faunal Diversity of Nauradehi Wildlife Sanctuary, Madhya Pradesh, Conservation Area Series, Zoological Survey of India, Kolkata: 33-51. (in English) ["An account of Odonata known from Nauradehi Wildlife Sanctuary, Sagar, Damoh and Narsimhapur districts, Madhya Pradesh is presented here. The species wise detailed account of 50 species belonging to 33 genera of 7 families are included. All the species are reported from the sanctuary area for the first time and the species *Cyclogomphus heterostylus* Selys, 1854 is reported first time from Madhya Pradesh." (Author)] Address: Talmale, S.S., Zoological Survey of India, Western Regional Centre, Vidyanagar, sector 29, Akurdi, Pune 411 044, India. Email: s_talmale@yahoo.co.in

23550. Theys, C.; Verheyen, J.; Delnat, V.; Janssens, L.; Tüzün, N.; Stoks, R. (2022): Thermal and latitudinal patterns in pace-of-life traits are partly mediated by the gut microbiome. *Science of The Total Environment* 855, 158829: (in English) ["The integration of life-history, physiological and behavioural traits into the pace-of-life generates a powerful framework to understand trait variation in nature both along environmental gradients and in response to environmental stressors. While the gut microbiome has been hypothesized as a candidate mechanism to underlie differentiation in the pace-of-life, this has been rarely studied. We investigated the role of the gut microbiome in contributing to the differentiation in pace-of-life and in thermal adaptation between populations of *Ischnura elegans* damselfly larvae inhabiting warmer low latitudes and colder high latitudes. We carried out a common-garden experiment, whereby we manipulated the exposure

of the damselfly larvae to two key global warming factors: 4°C warming and a 30 °C heat wave. We obtained three major insights. First, by comparing with the bacterial composition of the food source and the bacterioplankton, our results indicate that damselfly larvae differentially take up bacteria from the surrounding environment and have a resident and functionally relevant microbiome. Second, there was a latitude-specific gut microbiome, which was associated with the host's latitudinal differentiation in activity, a key pace-of-life trait. Third, the gut microbial community composition of high-latitude larvae converged towards that of the low-latitude larvae under heat wave exposure, with an increase in bacteria that likely are important in providing energy to cope with the heat wave. This suggests an adaptive latitude-specific shift in the gut microbiota matching the better ability of low-latitude hosts to deal with heat extremes. In general, our study provides rare evidence for the gut microbiome contributing to latitudinal differentiation in both the pace-of-life and heat adaptation in natural populations." (Authors)] Address: Theys, Charlotte, Laboratory of Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Charles Deberiotstraat 32, 3000, Leuven, Belgium. Email: theys.charlotte@kuleuven.be

23551. Tucumango, J.K.V.A. (2022): Estudio del orden Odonata en el Caserío Nuevo Perú del centro poblado Huambocancha Baja - Cajamarca. Tesis para Optar el Título Profesional de: Ingeniero agrónomo, Universidad Nacional de Cajamarca, Facultad de Ciencias agrarias: XVI, 85 pp. (in Spanish, with English summary) ["In the Nuevo Perú hamlet, Huambocancha Baja Populated Center, district, province and region of Cajamarca - Peru, the research was carried out with the objectives of determining the diversity of the Odonata Order and taxonomically identifying the collected specimens at the genus level. For eight months and on a weekly basis, the collection of adult and immature stages was carried out during the time of day when they showed their greatest activity using an aerial entomological net. For the case of immature states (eggs and naiads), the aquatic network was used. A field code was assigned to each collected insect, as well as the corresponding observations (collection time, weather conditions and type of aquatic system) were recorded on a form. The diversity of Odonata in the Nuevo Perú hamlet of the Huambocancha Baja Populated Center - Cajamarca, in the three water sources evaluated, for the state of development of naiad according to the Margalef, Simpson and Shannon indices was 1.34 (low), 0.62 (high) and 1.12 (low), while for the adult developmental stage it was 2.16 (medium), 0.75 (high) and 1.38 (low), as well as *Rhionaeschna marchali*, *Sympetrum gilvum*, *Erythrodiplax cf. fusca*, *Oxylagma dissidens*." (Author)] Address: <https://repositorio-unc.edu.pe/handle/20.500.14074/4766>

23552. Zhao, Y.; Yang, H.; Wang, D.; Wang, G. (2022): Reconstruction of bionic models and nanomechanical behavior of dragonfly membranous wings. *International Journal of Modern Physics B* 36, No. 16, 2250084 (2022): (in English) ["Dragonflies fly in flapping wing flight, bearing a variety of variable forces during flight. To comprehend and study from the biological system and then carry out technological innovation, the characteristic point cloud data of dragonfly wings were obtained and the 3D geometric models were reconstructed. The biomechanical characteristics of Costa, Radius and Postal veins of the wings were examined by a nanoindenter. It was shown that the reduced modulus and nanohardness of Radius of dragonfly forewings and hindwings are large. The maximum reduced modulus and nanohardness of Costa, Radius and Postal veins of hindwings appear at the place 0.7L of dragonfly wings. The biomechanical characteristics

of dragonfly wings were researched and then the deformations and stresses of the bionic models under the uniform load were investigated. It was shown that the dragonfly wings are less deformed under the uniform load and the chief veins have stronger stability and bearing capacity. The combinations of the main veins and branch veins can improve the overall strength and load-bearing capacity of dragonfly wings. It tries to explore the structural models of imitating dragonfly wings with good load-bearing capacity and, then, were used to guide the plan and manufacturing of thin film and offer novel ideas and methods for the study of thin film." (Authors)] Address: Zhao, Y., The College of Mechanical & Power Engineering, Henan Polytechnic University, Jiaozuo, Henan, P. R. China. Email: yanruzhao@163.com

23553. Zheng, D.; Zhang, X.; Zhang, H.; Nel, A. (2022): New Lower Cretaceous aeshnopteran dragonflies from western Liaoning, NE China (Odonata: Anisoptera). *Cretaceous Research* 140, December 2022, 105324: (in English) ["Aeshnoptera greatly diversified with a wide distribution during the Late Jurassic to Early Cretaceous. This clade is extraordinarily common in the lacustrine basins of northern China and mainly recovered from the Yixian Formation of western Liaoning and southeastern Inner Mongolia, which is one of the fossiliferous units yielding the famous Jehol Biota. This study briefly reviews all reported aeshnopteran dragonflies from the Mesozoic of China. Additionally, three new fossil Aeshnoptera are described from the Jianshangou Unit of the Yixian Formation of Beipiao, western Liaoning, northeastern China, including the *liupanshanii* Protoliupanshanian wangi Huang and Nel, 2010, *Parapetala yixianensis* sp. nov., and *Pseudoliupanshanian magnanicellula* gen. et sp. nov. The latter two taxa are considered as Aeshnoptera of uncertain position. These new fossils confirm the impressive diversity of the clade Aeshnoptera in the Jehol Biota." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

23554. Zhu, Z.; Song, B.; Xue, D.; Yang, W.; Lang, X.; Yang, X. (2022): Three-dimensional sweeping motion effects on hovering dragonflies. *Aerospace Science and Technology* 127, August 2022, 107701: (in English) ["This paper describes numerical simulations of the typical hovering mode of dragonfly wings with different sweeping motions. The simulation process involves solving the three-dimensional unsteady Navier–Stokes equations and exploring the effects of the sweeping motion on aerodynamic performance. Various parameters related to the three-dimensional sweeping motion are studied, including the sweeping amplitude, phase difference between flapping and sweeping motions, asymmetry of sweeping amplitudes of the forewing and hindwing, and frequency of sweeping motion. The results show that as the sweeping amplitude of the forewing and hindwing increases from 0 to 35°, the time-averaged lift and the lift efficiency increase by ~4 times and ~3.6 times respectively, while the power consumption first decreases and then increases. Moreover, increasing the sweeping amplitude delays the shedding of the trailing edge vortex. A phase difference of ~60° between flapping and sweeping maximizes efficiency and the change in phase difference can lead to vertical forces in opposite directions on the forewing and hindwing. Accordingly, the flow field interference between the two wings will be more serious. Greater symmetry between the sweeping amplitudes of the two wings leads to better lift performance. There is an optimal sweeping frequency which is also the same as the flapping motion, representing an elliptical trajectory that can make lift ~0.75 times higher. The optimal combination of various sweeping motion parameters may contribute to

better aerodynamic performance in the hovering state. This research provides theoretical guidance for the design of dragonfly-like aircraft with multiple degrees of freedom." (Authors)] Address: Dong X., School of Aeronautics, Northwestern Polytechnical University, Xi'an 710072, China. Email: xuedong@nwpu.edu.cn

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23555. Amarga, A.C.K.; Mercado, W.A.J.A. (2023): First report of *Euphaea refulgens* Hagen in Selys, 1853 (Odonata: Euphaeidae) on Mayon Volcano Natural Park, with some records from Luzon and Mindoro Islands, the Philippines. *Bulletin of the Natural History Museum - Plovdiv* 8: 43-48. (in English) ["*E. refulgens* is one of the three *Euphaea* species endemic in the Philippines and known only in Greater Luzon faunal region and Mindoro Island. This short note reports the first published documentation of *E. refulgens* in Mayon Volcano Natural Park, an active stratovolcano and a protected area situated in the Bicol peninsula, Luzon Island. In addition, some records of *E. refulgens* from institutional collections and field observations were provided." (Authors)] Address: Amarga, A.C.K., Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Taipei, Taiwan

23556. Borges, W.G.; Cozzer, G.D.; Durigon, G.R.; Lima-Rezende, C.A.; Rezende, R. (2023): Predator presence influences life history traits of *Aedes aegypti*. *Aquatic Sciences* volume 85, Article number: 58 (2023): (in English) ["Predator-prey relationships are not limited to predation. A predator may release chemical cues that can directly affect the physiology and behavior of prey by fear and intimidation. We aimed to test the effects of predator (dragonfly larvae) body size on larval development time and mortality, and on survival time, wing asymmetry, and adult size, of *Aedes aegypti*. We simulated predation risk by Libellulidae on *Ae. aegypti* using a microcosm approach. Microcosms consisted of 40 larvae of *Ae. aegypti* under the indirect effect of predators of different body sizes (four treatments of different body size classes, $n = 5$ per treatment) and predator absence (control treatment). Predator presence was found to have a strong effect on mosquito life history traits, whereas predator size had a weak effect. Predator presence increased prey larval mortality and wings size asymmetry, and accelerated development time, while it reduced adult body size and survival time. The results support predator presence as being responsible for changes in traits of *Ae. aegypti* during larval and adult stages, but with a weak effect of predator size." (Authors)] Address: Borges, W.G., Postgraduate Program in Environmental Sciences, Communitarian Univ. of Chapecó Region–Unochapeco, Chapecó, Santa Catarina, CEP: 89809-000, Brazil

23557. Bos-Groenendijk, G.I.; vrijwilligers (2023): De flora en fauna van Kroondomein Het Loo, rapportage monitoring 2022. Rapport VS2023.005, De Vlinderstichting, Wageningen: 25 pp. (in Dutch) [Verbatim/Google translate: Dragonfly routes: This year, the three dragonfly routes were counted again. The results of the routes are shown in table 7. The route in the Motketel was counted for the last time this year ($n=5$ odonate species). The stream is completely overgrown and the number of dragonflies has therefore decreased significantly at this location. A few stream bank dragonflies were still seen. The Wieselse Plas is again the route with the most species-rich species and with more than the current four visits, the species list could probably have been even longer ($n=24$ odonate species). In the fen along the Pomphulweg ($n=12$ odonate species), the target species *Leucorrhinia pectoralis* was observed once. *Aeshna juncea*,

which also occurs there, was not seen despite a few visits during the species' flight period.] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands

23558. Bos-Groenendijk, G.I.; Wolterbeek, T.M. (2023): SNL-monitoring Dagvlinders, sprinkhanen en libellen in Schuitwater 2023. Rapport VS2023.050, De Vlinderstichting, Wageningen: 29 pp. (in Dutch) ["Resume SNL monitoring was carried out in Schuitwater (LIP2-4) in 2023. The area is a legacy of the Meuse, which had its catchment area here until the last ice age. After the Meuse moved to its current bed, about 3 kilometers away, the remaining channels slowly filled with plant remains and became land. From the 18th century onwards, peat diggers dredged the peat from the channels to use it as fuel. This is how the elongated ponds were created. The research area covered 155 hectares and was examined for butterflies, dragonflies and grasshoppers. The mapping was carried out in accordance with the guidelines that apply to SNL monitoring. 19 field visits were made between early May and early September. Most plots have been visited two or three times. No important parts were missed. Of the area to be mapped, 98% was visited twice or more and 80% three or more times. The observations were recorded in the field with the LiveAtlas app (part of Avimap) from Sovon. On average, 5 minutes were spent crossing one hectare square during fieldwork. An average of 14 hectares was inventoried per fieldwork hour. In the research area, 30 species of butterflies, 30 species of dragonflies and 19 species of grasshoppers were observed. The regional importance of the research area is very great for butterflies and grasshoppers. Many special species have been observed and the number of individuals is also quite high. For dragonflies, the regional importance of this area is average. Stream restoration could possibly increase diversity here. This could include meandering, more diversity in the bankside vegetation, including variation in structure, and opening up densely vegetated parts of the stream. Some pools are also quite overgrown with reeds or are largely in the shade. To increase the diversity of dragonflies and amphibians here, it is recommended to apply pool management here. Large areas of the heath are overgrown with spruce, ferns and deciduous trees. These places are hardly interesting for butterflies and grasshoppers anymore. By opening up these places again, new habitat will be created for these species groups. ... 4.2 Dragonflies In the research area, 30 species of dragonflies were observed. Table 5 shows which species were found in which management types and the number of individuals observed. The relevant species discussed: *Lestes barbarus*, *L. virens*, *Libellula fulva*, *Brachytron pratense*, and *Sympetrum danae*. The number of species is average and the number of individuals is not very high. No Red List species were observed, but some species that are quite rare, such as *Somatochlora metallica*, *Orthetrum coerulescens* and *Coenagrion scitulum*." (Authors/Google translate)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands

23559. Das, J.K.; Hazarika, A.K.; Kalita, U.; Khanna, S.; Kalita, T.; Choudhury, S. (2023): Correction: Diversity of edible insects in a Natural World Heritage Site of India: entomophagy attitudes and implications for food security in the region. PeerJ 8:e10248. <http://doi.org/10.7717/peerj.10248>: 20 pp. (in English) [With a still growing population and skewed demographic structures across most societies of the world, the role of dragonflies „as nutrient-rich food has been increasingly advocated by researchers and policymakers globally. In this study, we examine the edible insect diversity and entomophagy attitudes of ethnic people in Manas National

Park, a UNESCO Natural World Heritage Site, located in Assam (India). The study involved a field investigation through which the pattern of entomophagy and the attitude towards insect-eating was studied. Following this, we examined the edible insect diversity and abundance at different sampling points. A total of 22 species of edible insects belonging to 15 families and eight orders were recorded from different habitat types. Out of these 22 species, orthopterans showed a maximum number of eight species followed by Hymenoptera (four), Hemiptera (three), Lepidoptera (two), Blattodea (two) and one species each from Coleoptera, Odonata, and Mantodea. Dominance, diversity, and equitability indices were computed along with the relative abundance of the insects concerning four habitat types. Aspects of the economic significance of entomophagy were also observed during the field investigation. To manage insects in the interest of food security, more attention should be given to sustainable collecting and rearing methods emphasizing their economic, nutritional, and ecological advantages." (Authors)] Address: Hazarika, A.K., Department of Zoology, Cotton University, Guwahati, India. Email: dr.arupkharika@gmail.com

23560. del Val, L.; Murga, A.A. (2023): Nuevos datos sobre los odonatos (Odonata) *Oxygastra curtisii* (Dale, 1834) (incertae sedis) *Gomphus similimus* (Selys, 1840) (Gomphidae) y *Brachytron pratense* (Müller, 1764) (Aeshnidae) en Cantabria (norte de España). Boletín de la Sociedad Entomológica Aragonesa 72: 196-198. (in Spanish, with English summary) [Records of the regionally rare odonate species *O. curtisii*, *G. similimus* and *B. pratense* in Cantabria province (Spain) are provided.] Address: Ludovico de Vega del Val, L., Técnico de la Sociedad Española de Ornitología en el P. N. Marismas de Santoña, Victoria y Joyel. Ctra. de Soano nº 4, 1º centro. 39180 Noja, Cantabria, Span. Email: ludovicodevega@hotmail.com

23561. Haines, W.P.; Triapitsyn, S.V.; Konicek, K.R.; Magnacca, K.N.; Renshaw, M.A.; King, C.B.A. (2023): Identity of a fairyfly (Hymenoptera: Mymaridae) egg parasitoid of the endemic, endangered damselfly *Megalagrion xanthomelas* (Odonata: Zygoptera: Coenagrionidae) on O'ahu, Hawai'i. Proceedings of the Hawaiian Entomological Society 55: 59-63. (in English) ["In November 2019 we reared 49 fairyfly wasps from a sample of *M. xanthomelas* eggs laid in stems and leaves of maile pilau (*Paederia foetida* L. Rubiaceae), collected in October 2019 from a stream at Tripler Army Medical Center (TAMC), Honolulu. Oahu, Hawai'i. The host damselfly is endangered throughout its range, but highly so on O'ahu, where only one wild population remains, confined to a 100 m stretch of stream and a nearby concrete drainage ditch (Polhemus 1996). Vegetation containing eggs was housed in a covered plastic tub containing dechlorinated water and kept inside an environmental chamber at 23°C (to match the observed water temperature at TAMC) with a 12:12 light:dark cycle. The sample was kept under constant aeration from an air pump. The sample was collected on 21 Oct 2019, and naiads and wasps both began hatching from the sample on 02 Nov. 2019, 12 days after collection. Based on extensive laboratory rearing, *M. xanthomelas* eggs incubated at 23°C typically begin hatching 14–16 days after oviposition, suggesting that these damselfly eggs were laid between 17 and 19 Oct. Therefore, the *Anagrus* eggs were likely laid sometime between 17 and 21 Oct., suggesting a development time of 12–16 days from egg to adult. Female wasps from this series" (Authors)] Address: Haines, W.P., Center for Conservation, Research, and Training, University of Hawai'i, Honolulu, Hawai'i, 96822, USA. Email: whaines@hawaii.edu

23562. Huskens, K.; Bos-Groenendijk, G.I. (2023): Dagvlinders, sprinkhanen en libellen in Mill, Langeboom en Cuijkse land 2023. SNL-monitoring. Rapport VS2023.054, De Vlinderstichting, Wageningen.: 29 pp. (in Dutch) ["SNL monitoring was carried out in the Mill, Langeboom and Cuijkse land area (NBP2-10) in 2023. The area is located in the northeast of the province of North Brabant. The Maas flows on the north and east side of the area. The plots consist mainly of grassland rich in herbs and fauna, largely grazed by cattle; by cattle, horses and sheep. In addition, there are some small pieces of heath within the area. There is a somewhat larger, weakly buffered fen in the center of the area. The research area covered 168 hectares and was examined for butterflies, dragonflies and grasshoppers. The mapping was carried out in accordance with the guidelines that apply to SNL monitoring. Seven field visits were made between early June and mid-September. Most plots have been visited two, three or four times. No important parts were missed. Of the area to be mapped, 91% was visited twice or more and 76% three or more times. The observations were recorded in the field with the LiveAtlas app (part of Avimap) from Sovon. On average, 3.3 minutes were spent crossing one hectare square during fieldwork. An average of 18 hectares was inventoried per fieldwork hour. 23 species of butterflies, 26 species of dragonflies and 13 species of grasshoppers were observed in the study area. The regional importance of the study area is average. ..."] (Authors/Google translate) Most interesting odonate species are: *Isoaeschna isocles*, *Brachytron pratense*, *Libellula fulva*, and *Sympecma fusca*.] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands

23563. Jouault, C.; Nam, G.-S.; Nel, A. (2023): *Koreaphlebia* gen. nov. (Odonoptera: Triadophlebiomorpha): new evidence of a Triassic age for the Amisan Formation in Korea. *Historical Biology* 35(9): 1551-1555. (in English) ["A new genus and species of Odonoptera is described and figured from the Amisan Formation as *Koreaphlebia iussradii* gen. et sp. nov. This new genus and species is placed in the Zygophlebiidae and differs from all other zygophlebid, inter alia, owing to the forewing with a distinct bridge IR2-RP2-IR1 perfectly straight, crossvein between MP and Cu+AA below apex of MAb vertical and rather long, base of CuP separating from that of CuA opposite point of junction between MAa and MP, at the crossing point of 'pillar' and Cu+AA, and RP3/4 with at most short distal branches covering a small area. This new specimen is the first Zygophlebiidae from the Amisan Formation. The temporal range of the Triadophlebiomorpha is used to discuss the dating of the Amisan Formation.] Address: Jouault, C., Institut de Systématique, Évolution, Biodiversité (ISYEB), Muséum national d'Histoire naturelle, CNRS, Sorbonne Université, EPHE, Université des Antilles, Paris, France. Email: jouaultc0@gmail.com

23564. Jouault, C.; Coutret, B.; Konhauser, K-O.; Nel, A.; Hakim, M. (2023): New odonatan (Odonata: Gomphaeschnidae; Synlestidae) from the Paleocene Paskapoo Formation: systematic and biogeographical implications. *Journal of Systematic Palaeontology* 21(1): 2261457: (in English) ["The Paleocene Paskapoo Formation in Alberta, Canada, offers a unique opportunity to gain insight into insect diversity at that time. This fossil insect-rich formation has yielded a variety of fossil arthropod specimens, including several wings of Odonata related to the genus *Alloaeschna* Wighton and Wilson, 1986. Here, we demonstrate that morphological characters previously used to separate three species are instead the result of intraspecific variability. We reinforce this demonstration using two examples of high variability and plasticity in

modern species of the family Aeshnidae. Accordingly, we reinterpreted the taxonomic position of *Alloaeschna marklae* Wighton and Wilson, 1986 syn. nov. and *Alloaeschna quadrata* Wighton and Wilson, 1986 syn. nov. as junior synonyms of *Alloaeschna paskapooensis* Wighton and Wilson, 1986. In addition, we describe the first occurrence of a zygopteran in the Paskapoo Formation, namely *Albertalestes paskapooensis* gen. et sp. nov. (Synlestidae). Importantly, this new taxon is the first representative of the family found in North America. We also reconstructed the relationships within the Synlestidae under Bayesian inferences with a newly assembled matrix. Finally, we discuss the biogeography of the clade considering its fossil record using parsimony ancestral state reconstruction." (Authors)] Address: Jouault, C., Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, AB, T6G 2E3, Canada. Email: Jouaultc0@gmail.com

23565. Kefford, B.J.; Hyne, R.V.; Brooks, A.J.; Bray, J.P.; Shenton, M.; Hills, K.; Nichols, S.J. (2023): Single-species acute lethal toxicity tests are not predictive of relative population and community effects of two salinity types. *Limnology and Oceanography Letters* 8: 181-189. (in English) ["Human-mediated salinity increases are occurring in freshwater globally, with consequent negative effects on freshwater biodiversity. Salinity comprises multiple anions and cations. While total concentrations are typically used to infer effects, individual ion concentrations and ion ratios are critical in determining effects. Moreover, estimates of toxicity from single-species laboratory tests, may not accurately predict relative effects on populations and communities. Here, we compared salinity increases from synthetic marine salts and sodium bicarbonate in an outdoor mesocosm experiment in southeastern Australia. We found different effects of salt types on stream macroinvertebrates at the population and community levels, where similar effects were predicted from single-species laboratory tests. Our results caution against the use of single-species laboratory-derived toxicological data to predict both environmentally safe salinity levels and the relative effects of different salt sources on freshwater biodiversity. ... Population level effects were considered on the 12 most abundant taxa. The densities of the remaining were insufficient and/or were too variable in the control for statistical analysis. Densities of oligochaete worms, caddisflies, mayflies, stoneflies, and riffle beetles were reduced by high concentrations of both salts compared to control treatments. Indeed, two of three abundant mayflies and two of three abundant caddisfly taxa were extirpated by high concentrations of both salts. Densities of *Offadens* sp. and *Austrophlebioides* sp. were reduced by low SMS and *Gripterygidae* densities were reduced by low NaCO₃ concentrations. The low concentrations of both SMS and NaCO₃ significantly reduced the density of *Agapetus* sp. In contrast, there were higher densities of Chironominae in the low SMS compared to the control. There were no differences between any treatment for blackfly (*Simuliidae*) nor *Hemigomphus* sp." (Authors)] Address: Kefford, B.J., Centre for Applied Water Science, Inst. Applied Ecol., Univ. Canberra, Canberra, Australian Capital Territory, Australia. Email: ben.kefford@canberra.edu.au

23566. Martoglio, J. (2023): Comparaison de la diversité taxonomique et fonctionnelle des communautés végétales et des invertébrés au sein de zones envahies et non envahies par des espèces végétales exotiques envahissantes. MSc thesis, Master en bioingénieur: gestion des forêts et des espaces naturels, à finalité spécialisée, Gembloux Agro-Bio Tech (GxABT): 83 pp. (in French, with English summary) ["Invasive alien plant species (IAPS) have diverse negative impacts on ecosystems and biodiversity, and management of

these species is expected to increase. This is particularly true in aquatic and riparian ecosystems that represent habitats of conservation value but which are severely invaded and can act as corridors for IAPS spread. My master's thesis has two main objectives: 1) set up an ambitious experimental design to be used to assess the effect of management actions; and 2) compare plant and invertebrate diversity (from both a taxonomic perspective) between invaded and non-invaded areas. I selected three systems, that are combinations of a particular plant invader, one management technique and one targeted ecosystem. They were selected among sites that will be managed by LIFE RIPARIAS, to ensure that control actions will be implemented and to have sufficient sites to choose from. The three IAPS are *Hydrocotyle ranunculoides*, *Impatiens glandulifera* and *Ludwigia grandiflora*, and the invertebrate groups are respectively aquatic macro-invertebrates (Odonata and Coleoptera) in aquatic habitats and Carabidae in tall herbs vegetation. I made vegetation surveys and collected invertebrates in invaded and non-invaded areas of invaded sites. For each system separately, I then compared diversity indices (species richness, Shannon, Simpson) and conservation value using ANOVA with invasion status as fixed factor and site as random factor. I also compared plant and invertebrate species composition with a principal coordinate analysis. The results did not highlight significant effect of invasion on plants communities except for Simpson index of communities invaded by *Hydrocotyle ranunculoides* due to the dominance of this species. Macro-invertebrate did not seem to be affected by the invasion neither except for odonates whose diversity and composition where significantly different between invaded and non-invaded areas in both aquatic habitats. My hypothesis is that invasive plants act as shelter for those taxa whose abundance was more important in invaded plots." (Author)] Address: https://matheo.uliege.be/bitstream/2268.2/18218/4/TFE_Justine_Martoglio.pdf

23567. Morris, L.M. (2023): Don't put all your eggs in one basket: Increasing survivorship in a headstarting program for the endangered Hine's Emerald Dragonfly (*Somatochlora hineana*). MSc thesis, Department of Biology, Conservation and Biodiversity Program In the Graduate School The University of South Dakota: 88 pp. (in English) ["In the age of the Anthropocene, wildlife is impacted by the presence of humans in both positive and negative ways. Many humans desire to conserve wildlife and the associated resources that come with it, while simultaneously the ever-expanding human population demands the land, food, and water resources, as well as other materials sourced from wildlife. Insects, a diverse and necessary group of animals are no exception to the impacts currently being experienced by wildlife. Because of this, some species are threatened or endangered, and human intervention is necessary. The federally endangered *S. hineana* is receiving intervention to augment wild populations via a captive rearing program based primarily at the University of South Dakota, using an approach known as head-starting. In the program, eggs are wild collected from adults in native habitat and brought to a laboratory setting until they are teneral adults, at which time they are released back into the area from which they were sourced. By diminishing potential sources of mortality that newly hatched larvae experience (e.g., competition, predation, and access to adequate prey resources), we increase survivorship, and the number of *S. hineana* introduced back into their native habitat. Laboratory experiments in microcosms evaluated the role of density and detrital community in growth and survivorship of hatchlings. Microbenthic community samples were collected in productive *S. hineana* habitat and contrasted with samples

collected from microcosms. Results indicate that microbenthic communities from natural habitat were more abundant than laboratory microcosms. Density and components of the microbenthic community, such as Amphipoda and edible prey types, negatively and positively impact survivorship and growth of larvae in microcosms. These findings demonstrate the importance of evaluation of captive rearing protocol in efforts to conserve a species." (Author)] Address: <https://red.library.usd.edu/cgi/viewcontent.cgi?article=1197&context=diss-thesis>

23568. Munyai, L.F.; Mugwedi, L.; Wasserman, R.J.; Dondofema, F.; Dalu, T. (2023): Assessing fish and macroinvertebrates assemblages in relation to environmental variables in Makuleke floodplain pans: Implications for biodiversity conservation. *Wetlands* 43, 93: (in English) ["Floodplain wetlands remain important habitats for most macrophytes, macroinvertebrates, birds, fish, amphibians, wildlife and in particular large mammals. They are dynamic in nature and provide many ecosystem services even to humans. The present study was undertaken to assess water and sediment chemistry as drivers of macroinvertebrates and fish communities in Makuleke floodplain wetlands in north Kruger National Park, South Africa. Water, sediments, macroinvertebrates and fish samples were collected across different hydroperiods (i.e., Low water period and high water period) from six floodplain pans. Macroinvertebrates were dominated by (Notonectidae, Libellulidae, Gerridae, Chironomidae larvae, Belostomatidae, Gomphidae, Dytiscidae and Baetidae, while fish were dominated by *Tilapia sparmintii*, *Gambusia affinis*, *Coptodon rendali*, *Oreochromis* hybrid, *Oreochromis mossambicus*, *Enteromius palludinosus* and *Clarias gariepinus*. Generally, fish and macroinvertebrate abundances and diversity were elevated during high water levels as compared to low water levels, suggesting that hydroperiod plays a significant role in structuring aquatic faunal communities. Redundancy and canonical correlation analysis identified salinity, TDS (water) and Zn, C and B concentrations (sediment) as the major drivers of macroinvertebrate community structure, while pH, TDS (water), and K, Ca and Mg concentrations (sediment) were the major drivers of fish communities. In addition, pelagic chlorophyll –a was strongly positively associated with fish, particularly *Gambusia affinis*, during the high water level period. The results of this study provide important baseline information on the ecology of the Makuleke pans." (Authors)] Address: Munyai, L.F., School of Biology and Environmental Sciences, University of Mpumalanga, 1200, Nelspruit, South Africa. Email: munyailinton@gmail.com

23569. Pucci, R.; Kalkman, V.J.; Stowell, D. (2023): Comparison between transformers and convolutional models for fine-grained classification of insects. *Workshop Camera Traps, AI and Ecology. Compare transformers and convolutional models*: 7 pp. (in English) ["Fine-grained classification is challenging due to the difficulty of finding discriminatory features. This problem is exacerbated when applied to identifying species within the same taxonomical class. This is because species are often sharing morphological characteristics that make them difficult to differentiate. We consider the taxonomical class of Insecta. Accurate identification of insects is essential in biodiversity monitoring as they are one of the inhabitants at the base of many ecosystems. Citizen science is doing brilliant work of collecting images of insects in the wild giving the possibility to experts to create improved distribution maps in all countries. Today, we have billions of images that need to be automatically classified and deep neural network algorithms are one of the main techniques explored for fine-grained tasks. At the state of the art, the field of deep learning algorithms is extremely fruitful, so how to identify the algorithm

to use? In this paper, we focus on Odonata and Coleoptera orders, and we propose an initial comparative study to analyse the two best-known layer structures for computer vision: transformer and convolutional layers. We compare the performance of T2TViT_14, a model fully transformer-base, EfficientNet_v2, a model fully convolutional-base, and ViTAEv2, a hybrid model. We analyse the performance of the three models in identical conditions evaluating the performance per species, per morph together with sex, the inference time, and the overall performance with unbalanced datasets of images from smartphones. Although we observe high performances with all three families of models, our analysis shows that the hybrid model outperforms the fully convolutional-base and fully transformer-base models on accuracy performance and the fully transformer-base model outperforms the others on inference speed and, these prove the transformer to be robust to the shortage of samples and to be faster at inference time.] Address: Rita Pucci, Rita, Naturalis Biodiversity Center, Leiden (NL). Email: rita.pucci@naturalis.nl

23570. Sanmartín-Villar, I.; Xin, Y.; Cordero-Rivera, A. (2023): Direct and cross-generational effects of reproduction on fitness and behavioural variability in male-biased environments. *Current Zoology* 69(3): 339-353. (in English) ["Population structure determines individuals' interactions and trade-offs with evolutionary consequences. Male biased populations increase intrasexual competition and intersexual harassment, reducing female resource acquisition and thus, resources availability for the following generation. We analysed direct and cross-generational effects of male harassment in two generations of damselflies. We exposed adult females to treatments with different sex-ratio and density (balanced and male-biased) to modify the male harassment level. We analysed female fecundity, fertility, and number of faecal deposits as indirect measure of resources acquisition. We studied female flight performance after repeated exposures to males. We analysed survivorship, development, exploration, thigmotaxis, and feeding latency of larvae produced by the experimental females. In both generations, we analysed four metrics of behaviour: mean value, interindividual differences in plasticity, intraindividual unpredictability, and repeatability. Mating duration increased in male-biased treatment while female resources acquisition and fertility decreased. Females that mated longer showed higher fecundity when they were exposed to balanced treatment, but not if they were exposed to male-biased treatment. Females from the male-biased treatment showed interindividual differences in plasticity and no repeatability in flight performance. Offspring showed balanced sex-ratio and similar survivorship, development, and feeding latency independently of the parental treatment; however, females exposed to male-biased treatment produced offspring with higher differences in exploration plasticity and daughters less explorative and with higher unpredictable thigmotaxis. We propose prolonged copulation as courtship at balanced sex-ratio but a cost to females under male-biased sex-ratio. Cross-generational effects in behavioural variability may be a mechanism to cope with predicted future environments." (Authors)] Address: Sanmartín-Villar, I., Universidade de Vigo, ECOEVO Lab, Escola de Enxeñaría Forestal, Campus Universitario A Xunqueira, 36005 Pontevedra, Galiza, Spain. E-mail: sv.iago@gmail.com

23571. Verma, P.K.; Varma, A.; Aggarwal, G. (2023): Studies on insect-pests complex of rapeseed mustard and their natural species in Roorkee Region, Uttarakhand, India. *Biological Forum – An International Journal* 15(5): 529-533. (in English) ["A field experiment was carried out to study the

insect pests associated with rapeseed mustard in Roorkee region of Uttarakhand's Haridwar district during 2021 and 2022 rabi season. In this region, rapeseed mustard was linked to a pest complex of roughly eight different insects-pests species. The Mustard aphid, *Lipaphis erysimi* has been found consistently expand in population and causing economic damage to mustard crop. It occurred from flowering to till maturity stage of the crop, while mustard sawfly, *Athalia lugens proxima* and flea beetle, *Phyllotreta cruciferae* occurred during seedling stage and painted bug, *Bagrada cruciferarum* damaged the crop during seedling to maturity stage as a minor pest. At the vegetative stage, the cabbage aphid *Brevicoryne brassicae*, the cabbage butterfly *Pieris brassicae*, and the rose aphid *Macrosiphum rosae* were all seen in sporadic, low-population occurrences. Only the mustard aphid, a regular important pest/major pest, does the most harm to mustard crops out of the eight insect pests that were identified. The other seven pests were all categorised as minor. In the experimental crop, four natural enemies of several insect pests of rapeseed mustard were identified: dragonflies [*Crocothemis servilia*], ladybird beetles, green lacewings and braconid wasps. Insect pests complex cause major crop losses in agriculture worldwide. Therefore, to identify a key pest of a particular crop and their damaging stages on crop is crucial to effectively control the economic crop yield losses and also to reduce cost benefit ratio of insecticide applications and by also identifying their natural enemies we can reduce the application of chemical insecticides." (Authors)] Address: Verma, P.K., School of Agricultural Studies, Quantum University, Roorkee (Uttarakhand), India

23572. Wang, J.; Zhou, W.; Liu, Y.; He, G.; Yang, Y. (2023): Biomimetic compound eyes with gradient ommatidium arrays. *ACS Applied Materials & Interfaces* 2023, 15, 37: 44503-44512. (in English) ["Compound eyes are high-performing natural optical perception systems with compact configurations, generating extensive research interest. Existing compound eye systems are often combinations of simple uniform microlens arrays; there are still challenges in making more ommatidia on the compound eye surface to focus to the same plane. Here, a biomimetic gradient compound eye is presented by artificially mimicking dragonflies. The multiple replication process efficiently endows compound eyes with the gradient characteristics of dragonfly compound eyes. Experimental results show that the manufactured compound eye allows multifocus imaging by virtue of the gradient ommatidium array arranged closely in a honeycomb pattern while ensuring excellent optical properties and compact configurations. Thousands of ommatidia showing a gradient trend at the millimeter scale while remaining relatively uniform at the micron scale have gradient focal lengths ranging from 260 to 450 μm . This gradient compound eye allows more ommatidia to focus on the same plane than traditional uniform compound eyes, which have experimentally been shown to capture more than 1100 in-plane clear images simultaneously, promising potential applications in micro-optical devices, optical imaging, and biochemical sensing." (Authors)] Address: Yang, Y., School of Physics & Technology, Key Laboratory of Artificial Micro- and Nano- Structures of Ministry of Education, Department of Clinical Laboratory, Institute of Medicine and Physics, Renmin Hospital, Wuhan University, Wuhan 430072, China. Email: yangyiys@whu.edu.cn

23573. Wildermuth, H. (2023): *Drumlinlandschaft Zürcher Oberland 2021-2023*. privat: 29 pp. (in German) ["*Leucorhinia pectoralis*: This rare dragonfly was discovered in 1970 in Ambitzgi (Cheibenrietli). Since then, it has been specially promoted and its populations are monitored annually. It was

present in Hinwilerriet until the 1980s and then disappeared temporarily. With the maintenance and upgrading of the peat waters, it has returned - hopefully permanently. *Lestes virens vestalis*: Within the drumlin landscape, it only occurs in the Ambitzgi/Böndlerriet area, where a vital population exists. Its presence is checked here annually. In 2021-2023, it was observed at several peat pits. However, counts are more difficult than with *L. pectoralis* because the animals often stay in the litter meadows away from the waters." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

2024

23574. Adelman, J. (2024): Feldstudie zur Larvalentwicklung des Kleinen Blaupfeils (*Orthetrum coerulescens*) in einem Quellgewässer im Spessart in Hessen (Odonata: Libellulidae). *Libellen in Hessen* 17: 85-94. (in German) ["The Eschenkar on the edge of the Spessart near Bad Orb is one of the most reproductive and best-studied occurrences of *O. coerulescens* in Hesse. In 2023, a study on the development of the larvae was carried out at a spring outlet where exuviae were found in high density in the past two years. A total of 52 larvae were collected and measured on seven survey days between April and September. The results suggest an exclusively semivoltine development in this occurrence. For the first time, the development of *Cordulegaster bidentata* could be documented for this quadrant using larvae." (Author/DeepL)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

23575. Adelman, J. (2024): Nehmen unsere Libellenbestände ab? Betrachtungen zur Erfassung und Entwicklung der Libellenfauna in Hessen. *Libellen in Hessen* 17: 61-83. (in German) ["Against the background of declining data input in many areas, the population development of dragonflies between the two periods 2006 to 2014 and 2015 to 2023 was analysed on the basis of 114 well-studied grid fields (MTB-64). In addition to the presence of the individual species, expressed by their grid frequency, the temporal consistency of the observations was also assessed. Compared to an older study, in which the two periods compared are further apart, the development trends observed are less pronounced. Overall, more species show a negative development of their grid frequency than a positive one. In many cases, but not for all species, the trends identified in this site selection correspond to the assessment in the current draft of the Red List of dragonflies of Hesse. The problems of summarised trend analyses and the significance of individual dry years are highlighted. Overall, despite slightly declining numbers, the results for the majority of species do not yet allow a reliable trend statement to be made." (Author/DeepL)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

23576. Adelman, J. (2024): Übernahme von Daten aus Meldeportalen - eine kritische Betrachtung. *Libellen in Hessen* 17: 105-113. (in German) [Hesse, Germany; "If we exclude the reports from members of our working group, the vast majority of the data reported on observation.org are randomly recorded observations with a low data standard ('low-level data'). This is evidenced by the very large number of people reporting. In the case of common species, this data certainly provides a better picture of the distribution than the systematically recorded observations of AK members ('high-level data'), which are concentrated in a few regions. They therefore represent an interesting addition to our database. In many grid fields they lead to a very desirable renewal of older records

or are even first records. However, despite this fundamentally positive assessment, it should not be forgotten that the 'low-level data', due to their incompleteness, only allow the distribution of a species to be analysed and do not allow any conclusions to be drawn about the size of an occurrence, its population development or habitat quality. This means that they are only of very limited use for nature conservation purposes and further analyses. An additional share of around 20 % of 'low-level data' in the working group's database, which already contained a certain proportion of such data in the past, is certainly not critical. The future will show how the composition of the data develops and whether the inclusion of a criterion, e.g. the 'data level', will be useful for special analyses." (Author/DeepL)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

23577. Adelman, J. (2024): Referenzdaten zur Jahresphänologie der Libellen in Hessen. *Libellen in Hessen* 17: 115-122. (in German) ["The records of the individual dragonfly species during the year are presented in phenograms over the time axis. They visualise their annual phenology and enable a comparison between species. In particular, the widely used bar charts, in which data are usually presented in monthly decades, visualise the statistical distribution of the data, which is characterised by the volatility of the species, among other things. Cumulative representations in line charts have the advantage that several species can be clearly visualised in them. By scaling the ordinate according to the Gaussian normal distribution, the existence of a normal distribution can be recognised if necessary. In addition, the values for discrete percentiles can be read from the cumulative data. For all Hessian species with a sufficient database, the data for their first and last observation as well as the days with the percentiles of 1%, 10%, 50%, 90% and 99% are listed. The period between the 10% and 90% percentiles characterises the main flight period with 80% of the observations." (Author/DeepL)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

23578. Adelman, J.; Frank, M.; Feisel, L. (2024): Im Fokus: Kleine Pechlibelle (*Ischnura pumilio*) - Status und Verbreitung in Hessen (Odonata: Coenagrionidae). *Libellen in Hessen* 17: 41-59. (in German) ["*I. pumilio* is widespread in Hesse, but is not common anywhere. Evidence of this unstable pioneer species, which is weak in competition, is mainly found in the lowlands of the rivers Eder, Lahn and Gersprenz, for example, as well as in the Lower Main Plain and Wetterau. The individual bodies of water, e.g. flood channels, shallow waters and ditches are subject to strong succession and are generally only suitable for the reproduction of the species for a few years. This is reflected in the comparatively low values of a new annual detection rate introduced here, which describes the recovery success of the species in its areas of occurrence. *I. pumilio* shows a strongly negative population trend in Hesse, with a stabilisation of detections at a low level in recent years. The numbers of individuals encountered are consistently small, mostly in the low single-digit range. Recently, the species has repeatedly been found reproducing in newly created beaver waters. Among the dragonfly species also found in the areas where *I. pumilio* occurs, *Orthetrum coerulescens* stands out with a disproportionately high frequency." (Authors/DeepL)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

23579. Agil, A.; Ramlah, S.; Ihsan, M.; Korja, I N.; Mallom-basang, S.N.; Sustri, S.; Ramadhan, G. (2024): Keanekaragaman Jenis Capung di danau Rano kecamatan Balaesang

Tanjung kabupaten Donggala provinsi Sulawesi tengah [Diversity of dragonfly species in Lake Rano, Balaesang Tanjung District, Donggala Regency, Central Sulawesi Province]. *ForestSains* 22(2): 279-284. (in Indonesian, with English summary) ["...This research aims to record and determine the value of the diversity of dragonfly species found in Lake Rano, Balaesang Tanjung District, Donggala Regency, Central Sulawesi Province. This research was carried out from February to April 2023 at Lake Rano, Balaesang Tanjung District, Donggala Regency, Central Sulawesi Province. The method used is the line transect method. Based on research results, the type of dragonfly found in Lake Rano, Balaesang Tanjung District, Donggala Regency, Central Sulawesi Province is in the medium category with a value (H') of 2.938. The species evenness index at the research location showed an overall result of 0.98. This condition shows that the evenness of species in Lake Rano is classified as good, meaning that the abundance of each species is evenly distributed in the location studied. The dominance index shows that the dominance of a dragonfly species can be seen in the largest number of a species compared to other species found. The dragonfly species found in the highest numbers in this study were *Neurothemis manadensis* [= *Neurothemis stigmatizans* (Fabricius, 1775)], *Orthetrum glaucum* and *O. pruinosum*. Overall, the three dragonfly species were dominant." (Authors)] Address: Agil, A., Jurusan Kehutanan, Fakultas Kehutanan, Universitas Tadulako Jl. Soekarno-Hatta Km. 9 Palu, Sulawesi Tengah 94118

23580. Ahmed, H.K.; Kareem, D.K. (2024): Molecular identification of some species of dragonfly (Odonata: Anisoptera) using COXI gene and DNA barcodes from Basrah Province, Southern Iraq. *Journal of Aquatic Research and Sustainability* 1(1): 8-14. (in English) ["The mtCOXI gene has been used in animal barcoding studies because of its wide range of phylogenetic signals. Odonata, a diverse group of aquatic insects, has been studied at the molecular level to understand the evolutionary relationships between their species and global species. In the current study in Basrah Province, Iraq, we extracted mitochondrial DNA from adult and nymph Dragonflies and designed species-specific primers to distinguish some of the endemic species at the molecular level. This study identified five species, *Crocotemis erythraea*, *Diplacodes trivialis*, *Orthetrum sabina*, *Trithemis annulata* and *Hemianax ephippiger*. The DNA sequences were deposited in the NCBI database for the first time. The nucleotide sequences of the mtCOXI genes were analyzed via BLAST. The similarity results ranged from 91.8% to 100%, indicating related species on the basis of the branches of the phylogenetic tree. The molecular identity of the selected species was confirmed, and DNA barcodes for Anisoptera species from Basrah Province were successfully developed and documented in GenBank and IBIN." (Authors)] Address: Ahmed, H.K., Dept of Marine Biology, Marine Science Center, University of Basrah, Basrah, Iraq

23581. Artika, U.; Kartika, W.D.; Subagyo, A.; Mursyid, D. (2024): Dragonfly dominance (Order: Odonata) in the Danau Tangkas natural tourism area, Tanjung Lanjut Village, Muaro Jambi Regency. *Biospecies* 17(2): 29-36. (in Indonesian, with English summary) ["The study aims to analyze the dominance of dragonflies found in the Danau Tangkas natural tourism area. The type of research is exploratory descriptive research. Sampling was done using purposive sampling method. Sampling was carried out at 3 location points that have different characteristics. Made 3 stations with a length of 100 m each to the side and 100 m to the front so as to form a square line. Sample collection is done by hand collecting

and using insect nets. Data analysis techniques using Simpson's dominance index calculation. The results of research that has been carried out in the Danau Tangkas natural tourism area, obtained as many as 447 individuals, 9 species belonging to 3 families. So it is known that the dragonfly dominance index in the Tangkas Lake natural tourism area is low with a value of 0.4." (Authors)] Address: Artika, U., Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Jambi. Indonesia. Email: Ulinartika08@gmail.com

23582. Avendaño-Marín, J.M.; Hoyos Blanco, A.; Flórez-V, C.; Muñoz-Quesada, F.J.; Bota-Sierra, C.A. (2024): Demography and natural history of the damselfly *Mesamphiagrion gaudii* montanum (Coenagrionidae), a Páramo endemic species in the Colombian Andes. *International Journal of Odonatology* 27: 151-160. (in English, with Spanish summary) ["The páramos are high mountain ecosystems in the tropical regions of the New World, and they are particularly threatened by climate change. The Belmira páramo complex in Colombia is home to *Mesamphiagrion gaudii* montanum, an endemic and endangered damselfly species. This study presents the first demographic assessment of *M. gaudii* montanum using the capture-recapture method to estimate population size, survival, and detection probabilities, focusing on differences in age, sex, female color morphs, and parasite infestation. The population size was estimated to be 730 ± 186.59 individuals, with an average survival probability of 0.89 ± 0.04 and a life expectancy of 8.34 days, these data are like the reported for other populations in the same genus in harsh environmental conditions. Ectoparasitic mites were more common on juveniles than adults. After several hours of observing the species few copula events have been recorded, all of them involving juvenile adult females, which points to a monandrous reproduction syndrome for the species. Another phenomenon observed in the species was a change in coloration due to body temperature in individuals, in which bright coloration becomes grayish in cold weather. This study provides fundamental data for future monitoring and conservation efforts, highlighting the species' vulnerability to environmental changes and the need for specific conservation strategies." (Authors)] Address: Flórez-V, C., Department of Entomology, The Pennsylvania State University, 548 ASI Building, University Park, USA, 16801

23583. Azar, D.; Maksoud, S.; Abi-Saad, P.; Nel, A. (2024): A new, to date endemic, family of dragonfly in the mid-Cretaceous fossil fish Konservat-Lagerstätte of Haql, Lebanon (Odonata: Anisoptera). *Zootaxa* 5497(1): 142-150. (in English) ["The new family *Libanoaeshnidae* fam. nov., with the new genus and species *Libanoaeshna mikhaeli* gen. et sp. nov., are characterised, described and illustrated from Haql, the famous upper Cenomanian fossil fish outcrop of Lebanon. This is the first time that a fossil insect is reported from this site. *Libanoaeshnidae* fam. nov., together with three other Cretaceous families, can be included in the stem group of the modern *Aeshnodea* Bechly, 1996, confirming the important diversification of this clade during this period, even if the oldest known representatives of the *Aeshnidae* sensu stricto are still Eocene." (Authors)] Address: Azar, D., Department of Natural Sciences, Faculty of Sciences II, Lebanese University, P.O. Box: 26110217, Fanar, Matn, Lebanon

23584. Bazin, S.; Diouloufet, V.; Molina, A.; Peroux, T.; Montoya, J.M.; Blanchet, S.; Edeline, E.; Jacquet, S.; Rasconi, S.; Fayolle, S.; Campana, M.; Zambaux, T.; Leclerc, C.; Lassus, R.; Morla, J.; Daufresne, M.; Sentis, A. (2024): Direct effect of artificial warming on communities is stronger

than its indirect effect through body mass reduction. *Oikos* 2024: e10561, doi: 10.1111/oik.10561: 18 pp. (in English) ["Theory predicts that morphological and bioenergetic constraints due to temperature-induced body size reduction can modulate the direct effects of warming on biotic interactions, with consequent effects on trophic cascades and biomass distribution. However, these theoretical predictions have rarely been tested empirically. Our aim was to distinguish the indirect effects of warming-induced body size reductions from the direct effects of warming on community structure. We conducted a mesocosm experiment manipulating factorially 1) body size reduction in the medaka fish *Oryzias latipes* using two populations raised for several generations under contrasted climate conditions and 2) warming (+4°C), to test their independent and interactive effects on the structure of prey and primary resource communities, the predator–prey biomass ratio and the biomass size spectra. We further dissected the effects of seasonal temperature variation from the effects of constant artificial warming. We found that the indirect effects of warming (i.e. fish body size reduction) on composition and structure of communities as well as their biomass size spectra were of marginal amplitude compared to the direct effects of seasonal temperature variation and constant warming. There were no changes in community composition in response to fish body size reduction or constant warming. However, the density of macroinvertebrates and zooplankton were maximal at intermediate seasonal water temperatures and lower in constantly-heated mesocosms. Contrastingly, phytoplankton was not strongly affected by seasonal temperature or warming, but rather responded to grazing effects of zooplankton. Finally, we found a reduction in predator–prey biomass ratio under warming and at the warmest seasonal temperature, inducing a steeper slope of the biomass size spectra under increasing seasonal (but not constant) temperature. We conclude that the direct effects of climate change on freshwater communities are stronger than its indirect effects mediated by body mass reduction. ... The most contributing taxa to the variation in macroinvertebrate density were dipteran (Ceratopogonidae, Chironominae, Tanytopodinae and Orthocladinae), Ephemeroptera (Caenidae and Cloeon sp.) and Odonata (Sympetrum sp., Libellula sp.) taxa." (Authors)] Address: Bazin, S., INRAE, UMR RECOVER, Aix Marseille University, Aix-en-Provence, France. Email: bazin.simon@laposte.net

23585. Borisov, A.S.; Borisov, S.N. (2024): A first record of two dragonfly species (Odonata) from Kamchatka Peninsula, Russia. *Eurasian entomological journal* 23(3): 138-140. (in English, with Russian summary) ["*Sympetma paedisca* and *Coenagrion glaciale* are newly recorded for Kamchatka Peninsula, Russia, in July 2023 at the vicinity of the city of Petropavlovsk-Kamchatsky. *S. paedisca*: Material. 1 ♀ — City of Petropavlovsk-Kamchatsky, Lake Medvezh'e, 53°04'18" N, 158°37'37" E, h~171 m a.s.l., 7.V.2023, overwintered individual, A.S. Borisov leg. *C. glaciale*: Material. 1 ♀ — 4 km north of Petropavlovsk-Kamchatsky city limits, Lake Svetloe, 53°07'33" N, 158°31'53" E, h~282 m a.s.l., 17.VII.2023, S.N. Borisov leg." (Authors)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. Email: borisov-s-n@yandex.ru

23586. Bouchelouche, D.; Saal, I.; Hafiane, M.; Doukhandji, N.; Smaoune, G.; Arab, A. (2024): Effect of the nature of the substrate and the environmental parameters on the biodiversity of the benthic macrofauna of the Upper Cheliff Hydrographic Network (W. Medea and Ain Defla. Algeria). In: Ksibi, M., et al. *Recent Advances in Environmental Science*

from the Euro-Mediterranean and Surrounding Regions (3rd Edition). EMCEI 2021. *Advances in Science, Technology & Innovation*. Springer, Cham. <https://doi.org/10.1007/978-3-031-43922-3159>: 711-713. ["The sampling carried out at the level of the upper Chélif hydrographic network made it possible to collect 11,035 individuals. The taxonomic group of insects dominates the population with 94.35% followed by molluscs with 5.61% and crustaceans with 0.04%. The group of insects is the most diverse and abundant. It is represented by 6 orders of which the order Diptera is the most represented with 64.6% (6726 individuals), followed by Ephemeroptera with 24.1% (2509 individuals), Heteroptera with 5.11% (532 individuals), Coleoptera with 3.59% (374 individuals), Trichoptera with 1.9% (198 individuals) and Odonata with 0.66% (73 individuals) of the total number of insects. We note a total absence of Plecoptera at all study stations. The results of canonical correspondence analysis (CCA) show 3 groups: group 1 formed by stations which are characterized by a much muddier substrate. Groups 2 and 3 are formed by stations which are characterized by a heterogeneous substrate but with a different degree of pollution. The results show that the stations which are characterized by a muddy substrate harbor less diversified and less rich benthic macrofauna compared to the other stations which have a heterogeneous substrate. And the polluted stations harbor less diversified and less rich benthic macrofauna compared to the other stations." (Authors)] Address: Bouchelouche, D., LaDyBio, FSB, USTHB, LP 32, El Alia, Bab Ezzouar, Algiers, Algeria

23587. Brozzi, C.; Sanchez-Guillen, R.A.; Cordero-Rivera, A. (2024): Vulvar spine and copulation duration: unravelling sexual conflict in *Ischnura damselflies*. *Animal Behaviour* 216: 55-62. (in English) ["Sexual conflict occurs when the fitness interests of the two sexes do not align. Some traits shared by males and females (like mating rate) have sex-specific fitness optima that cannot be achieved simultaneously, and this conflict can favour the evolution of adaptations that benefit one sex but harm the other, like copulatory wounding. Prolonged copulation in damselflies can be seen as a clear example of sexual conflict: while it allows males to guard their partners, preventing them from remating, females cannot feed during copulation and may be more exposed to predators. *Ischnura graellsii* is one of the species of damselflies in the Coenagrionidae family characterized by females having a conspicuous vulvar spine on the sternum of the eighth abdominal segment, which makes contact with the male seminal vesicle during copulation. To investigate the role of the vulvar spine in sexual conflict, we evaluated whether there is a difference in copulation duration between females with the spine removed and those with an intact spine (control females) and studied the allometry between spine length and body length. We found that the vulvar spine had a significant effect on copulation duration, since males mated on average for 200 min with control females but increased copulation to 227 min with spineless females. The spine was allometric with wing size, but the slope depended on the regression method used. The male seminal vesicle has a depression exactly where the spine is in contact with it during copulation. There was no evidence of physical damage, and consequently, males mated to control and spineless females had similar longevity. We conclude that this spine allows females to reduce mating duration." (Authors)] Address: Brozzi, Chiara, Universidade de Vigo, ECOEVO Lab., E.E. Forestal, Campus Universitario A Xunqueira, Pontevedra, Spain

23588. Budagova, L. (2024): Morpho-biological description and ecological characteristics of the species *Sympetrum meridionale* (Selys, 1841), belonging to the group of dragonflies

(Odonata) spread in the territory of the Nakhchivan Autonomous Republic. XIV International Scientific and Practical Conference «Challenges and problems of modern science», April 11-12, 2024, London, United Kingdom: 20-24. (in English) ["We continue the study of odonto fauna in Azerbaijan and Nakhchivan Autonomous Republic. However, most of the Nakhchivan Autonomous Republic remains poorly studied. For this, it is necessary to carry out purposeful, systematic research works for the complete identification of dragonfly species in the area. To date, 36 species of dragonflies have been described in Nakhchivan Autonomous Republic. However, during the research work conducted during the hot summer months of 2023, a new species - *Sympetrum meridionale* (Selys, 1841) - was observed for the first time in the territory of Nakhchivan MR, and detailed studies were conducted on this species. During the research, the ecological situation of the area where the species is distributed was studied, an ecological-faunistic analysis was carried out and a description was given." (Author) The paper includes several wrong statements, e.g. *S. meridionale* doesn't occur in "North America.". For a study of this region (and including the claimed new records of *S. meridionale*) see: Snegovaya, N.Yu. (2019): Dragonfly (Insecta, Odonata) fauna of Nakhichevan Autonomic Republic (Azerbaijan). International Dragonfly Fund - Report 127: 1-28.] Address: Budagova, Leyla, Nakhchivan State University, Azerbaijan

23589. Cao, L.; Wang, N. (2024): A comparison of the large-scale gene expression patterns in summer and fall migratory *Pantala flavescens* (Fabricius) in northern China. *Ecology and Evolution* 14(8), 2024, e70147: 10 pp. (in English) ["*P. flavescens* is the most well-known seasonal migratory insect. This research focused on the molecular response of *P. flavescens* migration in summer and fall. A total of 17,810 assembled unigenes were obtained and 624 differentially expressed genes (DEGs) were identified in summer migration compared to fall migration. A number of DEGs, including *cpr49Ae*, *itm2b*, *chitinase*, *cpr11B*, *laccase2*, *nd5*, *vtg2* and so on, had previously been reported to be involved in cold- and high-temperature resistance. Functional enrichment analysis showed three pathways 'that antibacterial humoral response, response to bacterial, and lipid transporter activity' were significantly enriched in summer migration while that six pathways 'structural constituent of cuticle, chitin binding, mitochondrion, propanoate metabolism, citrate cycle, hypertrophic cardiomyopathy' were significantly enriched in fall migration. These results will provide a valuable baseline for further understanding of the molecular mechanisms of insect adaptation to different climate migrations." (Authors)] Address: Cao, L., College of Life Science, Jiangxi Normal University, 330022 Nanchang, Jiangxi Province, China. Email: lingzhen_cao@jxnu.edu.cn

23590. Chandran, A.V.; Muneer, P.K.; Madhavan, M.; Jose, S.K. (2024): Description of *Protosticta sexcoloratus* sp. nov. (Odonata, Platystictidae) from the Western Ghats, India. *Journal of Asia-Pacific Biodiversity* 17(2): 295-302. (in English) ["During an ongoing study to document the odonate diversity of the Western Ghats, we came across a colony of *Protosticta* species in Wayanad, Kerala, that appeared different from all other species hitherto described. We describe this population as a new species after detailed morphological comparison with closely similar species occurring in the region." (Authors)] Address: Chandran, A.V., Aqua Research Lab, Department of Geology & Environmental Science, Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala 680125, India. Email: avivekchandran2@gmail.com

23591. Cieslinska, K.; Manikowska-Slepowska, B.; Zbyryt, A.; Jakubas, D. (2024): Foraging habitat availability and the non-fish diet composition of the Grey Heron (*Ardea cinerea*) at two spatial scales. *Animals* 2024, 14, 2461. <https://doi.org/10.3390/ani14172461>: 19 pp. (in English) ["Simple Summary: In this study, we investigated differences in the non-fish diet components of the Grey Heron (*Ardea cinerea*) at both regional and local scales. We found significant inter-regional and inter-colony differences, not only in the diet but also in the habitat composition of foraging areas. We also identified significant relationships between some prey items and different habitats. This study shows that the opportunistic character of the diet of the Grey Heron is adapted to the local foraging habitat and the availability of non-fish prey. Abstract: Habitat structure on foraging ground is one of the crucial factors determining diet diversity in colonially breeding avian predators. Quantifying the habitat and diet composition at different spatial scales (regional and local inter-colonial) can help provide understanding of the drivers of diet composition. In this study, we examined the composition of the non-fish diet of an opportunistic predator, the Grey Heron, based on pellets. We compared pellets from 21 colonies in two different regions of Poland that differing in composition of foraging habitats. Multivariate statistical techniques were used to analyze the relationship between diet and habitat compositions in a 20 km radius around these colonies. Significant inter-regional and inter-colony differences in Grey Heron diet and habitat composition were detected in foraging areas. However, some prey were present in the diet only from one of the regions. Around the heronries with a predominance of farmland habitats, the European water vole (*Arvicola amphibius*) and terrestrial invertebrates were present in relatively low frequencies, and the striped field mouse (*Apodemus agrarius*) was present in high frequencies. Voles (*Microtus* sp.) were more frequent in colonies with prevalence of non-irrigated arable land around the colony, in contrast to the bank vole (*Myodes glareolus*), which was less common in heronries with a higher contribution of this habitat type. Remains of aquatic invertebrates [including "Odonata"] were less abundant in colonies surrounded by extensive forests. The results of our research indicate the opportunistic character of the non-fish part of the diet of the Grey Heron adapted to the local foraging habitat and prey availability."] Address: Manikowska-Slepowska, Brygida, Dept of Vertebrate Ecology & Zoology, Fac. of Biology, University of Gdansk, ul. Wita Stwosza 59, 80-308 Gdansk, Poland. Email: biobms@ug.edu.pl

23592. Cochak, C.; Zanon, F.M.; Pineda, A.; Lansac-Tóha, F.M.; Jati, S.; Machado Velho, L.F. (2024): Beta diversity of freshwater algal communities: influence of different dispersal mechanisms. *Aquatic Sciences* 86, 26: (in English) ["This study investigates the impact of different dispersal vectors, such as amphibians and Odonata, on the temporal beta diversity of freshwater algae in a 33-day field experiment conducted in 2018. Four treatments were employed, including a control group, exclusive amphibian dispersal, exclusive Odonata [*Pantala flavescens*] dispersal, and a mixed dispersal group. In total, we identified 76 algal species, each influenced by specific dispersal patterns associated with these vectors. The experiment initially revealed an increase in species richness and abundance; however, as the study progressed, a decrease in the rates of new species incorporation was observed, possibly indicating community establishment. Additionally, competitive dynamics emerged among algal species, leading to a reduction in temporal beta diversity over time. In summary, as communities mature and achieve stability, beta diversity decreases, especially when multiple dispersal agents are involved. Biological vectors, such as animals,

significantly influence temporal beta diversity, but over time, local factors gain progressively more influence." (Authors)] Address: Cochak, Crislaine, Programa de Pós-Graduação em Ecologia de Ecossistemas Aquáticos Interiores (PEA), Univ. Estadual de Maringá (UEM), Centro de Pesquisa em Limnologia, Ictiologia e Aquicultura (Nupélia), Maringá, Paraná, Brazil

23593. Cordero-Rivera, A.; Soler Monzó, E.; Cabana, M. (2024): Androchrome females of *Crocothemis erythraea* (Brul , 1832) in Menorca, with notes on the oviposition into the sea and parasitism by midges (Odonata: Libellulidae; Diptera: Ceratopogonidae). *Bolet n de la Sociedad Entomol gica Aragonesa* 74: 217-220. (in English, with Spanish summary) ["The first record for the island of Menorca of androchrome females of *C. erythraea* is provided and the observation of a female laying eggs on the sea at Cala Carb  on May 2022, is described and discussed. The presence the parasitic midge *Forcipomyia paludis* on this species is reported from the locality of Son Bou." (Authors)] Address: Cordero Rivera, A., Departamento de Ecologia e Biologia Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

23594. Cristofaro, L.; Batty, P.; Muir, D.; Law, A. (2024): New insights on habitat use by larval Northern Emerald dragonflies (*Somatochlora arctica*). *Journal of Insect Conservation* 28: 789-798. (in English) ["Odonates are widely considered to be bioindicators of freshwater habitat quality. *S. arctica* is commonly found across Eurasia, predominantly in North and Central Europe, but in the UK, it has a restricted range and is listed as near threatened despite a large, potential habitat availability. Across their range, larvae are found in Sphagnum-filled bog pools near coniferous woodlands, but detailed data on their habitat requirements are limited and often overlooked in favour of adult surveys which inhibits conservation efforts. This study surveyed three areas across Scotland: Abernethy & Loch Garten National Nature Reserve (NNR), Beinn Eighe NNR and Flanders Moss NNR, to evaluate how different environmental factors per pool (e.g. water depth and chemistry, Sphagnum coverage, woodland distance, etc.) affect the presence of *S. arctica* larvae. We found a higher occurrence of *S. arctica* larvae when pools were located close to woodlands (i.e. 0–10 m), and had high coverage of Sphagnum (> 90%). Environmental variables in pools surveyed (i.e. conductivity, water depth, pH and water temperature) had no significant effects on *S. arctica* presence. Implications for insect conservation: Our results highlight and discuss the importance of nearby woodlands and Sphagnum cover for *S. arctica* larvae. Future conservation projects should consider the proximity of woodland to current and restored *S. arctica* sites or promoting expansion of surrounding natural woodland patches to benefit *S. arctica* and potentially other odonates sharing similar ecological preferences." (Authors)] Address: Law, A., Biol. & Environmental Sciences, Univ. Stirling, Stirling FK9 4LA, UK. Email: alan.law1@stir.ac.uk

23595. Csutoros, A. (2024):  tude de la reproduction d'*Oxygastra curtisii* (Odonata: Incertae sedis) sur deux  tangs en Mayenne (France). *Martinia* 38(4): 31-45. (in French, with English summary) ["Study of the reproduction of *O. curtisii* on two ponds in Mayenne (France). The discovery of exuviae of *O. curtisii* in two water bodies in Mayenne (53) has highlighted the presence of two populations with a record abundance. In total, 1,267 exuviae of *O. curtisii* were collected at the Vannerie pond (Louv n ), and 151 at the Roche pond (Saint-Martin-duLimet). The sex ratio of the *O. curtisii* population at the Vannerie pond is balanced (1:1), while that

of the Roche pond shows a slight female dominance (1:0.8). The distribution of males and females is similar during the emergence period in both ponds. The exuviae are predominantly found on the vegetation along the shores and rarely exceed a distance of 1.5 m from the water's edge. Overpopulation is likely on the Vannerie pond, considering the low number of observed imagoes compared to the number of exuviae found. These two populations appear to be significant for the conservation of the species and its dispersion in the Mayenne department." (Authors)] Address: Csutoros, A., 6, rue du bois jardin, 35190 Qu briac, France. Email: antoinecsutoros@gmail.com

23596. D az Mart nez, C. (2024): 4. Odonata. In: D az Mart nez, C.,  lvarez Fidalgo, M.,  lvarez Fidalgo, P., De Arce Crespo, J.I., Cabellos Cano, I., Cancela, J.P., Cardo Maeso, N., Casanova Valladolid, J.M., Domenech Fern ndez, M., Fern ndez Mart nez, J.A., Garc a Par s, M., Garc a-Pozuelo Ramos, C., Garc a-Sa co S nchez, G., Gil Tapetado, D., Jurado Angulo, P., L pez Estrada, E.K., Mart nez Men ndez, J., Miralles N  ez, A., Par s, M., Rodr guez Flores, P.C., Rosas Ramos, N., Ruiz, J.L., S nchez Ruiz, A., S nchez Ruiz, M. & Zapata de la Vega, J.L. 2024. *Insectos: la fauna oculta de la Mancha*. Consejer a de Desarrollo Sostenible, Junta de Comunidades de Castilla-La Mancha, 352 pp: 32-37. (in Spanish) [55 odonate species cited in the biosphere reserve of La Mancha Humid are introduced.] Address: <https://educacionambiental.castillalamancha.es/recursos/publicaciones/insectos-la-fauna-oculta-de-la-mancha>

23597. Doucet, G.; Mondion, J. (2024): A rare behaviour: predation of a teneral female of *Aeshna juncea* by a larva of the genus *Aeshna* (Odonata: Aeshnidae). *Martinia* 38(3): 27-30. (in French and English) ["On 13th July 2010, during a trip in the Alps, while surveying a peat bog (Fig. 1a) located at an altitude of 2040 m in the commune of Huez (Department of Is re), 650 m south of the Lac Noir, we witnessed an unusual scene in which a larva of *Aeshna* Fabricius, 1775 was consuming the abdomen of a teneral female of *Aeshna juncea* that had just undergone metamorphosis. There is a strong probability that the larva is an *Aeshna juncea* larva, but it is not totally excluded that it could be an *Aeshna cyanea*. As the larva was not captured, analysis of the various photos we took did not allow us to be certain of the identification. When we arrived at around 12.30 pm, the mentum of the larva was attached to the seventh segment of the teneral and it was already in the process of consuming the sixth segment of the abdomen." (Authors)] Address: Doucet, G., 22 rue de la Grette, 25000 Besan on, France. Email: guillaume.doucet@yahoo.fr

23598. Dow, R.A. (2024): Previously unpublished Odonata records from Sarawak, Borneo, part XI: Odonata from Ulu Katibas, Kapit Division. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 45: 1-9. (in English) ["Records of Odonata from the ulu (upper) Katibas River area, just downstream from the Lanjak Entimau Wildlife Sanctuary (LEWS), in October 2022 are presented. The fieldwork was part of a larger project mainly funded by the Mohamed bin Zayed Species Conservation Fund. All locations surveyed are within Song District in Kapit Division. The survey was focused on searching for species of small, high gradient forest streams so the results certainly do not reflect the full odonate fauna of the area. Forty species were recorded during the survey (with one additional record made in the town of Song). One species (*Drepanosticta simuni*) was recorded from Kapit Division for the first time; the second ever record of the species. *Drepanosticta adenani* was recorded from outside of the

LEWS boundary for the first time, and in second growth forest for the first time. A new species of Telosticta is reported based on a single male, however this might be the same species as a previously unidentified female specimen from within LEWS. A very distinctive female Chlorogomphus, of the same presumably undescribed species as one recorded from the Long Seridan area in Miri Division in 2020, was collected. The high diversity of Platystictidae in the ulu Kaitabas area is remarked on." (Author)] Address: Dow, R.A., Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

23599. Drage, H.B. (2024): Euarthropod diversity in Pokémon: searching for the ancestral type. *Journal of Geek Studies* 11(2): 97-102. (in English) ["10% of Pokémon taxa clearly represent morphological and behavioural characteristics of real-world extant and fossil Euarthropoda. As such, these taxa can be taxonomically classified using our existing nomenclature and placed on a cladogram representing their hypothetical evolutionary relationships. In this way, we can reconstruct ancestral states of euarthropod Pokémon, such as their primary type, and better understand the evolutionary patterns inherent in the Pokémon world, understanding that the methods and problems involved mirror those for the biosphere of our natural world" (Author)] Address: Drage, Harriet, Institute of Earth Sciences, University of Lausanne, Lausanne, Switzerland. Email: harriet.drage@unil.ch

23600. Edegbene, A.O.; Arimoro, F.O.; Odume, O.N. (2024): Developing macroinvertebrate biotic indices in Nigerian urban-agricultural river catchments: Is the continuous scoring system more effective than discrete scoring system? *Water* 2024, 16(15), 2182; <https://doi.org/10.3390/w16152182>: 24 pp. (in English) ["The evaluation of the ecological consequences of anthropogenic stressors is a critical challenge in the management of the environment. Multimetric indices (MMIs) are one of the biomonitoring tools that have been widely explored to assess the ecological health of riverine systems globally, as MMIs have proven to be extremely effective, owing to their ability to incorporate data and information from both structural and functional assemblages of organisms and the entire ecosystem. Currently, there are very few MMIs developed in Nigeria to assess the ecological health of riverine systems, and none of the MMIs was developed for river stations draining urban and agricultural catchments. In order to close this gap, we developed and validated a macroinvertebrate-based MMI for assessing the ecological health of river systems in the Niger Delta area of Nigeria draining urban and agriculture catchments. Furthermore, we also compared the effectiveness of both continuous scoring and discrete systems for the development of MMI. Physico-chemical variables and macroinvertebrates were collected from 17 well-marked out stations that spread throughout 11 different river systems. The stations were classified into three categories based on the degree of impact: least-impacted stations (LIS), moderately impacted stations (MIS), and heavily impacted stations (HIS). 67 candidate macroinvertebrate metrics were potentially tested, and only five metrics were deemed significant and ultimately retained for integration into the final Niger Delta urban-agriculture MMI. The following five metrics were chosen to remain in use for the MMI development: Chironomidae/Diptera abundance, %Odonata, Margalef index, Oligochaete richness and logarithmic-transformed relative abundance of sprawler. Notable performance rates of 83.3% for the least-impacted stations and 75% for the moderately impacted stations were found during the index's validation using a different dataset. However, for the stations that were

most affected (i.e., the HIS), a 22.2% performance rate was noted. The Niger Delta urban-agriculture MMI was adjudged to be suitable as a biomonitoring tool for riverine systems subjected to similar combined stressors of urban and agricultural pollution." (Authors)] Address: Edegbene, A.O., Institute for Water Research, Rhodes University, Makhanda 6139, South Africa. Email: ovieedes@gmail.com

23601. Evangelio Pinach, J.M.; García-Pozuelo Ramos, C. (2024): Primeras citas de *Coenagrion caerulescens* (Fonscolombe, 1838) (Odonata: Coenagrionidae) en la provincia de Toledo (Castilla-La Mancha, centro de España). *Zoolentia* 4: 12-17. (in Spanish, with English summary) ["First records of *Coenagrion caerulescens* in the province of Toledo (Castilla-La Mancha, central Spain). *C. caerulescens* is an Odonata with few records published for Castilla-La Mancha. During the years 2022 and 2023, several specimens, as well as reproductive behaviour, have been observed in a small stream bordering the provinces of Madrid and Toledo (central Spain). These records are the first of the species for the province of Toledo (Castilla-La Mancha) and provides additional information about its geographical distribution in the province of Madrid." (Authors)] Address: Evangelio Pinach, J.M., Sociedad Odonatológica de la Comunitat Valenciana-Parotets. C/ Padre Vicente Cabanes, 5-12^a. 46900 Torrent (Valencia), Spain. Email: jjevanach@hotmail.com

23602. Fischer, S.; Brauner, O. (2024): Neue Nachweise von *Epithea bimaculata* im Westen Brandenburgs und in Sachsen-Anhalt (Odonata: Corduliidae). *Libellula* 43(1/2): 49-69. (in German, with English summary) ["New records of *Epithea bimaculata* in western Brandenburg and Saxony-Anhalt (Odonata: Corduliidae) – After initial accidental detections in 2020 and 2021, *E. bimaculata* was detected in eight waterbodies in western Brandenburg and one in the district of Wittenberg (Saxony-Anhalt) by 2024. Four further occurrences in the Brandenburg districts of Potsdam, Potsdam-Mittelmark, Oberhavel, and Prignitz, and four in Saxony-Anhalt were ascertained. In this area, occurrences of the species were previously unknown (western Brandenburg) or only very sporadically distributed (Saxony-Anhalt). A concentrated occurrence with six colonised waterbodies, including two main habitats with large numbers of emerged individuals, was found in Havelland within the Westhavelland Nature Park. The habitats at the sites largely corresponded to the previously known habitat selection of *E. bimaculata*. In contrast, however, the two main habitats had no woody vegetation at all, and some waterbodies had little or no underwater or floating-leaf vegetation. A total of 28 associated species were detected in the four more intensively surveyed waterbodies. Information is provided on how to better locate *E. bimaculata* exuviae." (Authors)] Address: Fischer, S., Unter den Eichen 1 a, 14641 Paulinenaue, Germany. Email: stefan-fischer@magenta.de

23603. Frank, M.; Adelman, J.; Blanckenhagen, B.v.; Holtzmann, J.; Roland, H.-J.; Stübing, S.; Tamm, J. (2024): Jahresbericht Hessen 2023. *Libellen in Hessen* 17: 3-39. (in German) ["Data input: In 2023, the data pool of the Hesse Dragonfly Working Group increased by a total of 9369 records, 9320 of which were valid positive reports. From a total of 40 active members of the working group, 6431 records were received in 2023, which represents a further slight decline in reports after 2022. The remaining data records were to a lesser extent late reports from the working group, but mainly originated from the transfer of data from the online reporting platform [observation.org](https://www.observation.org). As a result, a total of 7760 data records were available for the annual analysis for 2023 and

the database for 2022 also increased to 7714 DS. This data input increased the number of species detected in numerous quadrants. The map of the observations reported in 2023 shows a somewhat more even distribution of sites compared to previous years. The sites located in an MTB-64 grid square from which no observations have yet been reported are highlighted in turquoise. The number of these 'first mapped' MTB-64 sites in 2023 is pleasingly high. However, most of these are not systematic mappings, but random individual observations from observation.org. Due to the broader coverage of the country with the inclusion of observation data in the evaluation, the number of MTB-64 with first-time observation reports is now on a par with previous years at 172 in 2023 and 167 in 2022. A detailed assessment of the additional data obtained through the collaboration with observation.org can be found in a separate article in this issue (Adelmann 2024). Compared to previous years, the inclusion of observation.org data has improved the data input from the northern parts of the country in particular. The district of Kassel (13.5 %) is now almost on a par with the district of Darmstadt (17.5 %)." (Authors/DeepL)] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

23604. García Veramatus, M.P. (2024): Protocolo, criterios y recomendaciones para el monitoreo de mercurio en niveles inferiores de la red trófica acuática de pozas mineras abandonadas en la Amazonía peruana. Tesis de Título Profesional, Universidad de Ingeniería y Tecnología. Repositorio Institucional UTEC. <https://hdl.handle.net/20.500.128-15/382>: 128 pp. (in Spanish, with English summary) ["Artisanal and small-scale gold mining (ASGM) has generated high concentrations of mercury (Hg) in the vicinity of mining operations in Madre de Dios. Mercury is a toxic pollutant that upon entering a water body can be transformed into its organic, bioavailable and bioaccumulative form: methylmercury (MeHg). Research efforts and public attention have focused mainly on the presence of mercury in fish since its consumption is the main route of exposure for humans. However, monitoring fish, especially in locations that are remote and difficult to access, can be costly and logistically complex. Given this problem, this study evaluates the feasibility of using zooplankton and aquatic macroinvertebrates as alternative bioindicators of mercury contamination in aquatic ecosystems impacted by ASGM in the Madre de Dios region. The study proposes a standard operating procedure for collecting, preparing, and analyzing zooplankton and macroinvertebrate samples for monitoring mercury contamination in artificial ponds formed by gold mining. The results show that, considering the proposed methodology, macroinvertebrates of the family Belostomatidae and of the order Odonata are appropriate bioindicators to monitor mercury bioaccumulation in the study area. In contrast, the results for zooplankton were not satisfactory. This is the first study of this nature conducted for the Peruvian Amazon and highlights the need for environmental monitoring methods suitable for working conditions in the tropics." (Authors) Taxa - including Odonata - are treated at family level (Coenagrionidae, Libellulidae, Gomphidae).] Address: https://repositorio.utec.edu.pe/bitstream/handle/20.500.12815/382/Garc%c3%ada%20Veramatus_Tesis.-pdf?sequence=1&isAllowed=y

23605. Gerstle, V.; Bollinger, E.; Manfrin, A.; Pietz, S.; Kolbenschlag, S.; Feckler, A.; Entling, M.H.; Brühl, C.A. (2024): Trophic effects of Bti-based mosquito control on two top predators in floodplain pond mesocosms. *Environmental Science and Pollution Research* 33: 45485-45494. (in English) ["Chironomid (Diptera: Chironomidae) larvae play a key role

in aquatic food webs as prey for predators like amphibian and dragonfly larvae. This trophic link may be disrupted by anthropogenic stressors such as *Bacillus thuringiensis* var. *israelensis* (Bti), a biocide widely used in mosquito control. In a companion study, we recorded a 41% reduction of non-target larval chironomids abundance in outdoor floodplain pond mesocosms (FPMs) treated with Bti. Therefore, we examined the diet of two top predators in the FPMs, larvae of the palmate newt (*Salamandridae*: *Lissotriton helveticus*) and dragonfly (*Aeshnidae*: predominantly *Anax imperator*), using bulk stable isotope analyses of carbon and nitrogen. Additionally, we determined neutral lipid fatty acids in newt larvae to assess diet-related effects on their physiological condition. We did not find any effects of Bti on the diet proportions of newt larvae and no significant effects on the fatty acid content. We observed a trend in *Aeshnidae* larvae from Bti-FPMs consuming a higher proportion of large prey (*Aeshnidae*, newt, damselfly larvae; ~42%), and similar parts of smaller prey (chironomid, mayfly, *Libellulidae*, and zooplankton), compared to controls. Our findings may suggest bottom-up effects of Bti on aquatic predators but should be further evaluated, for instance, by using compound-specific stable isotope analyses of fatty acids or metabarcoding approaches." (Authors)] Address: Gerstle, Verena, Institute for Environmental Sciences, iES Landau, RPTU Kaiserslautern-Landau, Fortstr. 7, 76829, Landau, Germany

23606. Ghaderi, E.; Mouludi-Saleh, A.; Eagderi, S.; Molodi, F.; Molodinia, B. (2024): Investigation of the habitat preference of sympatric species, (*Oxynemachilus kiabii*) and (*Oxynoemacheilus karunensis*) from Alk River (Karkheh River basin). *Journal of Natural Environment* 77: 213-222. (in Farsi, with English summary) ["Models based on regression analyses are used to express patterns of abundance and distribution of fish populations in relation to environmental parameters. Therefore, this study was conducted to investigate the habitat suitability indices of (*Oxynemachilus kiabii*) and (*O. karunensis*) from Alk River (sub-basin of Razavar and Karkheh basin). Sampling was done using a hand net in eight stations (each with three replicates). Five habitat variables were measured and recorded, including river width, river depth, bed slope, water velocity, and average bed size. The results showed that the most habitat preference of *Kiabi* loach is depth in the range of 46-<52 cm, 0.6-<0.9 m width, 5.8-<6.4% slope, and water velocity 0.52-<0.58 m/s and the size of bedrock is 0-<0.12 mm and for (*O. karunensis*) was calculated as depth in the range of 10-<16 cm, 2.1-<2.4 m width, 1.6-<2.2% slope, and water velocity 0.34-<4 m/s and the size of bedrock is 48-<60 mm. Also, the highest and lowest SI values for both (*O. kiabii*) and (*O. karunensis*) were related to depth and average bed size (for *O. kiabii*) and velocity and depth (for *O. karunensis*), respectively. The results showed that Alk River is a suitable habitat for (*O. karunensis*), whereas not suitable habitat for (*O. kiabii*). Examination of the results of their feeding habits and preferences in the digestive system showed that these favorite of fishes are *Chironomidae*, *Simuliidae*, *Baetidae*, *Gomphidae* and *Hydropsychidae*." (Authors)] Address: Ghaderi, E., Department of Fisheries Sciences, Faculty of Natural Resources, University of Kurdistan, Sanandaj, Iran

23607. Ghelich Khani, P.; Kiany, M.; Qashqaei, A.T. (2024): The first emerging records of a dragonfly in the dark zone of subterranean ecosystems: *Exuviae* and newly emerged adults of Hyrcanian Goldenring, *Cordulegaster vanbrinkae* in Danial Cave, northern Iran. *Ecology and Evolution*. 2024; 14:e70157. <https://doi.org/10.1002/ece3.70157>: 7 pp. (in English) ["Riverine caves are special habitats that are home

to many aquatic and terrestrial species. Some Odonata species and their emerging are recorded at the entrance and in the twilight zones of subterranean habitats around the world. However, the emergence of any Odonata species has not been recorded in the dark zones of caves or other subterranean habitats. We report the first evidence of the emerging of *C. vanbrinkae* Lohmann, 1993, as an endemic species of the Hyrcanian biogeographical region, in the dark zone of Danial Cave, in the World Heritage-listed Hyrcanian Forests, northern Iran. During 2020–2023, three newly emerged and three exuviae of the species were recorded in the entrance zone (25 m) and the dark zone of the cave (200–280 m). The main hypothesis of the study is the entry and exit of adults from the cave entrance. However, we still do not know if the newly emerged will leave the cave or not. We still need more study on the biology and ecology of the species inside and around the cave. Danial Cave, with its high biodiversity, is one of the most important caves in the Middle East, and is urgently in need of conservation as a national natural monument." (Authors)] Address: Ghelich Khani, P., Dept of Biodiversity & Ecosystem Management, Environmental Sciences Research Institute, Shahid Beheshti University, Tehran, GC, Iran. Email: pouriaghelichkhani11@gmail.com

23608. Girgente, H. (2024): Documenting the odonates of Florida's seepage streams in search of the Calvert's Emerald (*Somatochlora calverti*). MSc thesis, Texas Tech University: 98 pp. (in English) ["Globally, freshwater ecosystems and the organisms that depend on them are at risk. Dragonflies and damselflies (collectively, "odonates") have a history of being used as indicators of freshwater habitat quality due to their predatory trophic level and amphibious life cycle. However, the nymphal life stage is severely understudied compared to the adults, which inhibits conservation efforts. *S. calverti* is a rare species of dragonfly in the family Corduliidae, whose members are notoriously difficult to collect in the field as nymphs and adults due to their scarcity, little understanding of their habitat associations, and flight behavior of the adults. *S. calverti* is known primarily from the Florida panhandle but has been documented in Alabama, Georgia, and South Carolina (United States of America [U. S.]). The nymph of this species is speculated to use seepage streams analogous to sympatric congeners; however, the nymph has never been collected in the field and, therefore, its specific microhabitat is unknown. I conducted a review from three broad categories of source types to generate a holistic consensus on what is defined to be suitable reproductive habitat for *S. calverti*. Sources identified eight major characteristics that are likely to harbor *S. calverti*: shallow seepage streams, including steephead ravines, with undercut banks and mats of *Sphagnum* moss adjacent to intact sandhill forest. These ecosystems are being lost and degraded by anthropogenic activity, which has considerable impacts on the persistence of habitat specialists, including *S. calverti*, that use them and managers' ability to conserve them. Based on the results of this review, I conducted field surveys at 24 sites (11 of which were steephead streams and 13 non-steephead streams) from 2021–2023 that matched review criteria. At each site, I measured odonate presence/absence primarily through collection of nymphs, but adults were also recorded (not collected). Environmental data was also collected including canopy cover, stream bottom/bank composition, and stream physicochemical variables (temperature [°C], velocity [m/s], dissolved oxygen [%], specific conductivity [µS], pH, total dissolved solids [TDS ppm], average width [cm], and average depth [cm]). The odonate assemblages of each stream type were characterized using measures of Whittaker's beta diversity, Shannon-Wiener's alpha diversity, and richness estimates of each site and

stream type were generated using Jackknife 1 and 2, Chao, and Bootstrap estimators. An analysis of similarity (ANOSIM) was calculated to assess significant differences in assemblages by stream type. A hierarchical cluster analysis and linear discriminant function analysis were conducted using normalized, scaled abiotic variables to determine if sites separated by stream type and whether stream type could be determined by the model using abiotic variables alone. Cluster analysis was also applied to assemblage data. A non-metric multi-dimensional scaling (NMDS) ordination was produced using Bray-Curtis' dissimilarity matrices, and abiotic variables were fit to the NMDS. Mantel tests were run on abiotic variables to assess if variance in abiotic data covaried with variation in assemblage data. *Somatochlora calverti* was undetected at all sites, but 47 other odonate species were documented. Non-steephead sites had the highest richness ($N = 35$), diversity, and unique species of the stream types, but steephead sites were more speciose on average. Despite individual steephead sites averaging higher in species richness, steepheads were less speciose overall ($N = 31$) but had higher alpha diversity than non-steephead. NMDS indicated that there might be differences between assemblages in each stream type that did not align with measures of beta diversity, which showed that assemblages between the stream types were more similar than assemblages within stream types. Cluster analysis indicated two clusters for assemblage data and three for abiotic variables. Discriminant function analysis resulted in a model accuracy of 67%, indicating that more often than not, sites were accurately labeled as steephead or non-steephead based on abiotic composition. Environmental vectors from NMDS with the highest correlation coefficients were temperature, turbidity, and total dissolved solids. However, Mantel tests showed that these variables had insignificant impacts on assemblage structure. The cumulative effect of all environmental variables was also shown to be insignificant in shaping assemblage structure. Inconsistencies within the data and biological reasons that contribute to the overall lack of differentiation between stream types are addressed herein. Overall, it appears that odonates use seepage stream types interchangeably, but these streams are under major threat in the rapidly growing state of Florida. Further survey/research needs for both stream types are sorely needed, particularly for invertebrate (including odonate) taxa." (Author)] Address: <https://ttu-ir.tdl.org/server/api/core/bitstreams/b65615fa-450f-42c8-a7eb-9c55e9df30b9/content>

23609. Girgente, J. (2024): Ecomorphological variation in *Hylogomphus geminatus* (Odonata: Gomphidae). MSc thesis, Texas Tech University: 110 pp. (in English) ["The twin-striped clubtail dragonfly (*Hylogomphus geminatus*) is a relatively small (35 – 47 mm total length), uncommon black-and-yellow dragonfly with a restricted range that includes habitats comprised primarily of clear, sandy streams around the Florida panhandle. The Apalachicola River drainage is the main river drainage of the Florida panhandle; it includes four major rivers spanning three U.S. states and an area of almost 51,800 sq km. *H. geminatus* was originally described as having larger adults east of the Apalachicola River, FL than west of the river and expert opinions also noted that trend, but no data had been systematically collected. *H. geminatus* body length could be signaling aquatic stressors present in the watersheds within which it develops as aquatic nymphs and some aquatic variables, like temperature, specific conductance, turbidity, etc. have already been connected to detrimental consequences in individual macroinvertebrates or their communities. My goal was to confirm the veracity and significance of adult *H. geminatus* body size differences across the Apalachicola River and among its watersheds and to investigate

the significance of this pattern in the nymphs as well. I also attempted to find associations between adult size and land-cover and nymph size and stream variables. 166 adult *H. geminatus* were measured with calipers and used in analyses; those east of the Apalachicola River did exhibit significantly larger body sizes than those west of the river. Females were also always significantly larger than males. Adults were recorded from 14 distinct HUC-8 "subbasins" and of the 91 possible pairwise subbasin comparisons, 16 (17.58%) showed significant differences in body length, including several in adjacent subbasins. There were no significant associations between body length and landcover or body length and ground imperviousness, suggesting aquatic variables may be impacting the species as developing aquatic nymphs. Nymphs were collected with a dip- and kick-net in appropriate habitats around the panhandle of Florida. 94 nymphs were classified into one of three age classes (known as "instars") ranging from oldest (F-0) to youngest (F-2+) determinable instar. Contrary to adult body length results, F-0 and F-2+ nymphs showed significantly larger head widths west of the Apalachicola River than east of it, but sample size was likely a factor as the proportion of significantly larger female F-0 nymphs west of the river skewed the data. Additionally, conclusions drawn from the F-2+ age class use highly variable, overlapping measurements of many different instars whose instar cannot be determined with certainty past the F-2 stage. A mixed-effects model was applied to the F-1 and F-2+ instars (sample size was too low for the F-0 instars) which used site name as the random effect and stream pH, dissolved oxygen (DO), temperature, specific conductance, turbidity, width, and depth as fixed effects. For F-1 instars, significant inverse relationships were found between head width and DO and head width and specific conductance whereas significant positive relationships were found between head width and water temperature. No significant relationships were found using F-2+ instars. Although the model suggests the aforementioned three aquatic variables have a significant impact on *H. geminatus* development and morphology, only 22 F-1 specimens could be used in analyses so sample size is quite small. Additionally, these analyses would be best used on F-0 nymphs because this is the oldest instar and has therefore been exposed to potential environmental stressors for the longest period of time and because studies show this instar's size is highly predictive of adult size. These analyses show there are significant size differences in *H. geminatus* across its restricted range, often occurring in adjacent watersheds. These discrepancies could be related to the aquatic conditions in which the nymphs develop and the models I have presented herein provide a framework for future work that attempts to identify stressors in their aquatic environments which could pose a risk to other declining and protected taxa that share this home with *Hylogomphus geminatus*." (Author)] Address: <https://ttu-ir.tdl.org/server/api/core/bitstreams/c436b8ac-88b1-430d-80f9-de7d8d417556/content>

23610. Gokhman, V.E.; Kuznetsova, V.G. (2024): Structure and evolution of ribosomal genes of Insect chromosomes. *Insects* 2024, 15, 593. <https://doi.org/10.3390/insects15080593>: 26 pp. (in English) [Verbatim: "Palaeoptera (basal winged insects) includes two orders, Ephemeroptera and Odonata: Nothing is known about the number and position of 45S rDNA sites in the former order. On the contrary, this information became available during the last decade for more than 20 Odonata species, which possess holokinetic chromosomes. These species include 15 members of the families Aeshnidae, Corduliidae, and Libellulidae, as well as 7 members of Calopterygidae and Coenagrionidae that belong to the Anisoptera and Zygoptera. Although the karyotypes

of most Odonata contain single pairs of 45S rDNA clusters, the position of NORs may differ in members of these suborders. Specifically, these sites are located on one of the largest autosomes in all studied members of Anisoptera but on m-chromosomes in many members of Zygoptera. Since the former pattern is considered to be ancestral for Odonata, the distribution of 45S rDNA sites found in members of Zygoptera is believed to be derived. Moreover, the latter pattern could have arisen in a common ancestor of the superfamilies Calopterygoidea and Coenagrionoidea. On the other hand, FISH with an 18S rDNA probe revealed a single signal on a particular bivalent in the male meiotic karyotype of *Rhionaeschna planaltica* (Calvert) (Aeshnidae). However, detailed analysis identified this bivalent as neo-XY, with the neo-X chromosome apparently originated via fusion of the initial X chromosome and an m-chromosome."] Address: Gokhman, V.E., Russian Entomological Society, Moscow 111024, Russia. Email: vegokhman@hotmail.com

23611. Granath, G.; Hyseni, C.; Bini, L.M.; Heino, J.; Ortega, J.C.G.; Johansson, F. (2024): Disentangling drivers of temporal changes in urban pond macroinvertebrate diversity. *Urban Ecosystems* 27: 1027-1039. (in English) ["Ponds are key elements for ecosystem functions in urban areas. However, little is known about pond biodiversity changes over time and the drivers underlying such changes. Here, we tested whether past species assemblages, land cover and pond environmental change influence pond macroinvertebrate species richness and temporal beta diversity. We also compared spatial and temporal beta diversity, and investigated species-specific colonization and extinction rates over time. We sampled for presence of Odonata and Trichoptera (larvae), and Coleoptera and Hemiptera (larvae and adults) species in 30 ponds in Stockholm, Sweden, in 2014 and 2019. Past species richness was the best predictor of current species richness, whereas temporal changes in land cover and pond environment were not significantly related to current species richness. No correlations between temporal beta diversity and land cover or pond environmental changes were detected. However, ponds showed large changes in their temporal beta diversity, with equal contributions from species gains and losses. The probability of species colonizing and going extinct from ponds revealed that more common species were more likely to colonize a pond, while uncommon species were more likely to go extinct in a pond. Within our 5-year study, we found (i) highly similar spatial and temporal beta diversity, (ii) that past species richness is a good predictor of current species richness; however, the same does not hold true for species composition. The high dynamics of urban pond communities suggest that a large number of ponds are required to maintain high species richness at a landscape level." (Authors)] Address: Granath, G., Dept of Ecology and Genetics, Uppsala University, Norbyvägen 18D, Uppsala 75236, Sweden. Email: Gustaf.Granath@ebc.uu.se

23612. Großer, M.; Dreyer, J.; Arndt, B.; Schwerdtfeger, R.; Buchwald, R. (2024): Straßenbrücken als Barrieren am Beispiel Delme, Niedersachsen: Wie verhalten sich Fließgewässer-Libellen? *Mitteilungen der AG Libellen in Niedersachsen und Bremen* Nr. 6: 37-50. (in German, with English summary) ["To investigate the barrier effect of road bridges on stream damselflies, the dispersal behaviour of three typical species of flowing waters *Calopteryx splendens*, *C. virgo* and *Platycnemis pennipes* was studied. Mark-recapture and observations took place at the Delme River, Lower Saxony, Germany, at seven bridges in four subsequent summers from 2020 to 2023. Main findings suggest that 1) None of the investigated bridges functions as a complete barrier and 2)

With increasing bridge size the barrier effect becomes stronger. Further 3) Bridge depth, relative narrowness and light intensity below the bridge are the decisive parameters for the barrier effect of the studied bridges. And at last 4) Artificial light enormously increased the percentage of flights under the bridges, especially at the highway bridge, and reduced the reversals in front of the bridge. These results lead us to assume that lacking light incidence is the main limiting parameter, probably essential for damselflies to orientate." (Authors)] Address: Buchwald, R., Universität Oldenburg, Institut für Biologie und Umweltwissenschaften (IBU), 26111 Oldenburg, Germany. E-mail: rainer.buchwald@uni-oldenburg.de

23613. Gudade, S.G.; Patil, P.S. (2024): Dragonfly diversity around Washim region of Maharashtra, India. The Rubrics Journal of Interdisciplinary Studies 6(2): 1145-1149. (in English) [Without further data, the following species are reported: *Bradinopyga geminate*, *Orthetrum taeniolatum*, *Ictinogomphus rapax*, *Brachythemis contaminata*, *Trithemis aurora*, *T. festiva*, *Diplacodes trivialis*] Address: Gudade, S.G, P.G. & Research Dept Of Zoology, R.A. Arts, Shri M.K.Commerce & Shri S.R.Rathi Science College, Washim, Maharashtra, India

23614. Hawkes, W.; Selinger, F.; Willigalla, C.; Haest, B.; Keiss, O.; Kalnins, M. (2024): Northward expansion: four new Odonata species for Latvia. *Libellula* 43(1/2): 107-116. (in German, with English summary) ["This paper confirms four Odonata species (*Lestes barbarus*, *Sympecma fusca*, *Crocothemis erythraea*, and *Sympetrum meridionale*) as new for Latvia, three having increased the northern edges of their range due to the warming climate. The records of *C. erythraea* and *S. meridionale* are currently the most northerly records ever. While only individual records of *L. barbarus*, *C. erythraea*, and *S. meridionale* were made, *S. fusca* was found at eleven sites throughout the country." (Authors)] Address: Hawkes, W., Swiss Ornithological Institute, Seerose 1, 6204 Sempach, Switzerland. Email: will.leo.hawkes@vogelwarte.ch

23615. Hayashi, S.; Abe, T.; Igawa, T.; Katsura, Y.; Kazama, Y.; Nozawa, M. (2024): Sex chromosome cycle as a mechanism of stable sex determination. *The Journal of Biochemistry* 176(2): 81-95. (in English) ["Recent advances in DNA sequencing technology have enabled the precise decoding of genomes in non-model organisms, providing a basis for unraveling the patterns and mechanisms of sex chromosome evolution. Studies of different species have yielded conflicting results regarding the traditional theory that sex chromosomes evolve from autosomes via the accumulation of deleterious mutations and degeneration of the Y (or W) chromosome. The concept of the 'sex chromosome cycle,' emerging from this context, posits that at any stage of the cycle (i.e., differentiation, degeneration, or loss), sex chromosome turnover can occur while maintaining stable sex determination. Thus, understanding the mechanisms that drive both the persistence and turnover of sex chromosomes at each stage of the cycle is crucial. In this review, we integrate recent findings on the mechanisms underlying maintenance and turnover, with a special focus on several organisms having unique sex chromosomes. Our review suggests that the diversity of sex chromosomes in the maintenance of stable sex determination is underappreciated and emphasizes the need for more research on the sex chromosome cycle.... Several insect orders likely adopt the X dose for sex determination. For example, the majority of species belonging to Blattodea and Odonata do not have a Y (Supplementary Table S4)." (Authors)] Address: Nozawa, M., Department of Biological Sciences, Tokyo Metropolitan University, 1-1 Minamiosawa, Hachioji, Tokyo 192-0397, Japan. Email: manozawa@tmu.ac.jp

23616. Hernandez, J. (2024): Incomplete barriers to heterospecific mating among *Somatochlora* species (Odonata: Corduliidae) as revealed in multi-gene phylogenies. MSc thesis, Entomology, Michigan State University: V + 39 pp. (in English) ["*Somatochlora*, commonly known as the striped emeralds, is an enigmatic genus whose systematics have lagged other Odonata genera, with the last revision done by Walker (1925). North American *Somatochlora* inhabit fens, bogs, and forest streams, with most closely related species sharing a sympatric range. As a result, *Somatochlora* males have elaborate claspers which are species-specific and provide a morphological barrier to heterospecific mating, but exceptions have been observed. The objective of this project was to investigate the occurrence of heterospecific mating between North American *Somatochlora* species as inferred from multigene phylogenies. We employed the use of two mitochondrial genes (COI and ND3) and two nuclear genes (EF1-a and ITS2) to construct well-substantiated phylogenies using a maximum parsimony optimality criterion. Compared to nuclear genes (nDNA), mitochondrial genes (mtDNA) have a high nucleotide substitution rate, thereby allowing for the genetic discrimination of populations and species. Monophyly of mtDNA lineages is expected for closely related species because ancestral mtDNA lineages go extinct after a speciation event four times faster than nDNA lineages. Observation of non-monophyletic mtDNA lineages but monophyletic nDNA lineages between *Somatochlora* sister-species would indicate mtDNA introgression and suggest heterospecific matings. Our results highlighted three instances of heterospecific mating in the following groups: 1) *S. hineana* + *S. tenebrosa*; 2) *S. kennedyi* + *S. forcipata* + *S. franklini*; 3) *S. calverti* + *S. provocans* + *S. filosa*. In addition, the recovered topology accurately reflected previous taxonomic understanding of the genus. These multi-gene phylogenies of North American *Somatochlora* are the first, providing a foundation for future ecological and evolution studies and knowledge for effective decision-making and public policy, which is especially important for endangered species, *Somatochlora hineana*." (Author)] Address: <https://d.lib.msu.edu/etd/51879>

23617. Huang, J.; Feng, H.; Drake, V.A.; Reynolds, D.R.; Gaog, B.; Cheng, F.; Zhang, G.; Zhu, J.; Gao, Y.; Zhai, B.; Li, G.; Tian, C.; Huang, B.; Hu, G.; Chapman, J.W. (2024): Massive seasonal high-altitude migrations of nocturnal insects above the agricultural plains of East China. *PNAS* 2024 Vol. 121 No. 18 e2317646121: 9 pp. (in English) ["Migrations of insects contribute to ecosystem functioning but also have important economic impacts when the migrants are pests or provide ecosystem services. We combined radar monitoring, aerial sampling, and searchlight trapping, to quantify the annual pattern of nocturnal insect migration above the densely populated agricultural lands of East China. A total of ~9.3 trillion nocturnal insect migrants (15,000 t of biomass), predominantly Lepidoptera, Hemiptera, and Diptera, including many crop pests and disease vectors, fly at heights up to 1 km above this 600 km-wide region every year. Larger migrants (>10 mg) exhibited seasonal reversal of movement directions, comprising northward expansion during spring and summer, followed by southward movements during fall. This north-south transfer was not balanced, however, with southward movement in fall 0.66× that of northward movement in spring and summer. Spring and summer migrations were strongest when the wind had a northward component, while in fall, stronger movements occurred on winds that allowed movement with a southward component; heading directions of larger insects were generally close to the track direction. These findings indicate adaptations leading to movement in seasonally favorable directions. We compare our results from

China with similar studies in Europe and North America and conclude that ecological patterns and behavioral adaptations are similar across the Northern Hemisphere. The predominance of pests among these nocturnal migrants has severe implications for food security and grower prosperity throughout this heavily populated region, and knowledge of their migrations is potentially valuable for forecasting pest impacts and planning timely management actions." (Authors) The paper includes a reference to Odonata.] Address: Email: j.chapman2@exeter.ac.uk.

23618. Hughes, A.C.; Dorey, J.B.; Bossert, S.; Qiao, H.; Orr, M.C. (2024): Big data, big problems? How to circumvent problems in biodiversity mapping and ensure meaningful results. *Ecography* 2024: e07115. doi: 10.1111/ecog.07115: 15 pp. (in English) ["Our knowledge of biodiversity hinges on sufficient data, reliable methods, and realistic models. Without an accurate assessment of species distributions, we cannot effectively target and stem biodiversity loss. Species range maps are the foundation of such efforts, but countless studies have failed to account for the most basic assumptions of reliable species mapping practices, undermining the credibility of their results and potentially misleading and hindering conservation and management efforts. Here, we use examples from the recent literature and broader conservation community to highlight the substantial shortfalls in current practices and their consequences for both analyses and conservation management. We detail how different decisions on data filtering impact the outcomes of analysis and provide practical recommendations and steps for more reliable analysis, whilst understanding the limits of what available data will reliably allow and what methods are most appropriate. Whilst perfect analyses are not possible for many taxa given limited data, and biases, ensuring we use data within reasonable limits and understanding inherent assumptions is crucial to ensure appropriate use. By embracing and enacting such best practices, we can ensure both the accuracy and improved comparability of biodiversity analyses going forward, ultimately enhancing our ability to use data to facilitate our protection of the natural world." (Authors) There is a brief note on Odonata: "For example, IUCN maps of Odonata in the Eastern and Western Hemispheres use different approaches, amphibians in the United States use county boundaries, while elsewhere provinces or country boundaries are used."] Address: Orr, M.C., Entomologie, Staatliches Museum für Naturkunde Stuttgart, Stuttgart, Germany. Email: michael.christopher.orr@gmail.com

23619. Humala A. E.; Polevoi A. V. (2024): New insect species in the entomofauna of Karelia. *Trudy Karel'skogo nauchnogo tsentra RAN = Transactions of the Karelian Research Centre RAS*. 2024. doi: 10.17076/bg1875: 18 pp. (in Russian, with English summary) [Records of *Coenagrion puella* are documented: o. Kilpola, Leskelya, 13.06.2011 (A. Polevoy); Ruskeala, 28.06.2023 [https://www.inaturalist.org/observations/170703314]; Kol: Petrozavodsk, 22.06.2023 [https://www.inaturalist.org/observations/169590668]; Besovets, 24.06.2023 [https://www.inaturalist.org/observations/175-987880] Address: Humala A. E., Field Institute of Forests KarNC RAS, FITS "Karelian Scientific Center RAS" (Pushkinskaya Str., 11, Petrozavodsk, Republic of Karelia, Russia, 185910. Email: humala@krc.karelia.ru

23620. Husband, D.M.; McIntyre, N.E. (2024): Finding isolated aquatic habitat: Can beggars be choosers? *Diversity* 2024, 16(8), 468; https://doi.org/10.3390/d16080468: 22 pp. (in English) ["In a two-year field study across 58 isolated wetlands in Texas (USA), we examined whether odonate

assemblages were structured by local environmental filters or instead simply reflected the use of any available water in this semi-arid region. Cluster analysis resolved three wetland groupings based on environmental characteristics (hydroperiod, water chemistry, vegetation); 37 odonate species were detected at these wetlands. The most speciose assemblages occurred at wetlands with longer hydroperiods; these sites also had the most species found at no other wetland type. Ordination plots indicated some filtering with respect to the hydroperiod, but there was only mixed or weak support with respect to other local factors. Because water persistence was the strongest driver maintaining odonate diversity in this region, regardless of water quality or vegetation, beggars cannot be choosers in this system and conservation efforts can focus on water maintenance or supplementation." (Authors)] Address: Husband, Danielle, Department of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA. Email: dhusband94@gmail.com

23621. Hussain, M.; Mir, A.H.; Paray, N.P.; Dar, T.A. (2024): Diversity of Odonata in Hokersar Wetland- A Ramsar Site of Kashmir Himalaya, India. *Indian Journal of Entomology Online published Ref. No. e24141*: 4 pp. (in English) ["The present study was carried out from 2021 to 2023 to assess the diversity and seasonal distribution of odonates in the Hokersar wetland. A total of 18 species under 11 genera and four families were observed of which a high diversity of dragonflies were seen compared to damselflies. Libellulidae was found to be the most species-rich family followed by Aeshnidae. The most abundant species were *Pantala flavescens* (11.98%), *Crocothemis servilia* (11.35%) and *Ischnura inarmata* (11.09%). A change in diversity and abundance across seasons was observed with the highest being in summer followed by autumn, while absence during spring and autumn was seen, except for *Sympecma paedisca* (Brauer) found throughout the year." (Authors) Fig. 1 presents the following species: A- *Ischnura inarmata*; B- *Sympecma paedisca*; C- *Enallagma cyathigerum*; D- *Pantala flavescens*; E- *Palpopleura sexmaculata*; F- *Crocothemis servilia*; G- *Orthetrum brunneum*; H- *O. glaucum*; I- *O. luzonicum*; J- *O. triangulare*; K- *O. sabina*; L- *Sympetrum commixtum*; M- *S. fonscolombii*; N- *S. striolatum*; O- *Aeshna mixta*; P- *A. juncea*; Q- *Anax parthenope*; R- *Trithemis aurora*] Address: Hussain, M., Department of Zoology, University of Ladakh, UT Ladakh

23622. Ikayaja, E.O.; Arimoro, F.O. (2024): Organophosphate pesticide residue impact on water quality and changes in macroinvertebrate community in an Afrotropical stream flowing through farmlands. *Environmental Monitoring and Assessment* 196, 489: (in English) [Nigeria; "River Chanchaga has experienced significant agricultural practices around its catchment, which involved the indiscriminate use of pesticides. However, residents of the study area are not well aware of the negative impact of pesticides on water quality and macroinvertebrates. In this study, the first report on the influence of organophosphate pesticide contamination on the abundance of the macroinvertebrate community was provided. Sampling for the determination of organophosphate pesticide residues was carried out during the peak of the two seasons, while macroinvertebrates and physicochemical variables were observed for 6 months. We examined 11 organophosphate pesticide residues using gas chromatography coupled with mass spectrometry, 12 water quality variables, and 625 macroinvertebrate individuals. The concentration of recorded organophosphate pesticide residues ranged from 0.01 to 0.52 µg/L. From the Canonical Correspondence Analysis plot, malathion, chlorine, and paraffin show a positive correlation with *Unima* sp., *Hydrocanthus* sp., *Chironomus*

sp., and *Potadoma* sp. At station 3, depth shows a positive correlation with *Biomphalaria* sp. and *Zygomma* sp. [sic], indicating poor water quality as most of these macroinvertebrates are indicators of water pollution. Diuron and carbofuran show a negative correlation with *Lestes* sp. [sic] and *Pseudocloeon* sp., and these are pollution-sensitive macroinvertebrates. The total mean concentration of organophosphate pesticide residues was above international drinking water standards set by the World Health Organization except for paraffin, chlorpyrifos, and diuron. In conclusion, the observations recorded from this research are useful in managing pesticide applications around the river catchment." (Authors) Odonata taxa must be misidentified as the short of to taxa includes Asian and European taxa] Address: Ikayaja, E.O., Ecology and Environmental Biology Unit, Department of Animal Biology, Federal University of Technology Minna, Minna, P.M.B. 65, Nigeria

23623. Janssen, S.E.; Kotalik, C.J.; Willacker, J.J.; Tate, M.T.; Flanagan Pritz, C.M.; Nelson, S.J.; Krabbenhoft, D.P.; Walters, D.M.; Eagles-Smith, C.A. (2024): Geographic drivers of mercury entry into aquatic food webs revealed by mercury stable isotopes in dragonfly larvae. *Environmental Science & Technology* 58: 13444-13455. (in English) ["Atmospheric mercury (Hg) emissions and subsequent transport and deposition are major concerns within protected lands, including national parks, where Hg can bioaccumulate to levels detrimental to human and wildlife health. Despite this risk to biological resources, there is limited understanding of the relative importance of different Hg sources and delivery pathways within the protected regions. Here, we used Hg stable isotope measurements within a single aquatic bioindicator, dragonfly larvae, to determine if these tracers can resolve spatial patterns in Hg sources, delivery mechanisms, and aquatic cycling at a national scale. Mercury isotope values in dragonfly tissues varied among habitat types (e.g., lentic, lotic, and wetland) and geographic location. Photochemical-derived isotope fractionation was habitat-dependent and influenced by factors that impact light penetration directly or indirectly, including dissolved organic matter, canopy cover, and total phosphorus. Strong patterns for $\Delta^{200}\text{Hg}$ emerged in the western United States, highlighting the relative importance of wet deposition sources in arid regions in contrast to dry deposition delivery in forested regions. This work demonstrates the efficacy of dragonfly larvae as biosentinels for Hg isotope studies due to their ubiquity across freshwater ecosystems and ability to track variation in Hg sources and processing attributed to small-scale habitat and large-scale regional patterns." (Authors) Taxa are treated at family level.] Address: Janssen, Sarah, US Geological Survey Upper Midwest Water Science Center, One Gifford Pinchot Drive, Madison, WI, 53726, USA. Email: sjanssen@usgs.gov

23624. Jiang, B.; Yao, Y.; Li, J.; Zhang, J.; Sun, Y.; He, S. (2024): Structures and genetic information of control region in mitogenomes of Odonata. *Mitochondrial DNA Part B: Resources* 9(8): 1081-1092. (in English) ["Mitogenome data of Odonata is accumulating and widely used in phylogenetic analysis. However, noncoding regions, especially control region, were usually omitted from the phylogenetic reconstruction. In an effort to uncover the phylogenetic insights offered by the control region, we have amassed 65 Odonata mitogenomes and conducted an examination of their control regions. Our analysis discovered that species belonging to Anisoptera and Anisozygoptera exhibited a stem-loop structure, which was formed by a conserved polyC-polyG stretch located near the rns gene (encoding 12S rRNA). Conversely, the polyC-polyG region was not a conserved fragment

in Zygoptera. The length and number of repetitions within the control region were identified as the primary determinants of its overall length. Further, sibling species within Odonata, particularly those in the genus *Euphaea*, displayed similar patterns of repetition in their control region. Collectively, our research delineates the structural variations within the control region of Odonata and suggests the potential utility of this region in elucidating phylogenetic relationships among closely related species." (Authors)] Address: Jiang, B., Anhui Provincial Key Laboratory of Molecular Enzymology & Mechanism of Major Diseases, College of Life Sciences, Anhui Normal Univ., Wuhu, China. Email: bin.jiang@ahnu.edu.cn

23625. Jödicke, R. (2024): Erinnerung an Rolf Busse (09.12.1936 - 26.01.2024). *Mitteilungen der AG Libellen in Niedersachsen und Bremen* 6: 71-72. (in German) [Obituary and appreciation of a regionally well-known odonatologist from Lower Saxony, Germany.] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@magenta.de

23626. Keetapithchayakul, T.S.; Futahashi, R.; Danaisawadi, P.; Ignatius, K.J.; Wongkamhaeng, K. (2024): Description of the larva of *Argiocnemis rubescens rubeola* Selys, 1877 (Odonata, Coenagrionidae, Agriocnemidinae) from Thailand with systematic notes on the subfamily Agriocnemidinae. *Tropical Natural History* 24(1): 47-59. (in English) ["The final stadium larvae of *A. rubescens rubeola* are described in the present study. The adult-larva association along with the taxonomic remarks on the subfamily Agriocneminae, is established by employing the cytochrome oxidase subunit I gene (COI). The larva is characterized by the ovate shape of the caudal lamella, the lack of a band on the caudal lamella, a rounded postocular lobe outline, three pairs of premental setae, and four palpal setae. Taxonomic notes suggest the COI data consistently aligns with both larval and adult characteristics, offering a comprehensive perspective." (Authors)] Address: Wongkamhaeng, K., Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok, 10900, Thailand. Email: Koraon@gmail.com

23627. Keinath, S.; De Silva, S.; Sommerwerk, N.; Freyhof, J. (2024): High levels of species' extirpation in an urban environment — A case study from Berlin, Germany, covering 1700–2023. *Ecology and Evolution*. 2024;14:e70018: 21 pp. (in English) ["Species loss is highly scale-dependent, following the species–area relationship. We analysed spatio-temporal patterns of species' extirpation on a multitaxonomic level using Berlin, the capital city of Germany. Berlin is one of the largest cities in Europe and has experienced a strong urbanisation trend since the late nineteenth century. We expected species' extirpation to be exceptionally high due to the long history of urbanisation. Analysing 37 regional Red Lists of Threatened Plants, Animals and Fungi of Berlin (covering 9498 species), we found that 16% of species were extirpated, a rate 5.9 times higher than at the German scale and 47.1 times higher than at the European scale. Species' extirpation in Berlin is comparable to that of another German city with a similarly broad taxonomic coverage, but much higher than in regional areas with less human impact. The documentation of species' extirpation started in the eighteenth century and is well documented for the nineteenth and twentieth centuries. We found an average annual extirpation of 3.6 species in the nineteenth century, 9.6 species in the twentieth century and the same number of extirpated species as in the nineteenth century were documented in the twenty-first century, despite the much shorter time period. Our results showed that species' extirpation is higher

at small than on large spatial scales, and might be negatively influenced by urbanisation, with different effects on different taxonomic groups and habitats. Over time, we found that species' extirpation is highest during periods of high human alterations and is negatively affected by the number of people living in the city. But, there is still a lack of data to decouple the size of the area and the human impact of urbanisation. However, cities might be suitable systems for studying species' extirpation processes due to their small scale and human impact." (Authors) The study refers to Petzold, F. (2017): Rote Liste und Gesamtartenliste der Libellen (Odonata) von Berlin. In: Der Landesbeauftragte für Naturschutz und Landschaftspflege/Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (Ed.), Rote Listen der gefährdeten Pflanzen, Pilze und Tiere von Berlin. Technische Universität Berlin. <https://doi.org/10.14279/depositon-e-5849> Address: Keinath, Silvia, Museum für Naturkunde, Berlin – Leibniz Institute for Evolution and Biodiversity Science, Invalidenstraße 43, 10115 Berlin, Germany. Email: silvia.keinath@mfn.berlin

23628. Khedir, H.; Aouadi, A.; Seddik, S. (2024): So close, but yet so far: Assessing the community structure of Odonates in two adjacent rivers within different watersheds in Souk Ahras, North East of Algeria. *Journal of Insect Biodiversity and Systematics* 10(4): 805-825. (in English) ["Lotic systems are rapidly changing due to anthropogenic impacts, making it crucial to note the diversity and abundance of Odonates for effective conservation of these running waters. Our study aimed to assess and compare the Odonate communities in two adjacent rivers, Medjerda and Cheref, in Souk Ahras, northeastern Algeria collected during the period from January 2022 to August 2023. In total, 27 species belonging to 7 families and 17 genera were recorded, with three rare species in Numidia, and three Maghrebian endemic species, including *Gomphus lucasii* (Selys, 1850) listed as "Vulnerable" in the IUCN Mediterranean Red List. *Coenagrion mercuriale*, a locally endangered species, was abundantly present in the Medjerda River. Additionally, the presence of the desert species *Trithemis kirbyi* in Medjerda confirms their northward expansion within Algeria. The Libellulidae were the most dominant family with 11 species. Our findings revealed no significant differences in terms of biodiversity indices (Richness, Simpson, Shannon, & Pielou's evenness) between the two rivers. However, significant dissimilarities were observed in Odonate assemblages likely due to habitat and environmental variations. Many factors, such as water pumping, overgrazing, untreated wastewater, and riverbank development, which influence Odonate species, were observed in the two rivers. Consequently, an urgent conservation plan should be put in place to preserve water resources and biodiversity in the region. This study highlights the need for continued monitoring and conservation efforts, especially for rare and threatened species in the face of increasing anthropogenic pressures on these aquatic ecosystems." (Authors)] Address: Khedir, Houda, Laboratory of Sciences and Technology of Water and Environment, Department of Biology, Mohamed Cherif Messadia University, Souk-Ahras, Algeria. Email: h.khedir@univ-soukahrass.dz

23629. Kollmann, J.; Strobl, K. (2024): Biodiversität und Ökosystemfunktionen von Mooren: Effizienzkontrolle der Moorenaturierung. *Rundgespräche Forum Ökologie* 50 »Moore: Ökosystemfunktionen, Biodiversität und Renaturierung«: 43-52. (in German, with English summary) ["Biodiversity and ecosystem functions of peatlands: Monitoring of restoration success Intact peatlands are sinks for greenhouse gases and provide habitats for many species. However, most Central European peatlands have been degraded by drainage,

peat extraction, and intensive agriculture and forestry. This leads to lower water tables, greenhouse gas emissions and habitat fragmentation. Climate change accelerates these trends that can be reduced through restoration. As part of a monitoring scheme, we examined peat quality, soil water level, vegetation change, flora and fauna in 14 montane peatlands in NE Bavaria that had been restored in the period 1998-2015. Restoration resulted in higher water tables, reduced peat decomposition and an increase in target species. However, the water table was too low in some sites, particularly when far from the blocked drainage ditches. Dragonflies, including specialized bog species, quickly benefitted from rewetting. The number of butterflies also increased, while generalists were encouraged; birds hardly responded to the small-scale restoration measures. The study shows that peatland restoration is largely successful in the study region. Only in a few areas the water table is still insufficient, resulting in woody encroachment. At these areas the dams have to be enhanced. By restoring further peatlands, the habitat network can be improved, and existing populations strengthened at the landscape scale. Future projects should include an effective monitoring plan from the very beginning, since this is the only way for adaptive restoration. ... The dragonflies were recorded in three mapping runs in 2015 and 2016. *Aeshna juncea*, *Leucorrhinia dubia*, *Somatochlora alpestris* and *Coenagrion hastulatum* were identified as dragonfly species typical of moorlands. In addition, the recording of the water structure as an indicator of the habitat quality for dragonflies... provided important information. There were also strong fluctuations in the number of dragonfly species (Fig. 5a, b). Overall, the number of species rose significantly in the first few years after renaturation compared to degraded moors, i.e. the dragonflies benefited very quickly from the newly created bodies of water. ... The dams work in the first few years, but then there are usually problems: the wood decays, the water finds a way or spills over and erosion occurs. This is why we are seeing, for example, For example, we see an increase in dragonflies in the first few years, but then leaks appear and the system returns to a somewhat worse state. At least in our area, the optimum initial renaturation success is exceeded after 3 to 5 years. The structures can be improved... and there is still a lot to be gained: What type of wood should be used? How is the wood covered? How are the sheet pile walls founded?" (Authors)] Address: Kollmann, J., Technische Universität München, Lehrstuhl für Renaturierungsökologie, Emil-Ramann-Str. 6, 85354 Freising, Germany. Email: johannes.kollmann@tum.de

23630. Korhonen, S. (2024): *Wolbachia* infections across the Åland Islands populations of the damselfly *Ischnura elegans*. MSc thesis, Ecology and evolutionary biology, Department of Biological Sciences, University of Helsinki: 27 pp. (in English, with Finnish summary) ["The aim of this thesis was to characterize the *Wolbachia* infection status of Finnish *Ischnura elegans* populations in the Åland Islands and to investigate the infection status of the ectoparasitic mites attached to these damselflies. *Wolbachia* are intracellular endosymbiotic bacteria commonly found in many arthropod species. The success of the symbiont is explained by the many ways it can modify its host fitness to support its own spread in the host populations, and its ability to sometimes transfer horizontally between species via host shift. Nonetheless, some insect populations surprisingly remain uninfected. Previous research suggests that *I. elegans* damselfly populations from the Åland Islands are uninfected, while populations from mainland Finland and Sweden are found to carry two respective infections that reach near fixation. However, the sample size of previous studies for Åland population

was small, and potentially did not provide a representative estimate of the true infection status of the population. Moreover, *I. elegans*, like most damselfly species, are often parasitized by water mites (Hydrachnidia). To my knowledge, there is still little research on the prevalence of Wolbachia in ectoparasitic mites associated with Odonata, and their potential role in the horizontal transfer of the symbiont between mite and damselflies, and between damselfly specimens. My thesis includes *I. elegans* samples collected across the Åland Islands during June and July 2021, 2022, and 2023. Sampled damselflies and their mites were screened for Wolbachia separately, after extracting DNA, and amplifying by PCR one mitochondrial locus (COI) and three Wolbachia loci (*fbpA*, *wsp* and *ftsZ*). Finally, I manually curated all sequences, and analysed genetic diversity using the software MEGA v.11. In total, I found that 41.51% ($n = 44/106$) of my *I. elegans* samples were positive for Wolbachia, contrasting with the lack of infection in previous work. Three different strains were identified, with respective infection rates of 33.96%, 6.60% and 0.94%. Furthermore, each strain was associated with a different mitochondrial haplotype, which were previously characterized in the Swedish and the Finnish mainland populations. Altogether, my results indicate that the Åland islands has been invaded by specimens from the two neighbouring mainland source populations. Further work is needed to determine the role of Wolbachia in *I. elegans*, and why the infection has not spread through the Åland population as observed in the mainland Finland and Swedish populations. The infection status of the mites remains unclear, as despite possible PCR amplification, I could not produce any usable Wolbachia sequences, challenging the idea of whether these mites carry any Wolbachia infection." (Authors)] Address: <https://helsinki.fi/server/api/core/bitstreams/e9d7d9ac-d984-4-873-9a24-f213c50a7c27/content>

23631. Kosterin, O.E.; Delfosse, E. (2024): Lectotypification of *Macromia pyramidalis* Martin, 1907 (Odonata: Macromiidae) and its nomenclatural consequences. *Zootaxa* 5447(1): 145-150. (in English) ["The type series of *M. pyramidalis* was for a long time suspected to be heterogeneous. The photographs of the three syntypes preserved in Muséum National d'Histoire naturelle, Paris, France (MNHN) revealed the male syntype to be consubspecific to the current *Macromia pinratani vietnamica* Asahina, 1996 and the two female syntypes conspecific to the current *Macromia berlandi* Lieftinck, 1941. The name *M. pyramidalis* is the oldest among those mentioned. The male syntype is designated as the lectotype of *M. pyramidalis* to result in somewhat less inconvenient nomenclatural consequences, which are as follows: *Macromia pyramidalis pyramidalis*, valid name = *Macromia pinratani vietnamica*, syn. nov.; *Macromia pyramidalis pinratani* Asahina, 1996, comb. nov.; *Macromia pyramidalis*, valid name = *Macromia pinratani*, syn. nov." (Authors)] Address: Delfosse, E., Muséum National d'Histoire naturelle, Entomologie, Direction des Collections Naturalistes, CP 50, 45 rue Buffon, F-75005 Paris, France. Email: delfosse@mnhn.fr

23632. Kosterin, O.E. (2024): Photographic recording dragonflies and damselflies (Odonata) of Cambodia by public over a decade. *International Dragonfly Fund - Report* 189: 1-19. (in English) ["Photographs of Odonata taken in Cambodia by public and posted to the 'Natural Cambodia' group in a social network for the decade 2012-2022 were followed and registered. After exclusion of already published ones, they comprised a bulk of 682 photographic observations of 91 species, with strong biases towards Anisoptera (74%) and towards the species with coloured wings (34%) and a strong deficiency of lotic Anisoptera such as Gomphidae

and Macromiidae (just one observation of each). *Lestes concinnus* is for the first time reported for Phnom Kulen Plateau and *Lestes platystylus*, *Heliocyba biforata*, *Orolestes ocmaculatus*, *Aciagrion occidentale*, *Ceragrion calamineum*, *C. chaoi*, *Anax guttatus*, *Gynacantha subinterrupta*, *Agriopoda insignis*, *Brachydiplax sobrina*, *Cratilla lineata calverti*, *Orthetrum luzonicum*, *Rhyothemis obsolescens*, *R. pluto*, *R. triangulare*, *Tramea transmarina euryale*, *Trithemis festiva* for the lowlands of Siem Reap Province. It is recommendable to post biodiversity photographs to internet platforms specially designed for this purpose, such as iNaturalist.org, rather than to common social networks which miss functions relevant to operation with scientific data. Important taxonomic notes are made on *Aciagrion occidentale*, *Ceragrion* spp. and *Epopthalmia vittata*/E. *frontalis*." (Author)] Address: Kosterin, O.E., Ilyicha Street 21, app. 302, Novosibirsk, 630090, Russia. E-mail: achn@mail.ru

23633. Krieg-Jacquier, R. (2024): *Isoaeschna isoeles* (O.F. Müller, 1767) un nouveau nom binominal pour l'Aeschna isocèle (Odonata: Aeshnidae). *Martinia* 38(4): 46-48. (in French) [*Isoaeschna isoeles* (O.F. Müller, 1767) a new binomial name for the Green-eyed Hawker (Odonata: Aeshnidae)] Address: Krieg-Jacquier, R., Opie-odonates, 628 route de Marboz 01440 Viriat, France. Email: regis.krieg-jacquier@gmail.com

23634. Krishnan, J.; Devasia, S.C. (2024): A molecular based diversity assessment of Odonates through DNA barcoding. *International Journal of Tropical Insect Science* 44: 1355-1365. (in English) ["The present study depicts the first ever DNA barcoding study of Odonates from the State of Kerala, India. The northern part of the state, which corresponds to the western side of the western ghats, was the focus of the study. The study has been conducted as this region is blessed with ample annual rainfall brought on by the southwest monsoon, making it the ideal habitat for many Odonata species documented here. In total, of the 70 specimens collected, 37 cytochrome oxidase subunit I (COI) sequences belonging to 31 species were deposited in the public repositories (NCBI and BOLD) for future reference. This report produced five new DNA barcodes consisting of two endemic species (*Onychogomphus malabarensis* and *Agriocnemis keralensis*), two Coenagrionidae members (*Ceragrion coromendelianum* and *Aciagrion occidentale*), and one Libellulidae member (*Lathrecista* sp.) from Kerala, along with five novel reports from India. We also checked the inter-family relationships of the six dominant families and analyzed the monophyletic ancestry of the order Odonata. The study predicted monophyletic ancestry in both Zygoptera and Anisoptera over the taxonomically nearer outgroup (Ephemeroptera) taken for the analysis. This also confirmed the inter-family relationship between these members of the suborders Anisoptera (Libellulidae, Gomphidae, and Aeshnidae) and Zygoptera (Coenagrionidae, Platynemididae, and Calopterygidae). Thus, the cytochrome oxidase I gene nucleotide substitution analysis attributes neutral evolution to all species, irrespective of their geographical areas." (Authors)] Address: Krishnan, J., Division of Molecular Biology, Dept of Zoology, Univ. of Calicut, Thenhipalam, Kerala, 673635, India

23635. Kwon, H.-Y.; Seo, H.-S.; Ko, M.-H. (2024): Feeding Ecology of the Endangered Endemic Species, *Rhynchocypris semotilus* (Pisces: Cyprinidae) in the Songhyeoncheon (Stream), Korea. *Korean Journal of Ichthyology* 36(1): 68-76. (in Korean, with English summary) ["To reveal the feeding ecology of *Rhynchocypris semotilus*, the survey was conducted in Songhyeoncheon, Songhyeon-ri, Hyeonae-

myeon, Goseong-gun, Gangwon-do in April 2022. As a result of analyzing the contents of the stomach using the index of relative importance (IRI), the important prey organisms were mainly Trichoptera (46.6%), Ephemeroptera (27.6%), Diptera (12.6%), Odonata (9.7%), Plecoptera (2.8%), Coleoptera (0.6%), and Hemiptera (0.1%) of Class Insecta, Phylum Arthropoda in that order. As a result of analyzing the trend by calculating the index of relative importance (IRI) for each age, it was found that those born in the same year mainly feed on relatively small Ephemeroptera and Diptera, but the proportion of these gradually decreases as they grow. And the proportion of relatively large Trichoptera and Odonata gradually increased, turning them into the most important food source for those over 3 years old. Additionally, prey size was the smallest at 2.8 ± 2.5 (0.6 to 9.0) mm for individuals born in the same year, but gradually increased to 5.1 ± 6.1 (1.1 to 17.0) mm for individuals born more than 3 years. As a result of examining prey selectivity, Plecoptera (+0.78), Trichoptera (+0.66), Coleoptera (+0.66), and Hemiptera (+0.03) showed positive selectivity, while Amphipoda (-1.00), Ephemeroptera (-0.24), Odonata (-0.13) [*Davidius lunatus*] and Diptera (-0.05) showed negative selectivity." (Authors)] Address: Ko, M.-H, Kosoo Ecology Institute, Seoul 07952, Republic of Korea. Email: hun7146@gmail.com

23636. Leponce, M.; Basset, Y.; Aristizábal-Botero, Á.; Baïben, N.; Barbut, J.; Buyck, B.; Butterill, P.; Calders, K.; Cárdenas, G.; Carrias, J.-F.; Catchpole, D.; D'hont, B.; Delabie, J.; Drescher, J.; Ertz, D.; Heughebaert, A.; Hofstetter, V.; Leroy, C.; Melki, F.; Michaux, J.; Neita-Moreno, J.C.; Poirier, E.; Rougerie, R.; Rouhan, G.; Rufay, V.; Scheu, S.; Schmid, J.; Vanderpoorten, A.; Villemant, C.; Youdjou, N.; Pascal O. (2024): Unveiling the above-ground eukaryotic diversity supported by individual large old trees: the "Life on Trees" integrative protocol. *Frontiers in Forests and Global Change* 7:1425492. doi: 10.3389/ffgc.2024.1425492. 22 pp. (in English) ["Large tropical trees are rightly perceived as supporting a plethora of organisms. However, baseline data about the variety of taxa coexisting on single large tropical trees are lacking and prevent a full understanding of both the magnitude of biodiversity and the complexity of interactions among organisms in tropical rainforests. The two main aims of the research program "Life on Trees" (LOT) are (1) to establish baseline knowledge on the number of eukaryote species supported/hosted by the above-ground part of a single tropical tree and (2) to understand how these communities of organisms are assembled and distributed on or inside the tree. To achieve the first goal, we integrated a set of 36 methods for comprehensively sampling eukaryotes (plants, fungi, animals, protists) present on a tropical tree. The resulting LOT protocol was conceived *Frontiers in Forests and Global Change* 02 frontier-sin.org and implemented during projects in the Andean Amazon region and is proposed here as a guideline for future projects of a similar nature. To address the second objective, we evaluated the microclimatic differences between tree zones and tested state-of-the-art terrestrial laser scanning (TLS) and positioning technologies incorporating satellite and fixed base station signals (dGNSS). A marked variation in temperature and relative humidity was detected along a 6-zones Johanson scheme, a tree structure subdivision system commonly used to study the stratification of epiphytic plants. Samples were collected from these six zones, including three along the trunk and three in the canopy. To better understand how different tree components (e.g., bark, leaves, fruits, flowers, dead wood) contribute to overall tree biodiversity, we categorized observations into communities based on Johanson zones and microhabitats. TLS was an essential aid in understanding the complex tree architecture. By contrast,

the accuracy of positioning samples in the tree with dGNSS was low. Comprehensively sampling the biota of individual trees offers an alternative to assessing the biodiversity of fewer groups of organisms at the forest scale. Large old tropical trees provide a wealth of microhabitats that encompass a wide range of ecological conditions, thereby capturing a broad spectrum of biodiversity. ... The larvae from Odonata were reared in individual plastic jars under the same conditions: natural room temperature around 21°C ($\pm 5^\circ\text{C}$), relative humidity from 80 to 100%, and a 12: 12 h light–dark regime (Aristizábal-Botero et al., 2023). All the aquatic invertebrates, the emerged Odonata adults, and its exuviae were photographed alive, then preserved in 96% ethanol until further determination by professional taxonomists. Aquatic invertebrates were also detected using eDNA from the water of bromeliads." (Authors) For the odonatological results of this study see: Aristizábal-Botero, Á., Snoeks, J. M., Realpe, E., and Vanschoenwinkel, B. (2023). Conductivity and water level modulate developmental plasticity and explain distribution patterns in a diverse neotropical Odonata assemblage. *Freshw. Biol.* 68, 1558–1571. doi: 10.1111/fwb.14151] Address: Leponce, M., Biodiversity Monitoring and Assessment, Royal Belgian Institute of Natural Sciences, Brussels, Belgium. Email: mleponce@naturalsciences.be

23637. Li, F.; Deng, Z.; Li, H.; Duan, X. (2024): Reflections on the application of bionic compound eyes triggered by dragonfly compound eyes. *Proceedings Volume 13182, 2024 International Conference on Optoelectronic Information and Optical Engineering (OIOE 2024)*; 1318229 (2024) <https://doi.org/10.1117/12.3030474>: ["Compound eyes are widely found in insects and other invertebrates, serving as their primary visual organs. The unique structure and function of compound eyes have long captivated the attention of scientists. Taking dragonflies as an example, their exceptional reaction speed and remarkable observation ability can be attributed to the presence of large compound eyes on their heads. In this study, we examined the characteristics and functions of dragonfly compound eyes by observing the diffraction phenomenon on temporary slides, aiming to explore the potential applications of bionics in replicating these features. Our findings revealed that dragonfly compound eyes possess distinctive optical properties including multi-channel imaging, wide-angle field of view, and exceptionally high temporal resolution. Moreover, the neuronal network within these compound eyes enables simultaneous sensing and tracking motions from multiple directions while rapidly and accurately processing optical signals. Therefore, drawing inspiration from both its optical properties and information processing capabilities, we can derive novel ideas for developing artificial compound eyes." (Authors)] Address: Li, F., Hebei University of Technology, China

23638. Li, T.; Zheng, D.; Jarzembowski, E.A.; Wang, B.; Zhang, H. (2024): A new *Paleoovoidus* ichnospecies on a conifer leaf from the Middle Jurassic of the Ordos Basin, NW China. *Palaeontographica Abteilung A* 328: 101-110. (in English) ["Endophytic oviposition is one of the most informative plant-insect interactions in the palaeontological record. A new ichnospecies of *Paleoovoidus* *Paleoovoidus orientatus* isp. nov., is established based on endophytic oviposition traces on a leaf of the conifer *Podozamites* Braun, 1843 from the Middle Jurassic Yanan Formation in the Ordos Basin, NW China. It is distinguished by the oviposition of straight rows of eggs distributed along the long axis of eggs and not completely parallel to the veins. These endophytic oviposition traces were probably made by a damsel-dragonfly (Odonata: Anisozygoptera) based on the comparison with recent Odonata oviposition

and the co-occurrence of a damselfly-dragonfly with endophytic behaviour. The find of damselfly-dragonfly endophytic oviposition indicates an aquatic or waterside environment for the host plant." (Authors)] Address: Li, T., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. Email: tingli@nigpas.ac.cn

23639. Loehn, A.F.; Sparks, D.W.; Valdez, E.W. (2024): Diet of *Myotis ciliolabrum* from six sites in the southwestern United States. *Western North American Naturalist* 84(2): 210-218. (in English) ["With bat populations declining in many parts of the world, detailed life history information will be critical for assessing vulnerabilities of bat populations and associated trophic effects. *Myotis ciliolabrum* (western small-footed bat) is a species of insectivorous bat distributed from the Great Plains to the Pacific Coast and from British Columbia to Central Mexico. The species is spottily distributed within this wider range but is locally abundant in areas containing appropriate rocky habitat. Despite *M. ciliolabrum* being relatively common, little information is available about its feeding ecology. Earlier studies have suggested that skull morphology can be used to determine whether insectivorous bats select for soft- or hard-bodied prey, but we hypothesized that *M. ciliolabrum* may feed opportunistically on a variety of insect types. To test this hypothesis, we examined the feeding habits of western small-footed bats captured during 2000–2022 at 6 national parks and 1 national conservation area across the Southwest. Visual analysis of prey remains in guano revealed that western small-footed bats within our study area consumed insects belonging to 7 orders (Lepidoptera, Coleoptera, Hymenoptera, Hemiptera, Neuroptera, Diptera, and Odonata) and 20 families. Diet varied over time and across geographic space, though we observed a general trend in which the orders Lepidoptera, Coleoptera, and Hymenoptera were consumed at the highest volumes. This varied diet indicates opportunistic feeding in which *M. ciliolabrum* makes use of locally abundant resources." (Authors)] Address: Loehn, A.E., Dept of Biology, MSC03 2020, University of New Mexico, Albuquerque, NM 87131

23640. Lorenzo-Carballa, M.O.; Koroiva, R. (eds.) (2024): Diversity, Ecology and Evolution of Odonata. Reprint of the Special Issue Diversity, Ecology and Evolution of Odonata, published in *Diversity*. ISBN 978-3-7258-0710-9 (PDF): 402 pp. (in English) ["Odonata play an important ecological role as predators that consume large numbers of insects and serve as prey for larger animals such as birds, fish, and amphibians. They also serve as bioindicators for freshwater quality assessment and wetland conservation monitoring. Their beauty and diversity make them attractive to the public, which has led to an increased interest in their biology and conservation. This special issue compiles a series of articles focusing on different aspects of the diversity, ecology and evolution of odonates from different regions of the world including China, Australia, USA, Brazil, Czech Republic and Poland, among others." (Publisher)] Address: <https://www.mdpi.com/books/reprint/9112-diversity-ecology-and-evolution-of-odonata>

23641. Majorel, C.; Loucif, A.; Marinov, E.; Martins, R.J.; Patoux, A.; Coulon, P.-M.; Brandli, V.; Antolovic, M.; Bruschini, C.; Charbon, E.; Genevet, P. (2024): Bio-inspired flat optics for directional 3D light detection and ranging. *npj Nanophotonics* | (2024) 1:18: 10 pp. (in English) ["The eyes of arthropods, such as those found in bees and dragonflies, are sophisticated 3D vision tools that are composed of an array of directional microlenses. Despite the attempts in

achieving artificial panoramic vision by mimicking arthropod eyes with curved microlens arrays, a wealth of issues related to optical aberrations and fabrication complexity have been reported. However, achieving such a wide-angle 3D imaging is becoming essential nowadays for autonomous robotic systems, yet most of the available solutions fail to simultaneously meet the requirements in terms of field of view, frame rate, or resistance to mechanical wear. Metasurfaces, or planar nanostructured optical surfaces, can overcome the limitation of curved optics, achieving panoramic vision and selective focusing of the light on a plane. On-chip vertical integration of directional metalenses on the top of a planar array of detectors enables a powerful bio-inspired LiDAR that is capable of 3D imaging over a wide field of view without using any mechanical parts. Implementation of metasurface arrays on imaging sensors is shown to have relevant industrial applications in 3D sensing that goes beyond the basic usage of metalenses for imaging." (Authors)] Address: Genevet, P., Ecole polytechnique fédérale de Lausanne (EPFL), Advanced Quantum Architecture Laboratory (AQUA), CH-2002 Neuchâtel, Switzerland. Email: Patrice.Genevet@mines.edu

23642. Manjula, K. T.; Abdul Jaleel, K.; Vijaya, M. B.; Anangh, M. K.; Jiji Joseph, V.; Raghunathan, P. P.; Jayakrishnan, T. V.; Rajeevan, E. (2024): Dragonflies and damselflies: A comprehensive review on their role as heavy metal bioindicators in aquatic ecosystems. *Environment and Ecology Research* 12(4): 419-429. (in English) ["Aquatic ecosystems are seriously threatened by heavy metal contamination, which also endangers human health. The potential of Odonata as bioindicators of heavy metal pollution in freshwater habitats is examined in this review. They serve as excellent materials as the indicator of the wellbeing of the ecosystems they live in; because of their different life stages that have close ties to aquatic environments and their susceptibility to different metals. This comprehensive review aims to bridge gaps in the current understanding of the role of odonates, specifically dragonflies as bioindicators in the context of heavy metal contamination in aquatic ecosystems. Researchers analyse the presence and concentration of heavy metals in their tissues by various methods; this information can help understand their origin and dissemination and general health of the ecosystem. This bioindicator approach informs remediation tactics, provides early warning of emergent problems and ultimately directs efforts to protect freshwater resources. By consolidating diverse perspectives and synthesising the existing knowledge, this review aims to provide a valuable resource for researchers, environmentalists, and policymakers involved in safeguarding the delicate balance of aquatic environments" (Authors)] Address: Manjula, K. T., Dept of Zoology, Government Brennen College, Kerala, India

23643. Martin, A.; Linington, S.; Foreman, B. (2024): The Damselflies and Dragonflies of Sussex: their status and distribution. Regua publications: 170 pp., col photos, col distribution maps. (in English) ["This book updates *Dragonflies of Sussex* (2005), providing up-to-date information on all species. There have been many changes in the distribution, and some new species arriving since then, and this new book describes those changes, has a series of introductory chapters and a section on where to watch dragonflies in Sussex. All of the Sussex species are illustrated, showing both males and females, subspecies and colour forms, together with potential future arrivals. Maps show current distribution in Sussex of all species regularly occurring there. Species accounts provide information on flight times, habitat and wider distribution with useful pointers to identification

and advice on recording and photographing the species." (Publisher)]

23644. McEvoy, H.E.; Parker, S.A.; Merola-Lapson, J.; Taylor, A.; Woods, P.; Utz, R.M. (2024): A decadal-scale qualitative comparison of lotic Odonata nymph surveys in northwestern Pennsylvania, USA, reveals possible assemblage restructuring. *International Journal of Odonatology* 27: 161-171. (in English) ["Detecting long-term changes to Odonata assemblages requires repeated sampling at fixed locations over decadal periods. However, few such biomonitoring efforts exist for Odonata, especially at low taxonomic resolution and immature life stages. We repeated a survey of Odonata nymphs conducted nearly thirty years ago in ten streams from a northern Pennsylvania forest reserve to qualitatively explore assemblage-scale changes and identify streams supporting species of conservation concern. Our survey collected five more species among all sites than the original survey, reflecting a 15% increase in richness despite a reduced sampling effort. Rank abundances of many species changed substantially between surveys. Some, such as *Calopteryx maculata*, fell in rank while other species like *Boyeria vinosa* and *Phanogomphus lividus* that were rare in 1994 became the most numerically dominant. We did not detect patterns in species richness or changes in richness between surveys along gradients of unconventional natural gas extraction or timber harvest among streams. The fraction of species deemed vulnerable or imperiled within Pennsylvania grew from 22 to 38% between surveys, highlighting the regional conservation value of protected area we sampled. Our sampling methodology precludes population estimates or quantitative community comparisons due to the sampling design and inconsistencies in the literature used for identification between surveys. However, the substantial differences in rank-abundance among species between surveys suggests potential long-term changes in these lotic Odonata assemblages. The collective findings presented here emphasize the high value of data from repeated surveys with species-level taxonomic resolution." (Authors)] Address: McEvoy, Hayley, Falk School of Sustainability, Chatham University, 6035 Ridge Rd., Gibsonia Pennsylvania, 15044, USA. Email: hayley.mcevoy@chatham.edu

23645. Montagna, M.; Magoga, G.; Stockar, R.; Magnani, F. (2024): The contribution of the Middle Triassic fossil assemblage of Monte San Giorgio to insect evolution. *Communications Biology* 7(1023): 10 pp. (in English) ["The Triassic represents a critical period for understanding the turnover of insect fauna from the Paleozoic to the Mesozoic following the end-Permian mass extinctions (EPME); however, fossil deposits from the Early-Middle Triassic are scarce. The exceptionally preserved 239 million-year-old fossil insect fauna recorded at Monte San Giorgio (Switzerland), including 248 fossils representing 15 major insect clades is presented here. Besides the exceptional features, including their small size and excellent preservation, the fossils have importance in the evolutionary history of the group. The taxonomic and ecological diversity recovered, including both freshwater (dragonflies and caddisflies) and terrestrial taxa (true bugs and wasps), demonstrates that complex environments sustained a paleocommunity dominated by monurans (thought not to have survived the EPME), midges, and beetles. Interestingly, a blattodean-like fossil bearing an external ootheca was also found, important for understanding Paleozoic roachoids to extant cockroaches' transition and the evolution of maternal brood care. Moreover, the youngest and first complete specimen of †Permithonidae and the oldest sawfly fossils were discovered. Finally, round-shaped

bodies, compatible with seminal capsules or lycophyte spores, were found on the abdomens of several midge-like individuals. If these are spores, non-seed-bearing plants could have been the first entomophilous plants rather than gymnosperms, as recently supposed. Altogether, these fossils contribute substantially to understanding insect evolution and Paleozoic-Mesozoic faunal turnover.... Odonata. An elongate naiad of ~ 10.5mm in length (from head to abdominal apex), was assigned to Odonata (MCSN 8666; Fig. 2C). The specimen, preserved in dorsal view, is characterized by a laterally and strongly expanded head of ~ 2.5mm in width and ~ 1.2mm in length (width-length ratio of 2.1), with wide compound eyes and a cervical region strongly constricted (Fig. 2C). The mouthparts are preserved, and a raptorial mask protruding anteriorly from the head capsule is visible, including developed maxillary palps (Fig. S1A, B). Antennae consist of six segments. On the thorax, wing pads are visible (extending to the middle of the abdomen) and present grooves that can be interpreted as wing tracheation (Fig. S1C); six robust partially preserved legs, some with 3-segmented tarsi, are also visible. The abdomen preserves three posterior abdominal processes composing the anal pyramid: a central, wide and possibly long epiproct (truncated abruptly at the base but likely a postmortem effect), and two lateral paraprocts that retain setae (Fig. S1D)." (Authors)] Address: Montagna, M., Dept of Agricultural Sciences, University of Naples Federico II, Portici, Italy. E-mail: matteo.montagna@unina.it

23646. Muhammad, A.-I.; Amirrudin, B.A. (2024): Species richness and composition of Odonata in four swamp forests of Terengganu, Peninsular Malaysia. *Serangga* 29(2): 128-149. (in English, with May summary) ["Studies on Odonata diversity in tropical areas are still limited, especially in swampy areas that are often subject to anthropogenic disturbances. A study was conducted in four different swampy areas in Terengganu, Malaysia, to assess the Odonata diversity in these areas. Four sampling days were spent at each study site between February and June 2023. A total of 1,843 individuals were collected, representing 63 species from ten families. Ten of these were new records for Terengganu. The family Libellulidae was the most well-represented family, with *Neurothemis fluctuans* being the most abundant species. Some notable findings from the study include the occurrence of the uncommon *Heliaeschna simplicia*, *Pornothemis* cf. *serrata*, *Risiphlebia dohmi*, and *Teinobasis ruficollis*. Species richness was highest in Tasik Bungkus (36 species), followed by Jambu Bongkok, Sungai Ular, and Bandar Kuala Nerus. These findings provide new insights into the Odonata diversity of swampy areas in Terengganu. The discovery of stenotopic species (species restricted to specific habitats) is particularly important, as these species are often vulnerable to changes in environmental quality. The study also highlights the need for further research on Odonata diversity in tropical areas, especially in swampy areas that are under threat of urbanisation." (Authors)] Address: Ahmad, A.B., Institute of Tropical Biodiversity and Sustainable Development, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia. Email: amirrudin@umt.edu.my

23647. Munyai, L.F.; Malungani, A.; Ikudayisi, A.; Mutoti, M.I. (2024): The drivers of benthic macroinvertebrates communities along a subtropical river system: Sediments chemistry or water quality? *Ecohydrology* 2024:e2649: 13 pp. (in English) ["Impacts of metal pollution, either on water or in sediments within aquatic systems have been a serious challenge globally. Little is known about the ecological impacts of metal pollution on benthic macroinvertebrates species in sub-tropical river systems. The aim of this study was

to examine benthic macroinvertebrates community composition in relation to sediment metal concentrations and other physicochemical variables in the Mutshundudi River system. Benthic macroinvertebrates sampling and community composition analysis, sediment collection, processing, metal analysis and assessment of water variables in the river system were done across two seasons at 12 sampling sites. The river was categorized into three segments: upstream, midstream and downstream. The results from geo-accumulation (Igeo) values showed that sediments were loaded with Na, Zn, and B in all river segments. In comparison with South African water quality guidelines for aquatic ecosystems, water quality ranged from good at upstream sites because of low anthropogenic activities to very poor in downstream sites because of high anthropogenic activities. Sediments from the Mutshundudi River showed significant differences on high concentrations of metals (i.e., Mg, K, Na, and Cu) and seasonal variations. Both water quality and sediment chemistry were considered the driving factors of benthic macroinvertebrates, since species densities and composition reduced with a decline in water and sediment quality during both cool-dry and hot-wet seasons. Continuous build-up of the metal contaminants, such as Mg, K, Na, and Cu in river sediments may pose adverse impacts on macroinvertebrate community structure." (Authors) (Odonata) taxa are treated at family level.] Address: Mutoti, M.I., Dept of Environmental, Water & Earth Sciences, Tshwane University of Technology, Pretoria, 0083, South Africa. Email: mutotimi@tut.ac.za

23648. Munyai, L.F.; Liphadzi, T.; Mutshekwa, T.; Mutoti, M.I.; Mofu, L.; Murungweni, F.M. (2024): Water and sediment chemistry as drivers of macroinvertebrates and fish assemblages in littoral zones of subtropical reservoirs. *Water* 2024, 16, 42. <https://doi.org/10.3390/w16010042>: 15 pp. (in English) ["Reservoirs are human-made ecosystems with diverse purposes that benefit humans both directly and indirectly. They however cause changes in geomorphological processes such as sediment cycling and influence the composition and structure of aquatic biota. This study aimed to identify water and sediment quality parameters as drivers of macroinvertebrates and fish communities during the cool-dry and hot-wet seasons in the littoral zones of three subtropical reservoirs (Albasini, Thathe and Nandoni). Macroinvertebrates and fish were collected from three sites (n = 3 from each site) in each reservoir. A total of 501 and 359 macroinvertebrates and fish individuals were collected throughout the sampling period, respectively. The present study employed a two-way ANOVA in conjunction with redundancy analysis (RDA) to assess the relationships that exist between water and sediment variables, macroinvertebrates diversity and species abundances across seasons. Based on the two-way ANOVA model, significant differences were observed across reservoirs for evenness, Simpson's diversity, and total abundance, while seasonal differences were observed for most metrics, with exception for evenness. The RDA results identified four water variables (i.e., water temperature, oxidation-reduction potential, pH and conductivity) and one sediment metal (Mg) as the most important parameters in driving the fish community structure. Field observations and metal results attest that the Nandoni reservoir shows high concentrations of metals in sediments as compared to other reservoirs, suggesting that anthropogenic activities such as car washing, brick making, recreation, fishing, wastewater treatment work and landfill site may be the major contributor of metals to the Nandoni reservoir, which accumulate in the littoral zones. Findings of this study highlight the need to analyze reservoir ecological conditions at several scales. The study of macroinvertebrates and fish, water, and sediment chemistry in the littoral zone laid

the groundwork for proposing measures for conserving aquatic ecosystems." (Authors) Odonata are treated at family level.] Address: Mutoti, M.I., Department of Environmental, Water and Earth Sciences, Tshwane University of Technology, Pretoria, 0083, South Africa. Email: mutotimi@tut.ac.za

23649. Nicolai, B. (2024): Beobachtungen zur Eiablage bei *Erythromma lindenii* und zu interspezifischer Aggression von *Enallagma cyathigerum* (Odonata: Coenagrionidae). *Libellula* 43(1/2): 89-106. (in German, with English summary) ["Observations on oviposition of *Erythromma lindenii* and on interspecific aggression of *Enallagma cyathigerum* (Odonata: Coenagrionidae) – The observation site, an old gravel lake in the north-eastern Harz foreland (Saxony-Anhalt), was newly colonised only a few years ago in the course of the eastward expansion of the range of *E. lindenii*. Since 2019, observations on phenology and reproductive behaviour, among others, have been made there. Here, the following remarkable ovipositions are described and subsequently discussed: (1) observation of oviposition with submersion of the male, (2) observation of the attack of a water bug (*Aquarius paludum*) on *E. lindenii* pair during oviposition, (3) oviposition in the leaf of *Nymphaea alba*, (4) interspecific aggression of *E. cyathigerum* during oviposition of *E. lindenii*. The breeding period is extended compared to the previous general data. The last recorded egg-laying occurred in mid-September (14-ix-2021, 17-ix-2023). The current climatic changes could promote this. The prolonged reproductive phase even suggests the possibility of bivoltine development, as has been found in southern populations. The observations indicate a great flexibility of *E. lindenii* and its adaptability to different ecological conditions. These abilities enable and promote the current spread of this species." (Author)] Address: Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. Email: nicolai-bea@gmx.de

23650. Novelo-Gutiérrez, R.; Sites, R. (2024): The dragonfly nymphs of Thailand (Odonata: Anisoptera): An identification guide to families and genera. Springer: 495 pp. (in English) ["This unique work is the first reference that provides detailed descriptions of the fully developed larvae of the Odonata suborder Anisoptera, including keys to families and genera, high resolution photographs, distribution maps, and an up-dated list of the dragonfly species from Thailand. Also, because the adults are so well known in this country, this book will provide completion to our understanding of the life cycle of an entire fauna. Through the six chapters of this book, the reader will find an introduction with generalities of the order Odonata, a description of the morphology of a dragonfly larva with emphasis in the structures used in the keys, a brief description of Thailand's geography, relief, hydrology, climate, precipitation, agriculture, history, and faunal studies, and detailed descriptions of each of the 82 genera of Anisoptera of Thailand whose larvae are known. This book will have broad appeal in the large community of odonatists around the world and for the aquatic entomologists, ecologists, and conservationists interested in the Southeast Asian fauna in general." (Publisher)]

23651. Novelo-Gutiérrez, R.; Bota Sierra, C.A. (2024): Description of the larvae of *Epigomphus rufus* Bota-Sierra & Novelo-Gutiérrez, 2020, and *E. brillantina* Bota-Sierra & Novelo-Gutiérrez, 2020 (Odonata: Gomphidae). *Zootaxa* 5506(1): 93-103. (in English, with Spanish summary) ["The larvae of *Epigomphus rufus* Bota-Sierra & Novelo-Gutiérrez, 2020, and *E. brillantina* Bota-Sierra & Novelo-Gutiérrez, 2020 (by supposition) are described, figured and compared with other described larvae of the genus. The larva of *E. rufus* is

characterized by 3rd antennomere spindle-shaped, 2.12x as long as widest part; ligula with a ventral row of 8–10 short, truncate teeth on middle; abdomen lateral spines on S7–9 divergent and upturned; middorsal third of abdomen reddish-brown. The larva of *E. brillantina* is characterized by 3rd antennomere 2x as long as widest part, 4th antennomere more or less subspherical; ligula with 9–10 teeth, and lateral margins of S7–9 serrate." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

23652. Nozad, S. (2024): The correlation between benthic invertebrate productivity and fish density at streams. MSc thesis, Department of Biological and Environmental Sciences, University of Göteborg: 26 pp. (in English) ["Within riverine ecosystems, fish and benthic invertebrates have crucial ecological roles, contributing to the overall functioning and biodiversity of these aquatic environments. The purpose of this study is to describe the relationship between the productivity of benthic invertebrate communities and the density of fish populations in upstream and downstream sections across four European countries. Sampling involved the collection of benthic invertebrates and fish. Data analysis included estimation of invertebrate diversity, density, biomass, and growth rates, as well as assessment of fish condition and density. The correlation between invertebrates and fish were examined and linkages between these factors in both organisms were explored. Also, these connections were compared in four countries under investigation. My results suggest that different countries exhibited various relations among the examined factors concerning these two organisms. Most countries showed higher invertebrate density upstream, a trend that aligns with the density and condition of fish in Sweden and France with no reliable relation in other countries. The highest biodiversity in benthic invertebrate groups is observed in France, which positively correlates with fish density and condition in this country. The taxons with the highest biomass included Hemiptera and Odonata, however, the Hydracarina's small size made it difficult to measure them. The highest growth rate of insects was observed in Portugal, showing no correlation with the abundance and condition of fish. Among benthic invertebrates, Diptera showed the highest productivity based on growth rate across all sites, with Trichoptera displayed the lowest. In this study, it is shown that although significant relationships are not found between benthic invertebrates and fish in all countries, invertebrates can be utilized in the evaluation of various domains such as ecological health assessments, water quality monitoring, and ecosystem functioning, all of which can affect the fish." (Author)] Address: <https://gupea.ub.gu.se/bitstream/handle/2077/83147/BIO797%20SN%20VT24.pdf?sequence=1&isAllowed=y>

23653. Orr, A.G.; Dow, R.A.; Steinhoff, P.O.M. (2024): Descriptions of larvae of four mainly DNA barcode-matched species of chlorocyphids from south-east Asia (Odonata: Chlorocyphidae) with notes on the generic and species level larval identification of Oriental region members of the family. *Zootaxa* 5486(3): 301-337. (in English) ["The final stadium larvae of the following four species of south-east Asian Chlorocyphidae are described and compared: *Aristocypha fenestrella*, *Heliocypha biseriata*, *Libellago hyalina* and *Sundacypha petiolata*, including both sexes for the latter two species. Excepting one *L. hyalina* specimen from Brunei, identified by supposition based on habitat, all specimens were identified by comparing and matching the mitochondrial marker COI with that of known adult specimens from Sarawak,

Brunei and several localities throughout tropical Asia. The specimens presented close matches with all adults in this gene. An assessment of the efficacy of this method of identification is provided, noting that in some cases close species cannot be separated by bar-code matching and ultimate determination is partially based on known distributions of adults. Some aspects of the relationships among genera revealed by the genetic analyses are also discussed. In addition, an exuvia of *Libellago lineata* from northern Thailand, identified by supposition, is partially described for the purpose of comparison with *L. hyalina*. For the morphological analysis the unique features of chlorocyphid anatomy are discussed, and some new terminology is introduced. Overall, the morphological analysis revealed numerous clear differences between the four species studied, and comparisons with available literature suggest that some of these may be characteristic of their genera. It is also evident that in some cases clear inter-specific differences occur within genera. It is however concluded that a generic level larval key for the Oriental region Chlorocyphidae based on morphology may never be attainable, although local generic or even species level keys addressing the fauna of limited geographic areas may be possible in many places, especially as the larvae of more species come to be known and described in detail." (Authors)] Address: Orr, A.G. Environmental Futures Research Institute, Griffith Univ., Nathan, Australia. Email: agorr@bigpond.com

23654. Palacino-Rodríguez, F.; Silva Brito, J.; Juen, L.; Palacino Penagos, D.A. (2024): Behavioral diversity among Odonata larvae increases in water with greater turbidity under captivity conditions. *Neotropical Entomology* 53: 726-737. (in English) ["Various factors, including environmental variables, influence the behavior of aquatic insects. However, our understanding of insect behavior and their relationships with these variables remains limited. One important variable is water turbidity, which may be exacerbated by soil erosion, directly impacting visibility in the water and potentially affecting the organism's behaviors. In this study, we investigated larval behavior across seven Odonata species under controlled conditions, examining variations in behavioral diversity (frequency and type) associated with sex and three levels of water turbidity. Our findings revealed that heightened water turbidity correlated with increased behavior frequency, possibly attributable to predator avoidance in darker, seemingly safer habitats. Furthermore, behavior diversity differed between sexes, being higher for males in certain categories and for females in others. Anisoptera species predominantly displayed behaviors like resting, eating, and prey capture, whereas Zygoptera larvae were often observed perching and walking, possibly indicative of distinct predator response strategies. Behaviors shared by Anisoptera larvae could be associated with similar responses to predators and capture of prey. Our study found an increased frequency of behaviors when the larvae are in water with higher turbidity. Behavior frequency disparities between the sexes were observed across various behaviors, likely influenced by species-specific activity levels and individual behavioral plasticity in response to environmental cues. Overall, individuals exhibited heightened behavioral activity in environments with elevated turbidity, potentially reflecting a perceived lower risk environment." (Authors)] Address: Palacino-Rodríguez, F., Sección Etología, Facultad de Ciencias, Univ de la República, Montevideo, Uruguay

23655. Perron, M.A.C.; Bried, J.T.; Richmond, I.C.; Charette, C.; Pick, F.R. (2024): Urban stormwater ponds can support dragonfly reproduction akin to natural ponds. *International Journal of Odonatology* 27: 187-198. (in English)

["Stormwater ponds are constructed to receive urban runoff and regulate flooding of built areas. As a result, they can be more stressful habitats for aquatic organisms than natural ponds. Adult dragonflies are known to frequent stormwater management ponds in cities, but whether they successfully reproduce in these artificial systems is not clear. This study compared the reproductive potential of dragonflies in stormwater ponds across a temperate metropolitan area through weekly collections of exuviae at stormwater ponds and natural (reference) ponds. We hypothesized that stormwater ponds were poor habitats for dragonfly reproduction (in comparison to natural ponds) because of the typically negative effects of urbanization on wildlife. With respect to dragonfly reproduction, we therefore predicted: (1) lower breeding recruitment, (2) fewer habitat specialists, and (3) greater homogenization of breeding assemblages at stormwater ponds. However, we did not find a significant difference in the number of species and abundance of exuviae between stormwater and natural ponds. Stormwater ponds also supported similar numbers of habitat specialists as natural ponds. Furthermore, we did not find evidence of greater biotic homogenization across stormwater ponds as species composition was similar between both pond types. These results indicate that stormwater ponds can support the reproductive success of a diverse community of dragonflies." (Authors)] Address: Perron, Mary Ann, Dept Biol., Univ. Ottawa, Ottawa, Ontario, Canada, K1N 6N5. Email: maperron@riverinstitute.ca

23656. Popoola, K.O.K.; Sowunmi, A.A.; Ganiyu, S.K.; Ossai, L. (2024): Aquatic macro-invertebrate diversity and abundance in Eleyele. *Nigerian Journal of Entomology* 40(2): 30-46. (in English) ["Eleyele Lake is a general-purpose water body which supplies water to various communities in Ibadan metropolis. This research aimed to investigate the quality of the water using physico-chemical parameters and their influence on the diversity, abundance and distribution of aquatic macro-invertebrates of the lake. Monthly, sample of water and macro-invertebrates from April to September, 2021 at eight sampling points were done, using standard APHA and Winkler's methods. Macroinvertebrates collected were identified using standard identification guides. Relationship between physico-chemical parameters and aquatic macro-invertebrates was determined using Pearson's correlation coefficient (r). Species diversity, taxa richness, evenness and similarity were determined using Simpson, Shannon-Weiner, Margalef, Evenness and Equitability. A total number of 670 macro-invertebrates belonging to 7 orders namely, Hemiptera (47%), Odonata (20%), Diptera, Coleoptera, Lepidoptera, Trombidiformes and Hygrophila were collected and identified during the study period. Positive correlations occurs between BOD, EC, TDS, Nitrate and Phosphate and Chironomus sp. Also, pH was positively correlated with Lestes sp. and Aeshna sp. while DO have negative correlation with Lethocerus sp., Physa sp. and Lymnaea sp. The physico-chemical parameters and the diversity indices of macro-invertebrates encountered indicated that the lake was moderately polluted and tends toward degradation as a result of indiscriminate discharge of domestic, agricultural and industrial effluents into the Lake. Therefore, proper management of the lake is required to prevent further deterioration." (Authors) Taxa are treated on genus level; as most of the taxa are from Asia or the Americas, identifications must be wrong.] Address: Popoola K.O.K., Department of Zoology, University of Ibadan, Ibadan, Nigeria. Email: kok.popular@gmail.com

23657. Ristow, D.; Wink, M. (2024): The diet of Eleonora's Falcons (*Falco eleonora*) during the autumn migration of passerine birds across the Aegean Sea. *Diversity* 2024, 16,

538. <https://doi.org/10.3390/d16090538>: 22 pp. (in English) ["Every year, several hundred million birds cross the Mediterranean on their migration from Eurasia to their wintering quarters in Africa. As many migrants travel at night or at high altitudes, direct observations of bird migration are difficult and thus our information about migrating species, numbers and timing is incomplete. An indirect way to assess autumn migration is the analysis of prey remains of Eleonora's Falcons (*Falco eleonora*). These falcons breed in large colonies on islands in the Mediterranean and on the Canary Islands. Many migrants have to pass these islands on their flight to their African wintering quarters. Eleonora's Falcons appear to be adapted to the autumn bird migration and raise their young between August and October, when migrating birds are abundant. When nestlings have to be fed, falcons exclusively hunt small birds of 10 to 150 g body mass, whereas they prey mostly on aerial invertebrates (Coleoptera, Hymenoptera, Diptera, Orthoptera, Hemiptera, Odonata, Lepidoptera) from November to July. We studied Eleonora's Falcons from 1965 to 2001 on a rocky islet, north of Crete, which harboured a colony of about 200 breeding pairs. In 1969, 1971, 1977, and 1988 we systematically monitored and collected the pluckings and cached food items in 22 to 36 nest sites each year. Pluckings were systematically analysed later in Germany using a reference collection of bird feathers for identification. In total, we determined more than 111 prey species (mostly Passerines) comprising more than 13,450 individuals. The top 12 prey species were: Willow Warbler (27.8% of all prey items), Red-backed Shrike (10.7%), Spotted Flycatcher (9.9%), Whinchat (8.8%), Common Whitethroat (5.1%), Wood Warbler (3.8), Tree Pipit (2.9%), Icterine Warbler (2.5%), Greater Short-toed Lark (2.5%), Northern Wheatear (1.8%), Common Nightingale (1.6%), and European Pied Flycatcher (1.5%). Eleonora's Falcons are selective hunters to some degree; thus, the phenology and abundance data derived from the plucking analyses are biased towards slow-flying species or smaller birds (only up to a body mass of 150 g). When the young falcons develop and grow, food demand increases concomitantly. Comparing the total weight of prey over time indicates a correlation with food demand and in consequence with the number of prey items brought to the nest sites by the falcons." (Authors)] Address: Ristow, D., 85579 Neubiberg, Germany. Email: dietrich.ristow@t-online.de

23658. Rivas-Torres, A.; Cordero-Rivera, A. (2024): A review of the density, biomass, and secondary production of odonates. *Insects* 2024, 15(7), 510; <https://doi.org/10.3390/insects15070510> (registering DOI): 11 pp. (in English) ["Simple Summary: Dragonflies and damselflies are invaluable components of freshwater ecosystems, acting as dominant predators and facilitating the exportation of matter and energy from aquatic to terrestrial environments thanks to their powerful flight. They are also crucial as a food source for various animals and, in some cases, for humans. Through a comprehensive review of the literature, we estimated the biomass, density, and secondary production of these insects, assessing their potential significance in terrestrial fertilization. Our findings indicate that dragonfly larvae are particularly abundant in lentic habitats. Overall, the evidence suggests that dragonflies and damselflies may make a substantial contribution to the exportation of materials to terrestrial systems, especially considering the adults' ability to migrate and inhabit different types of water ecosystems. Abstract: Freshwater insects are highly significant as ecosystem service providers, contributing to provisioning services, supporting services, and cultural services. Odonates are dominant predators in many freshwater systems, becoming top predators in fishless ecosystems. One service that odonates provide is the export of

matter and energy from aquatic to terrestrial ecosystems. In this study, we provide a review of the literature aiming to estimate the density, biomass, and secondary production of odonates and discuss to what extent this order of insects is relevant for the fertilization of terrestrial ecosystems. We found published data on 109 species belonging to 17 families of odonates from 44 papers. Odonata larvae are abundant in freshwater systems, with a mean density of 240.04 ± 48.01 individuals m^{-2} ($\pm SE$). Lentic habitats show much higher densities (104.40 ± 55.31 individuals m^{-2} , $N = 118$) than lotic systems (27.12 ± 5.09 , $N = 70$). The biomass estimations for odonates indicate values of 488.56 ± 134.51 mg $m^{-2} y^{-1}$, with similar values in lentic and lotic habitats, which correspond to annual secondary productions of 3558.02 ± 2146.80 mg $m^{-2} y^{-1}$. The highest biomass is found in dragonflies of the Aeshnidae, Corduliidae, and Gomphidae families. The available evidence suggests a significant potential contribution of Odonata to the exportation of material from water bodies to land. This is further strengthened by the ability of adult odonates to migrate and to colonize different types of water bodies." (Authors)] Address: Cordero-Rivera, A., Universidade de Vigo, ECOEVO LAB, Escola de Enxeñaría Forestal, Campus Universitario A Xunqueira s/n, 36005 Pontevedra, Spain. Email: adolfo.cordero@uvigo.gal

23659. Roland, H.-J.; Frank, M.; Martens, A. (2024): Beobachtungen zur starken Zunahme der Parasitierung von *Sympetrum meridionale* durch *Arrenurus papillator* rund um das NSG Bingenheimer Ried in der Wetterau (Odonata: Libellulidae; Acari: Hydrachnidia). *Libellen in Hessen* 17: 95-103. (in German) [Hessen, Germany; "Observations of adults of *S. meridionale* with mite infestation on the wings caused by *Arrenurus papillator* around the Bingenheimer Ried have increased significantly in the last two years. This was confirmed by counting the mite larvae on the wings using more than 270 photos. Around 90% of the males and 70% of the females were infested with mite larvae. The general reasons for this and the observed increase, as well as the question of whether this only applies to the Bingenheimer Ried area and the surrounding area, could not yet be clarified within the scope of this study. Only just under half of the males involved in a tandem were infested with mite larvae. This is interpreted as a clear indication that the mite larvae on the wings weaken the animals or at least hinder them in flight, making successful egg laying, including prior tandem formation and copulation, more difficult. In about 50% of the males with mite infestation, recognizable as "red balls", these were found on both the underside and upper side of the wings, but never only on the upper side of the wings. The mites prefer to sit under the wings. A maximum of up to 140 mite larvae could be found on one dragonfly. The mite larvae were slightly more common on the hind wings than on the forewings. In the last decade of August, the animals lost more mite larvae. On September 8th, 2023, only 3 of 23 photographed animals had 1, 2 and 9 mite larvae. On October 1st, 2023, a dragonfly with 3 mite larvae was discovered as the latest observation for the season." (Authors/Google translate)] Address: Hanns-Jürgen Roland, Im Mühlahl 35, D-61203 Reichelsheim, hjroland@gmx.de

23660. Román-Heracleo, J.; González-Soriano, E. (2024): Diversidad del orden Odonata del Parque Central La Sabana, San José, Costa Rica. *Repertorio Científico* 23(2): 104-108. (in Spanish, with English summary) ["La Sabana is an important cultural and recreational area, which covers an area of 72 hectares in the center of San José. As part of the Sabana taxathon organized by Huella Verde-UNED Project of State Distance University, ICODER and Scotiabank,

an insect count belonging to the Odonata order, was performed. The capture of the adults was carried out by means of an aerial entomological network, searching on the lagoon shore, in the vegetation and surrounding areas. Adults were placed in a hard-plastic box to be transported alive to the laboratory, where once there they were sacrificed and classified. The information obtained reflected 3 genera and 4 species of Coenagrionidae, as well as 6 genera and 7 species of Libellulidae." (Authors) Argia sp., Enallagma civile, Ischnura capreola, I. ramburii, Brachymesia furcata, Erythrodiplax fusca, Miathyria marcella, M. aequalis, Pantala flavescentes, P. hy-menaea, Perithemis mooma] Address: Román-Heracleo, J., Programa Regional de Posgrado en Biología, Universidad de Costa Rica. 2060, San Pedro, Montes de Oca, San José, Costa Rica. Email: romanjareth@gmail.com

23661. Rüppell, G.; Hilfert-Rüppell, D. (2024): Verhalten von Libellen. Springer Berlin, Heidelberg: XIII, 231 pp. (in German) [oas 77: The following aspects are presented chapter wise: Habitus.- Eyes.- Wings.- Thermoregulation.- Aerial acrobatics.- Curving flight.- Take-off.- Acceleration.- Backward flight.- Inverted flight.- Colors.- Colored wings beat differently.- Landing.- Dangerous colored wings.- Catching prey.- Drinking.- Preying.- Interspecific encounters.- Fighting.- Threatening.- Getting a female.- Defense against males.- Courtship.- Mating.- Egg-laying.- Larvae.- Hunting.- Hatching and maiden flight.- Dragonfly swarms.- Ecological aspects.- Web links.- Thanks.- Authors.- Literature.- Image credits.- Anecdotes] Address: Hilfert-Rüppell, Dagmar, Institut für Fachdidaktik der Naturwissenschaften, TU Braunschweig, Braunschweig, Germany

23662. Ruta, R.; Rutkowski, T.; Sienkiewicz, P.; Wendzonka, J. (2024): Selected groups of invertebrates of "Bagno Kusowo" nature reserve: arachnids, odonates, beetles, aculeate hymenopterans and lepidopterans (Arachnida, Odonata, Coleoptera, Hymenoptera: Aculeata, Lepidoptera). *Przegad Przyrodniczy* 35(1): 51-103. (in Polish, with English summary) ["The paper summarizes a survey of invertebrates of "Bagno Kusowo" nature reserve, conducted in 2017. As a result, 497 species of invertebrates were recorded: 6 species of Opiliones, 149 spiders, 15 dragonflies and damselflies, 272 beetles, 45 aculeates, and 10 lepidopterans. All studied groups of invertebrates included rarely collected species as well as those present on red lists of threatened animals in Poland. Disused peat extraction areas are important to sustain populations of *Somatochlora arctica* in the nature reserve. Forests surrounding peat bogs are important refugia of regionally rare saproxylic beetles, like *Hoshihananomia perlata* and *Stictoleptura scutellata*." (Authors) The following Odonata species are listed: *Lestes dryas*, *L. sponsa*, *L. virens*, *Sympecma paedisca*, *Enallagma cyathigerum*, *Coenagrion hastulatum*, *C. puella*, *Aeshna cyanea*; *A. grandis*, *A. mixta*, *A. subarctica*, *Anax imperator*, *Cordulia aenea*, *Epithea bimaculata*, *Somatochlora arctica*, *S. metallica*, *Leucorrhinia albifrons*, *L. caudalis*, *L. dubia*, *L. pectoralis*, *L. rubicunda*, *Libellula fulva*, *L. quadrimaculata*, *Orthetrum cancellatum*, *Sympetrum danae*, *S. flaveolum*, *S. sanguineum*, *S. vulgatum*.] Address: Ruta, R., Zakład Bioróżnorodności i Taksonomii Ewolucyjnej, Uniwersytet Wrocławski, ul. Przybyszewskiego 65, 51-148 Wrocław, Poland. Email: rafal.ruta@uwr.edu.pl

23663. Salifu, U.A.; Abdulkarim, M.; Sani, I.; Idris, M.S. (2024): Assessment of macro-Invertebrates of Gubi and Waya Dams in Bauchi State, Nigeria. *African Journal of Agricultural Science and Food Research* 15(1): 133-143. (in English) ["This study assessed the diversity, abundance,

and composition of macro-invertebrates in the Gubi and Waya Dams in Bauchi State. Macro-invertebrates were collected fortnightly from different locations in the upper and lower parts of the dams using a D-frame net with a mesh size of 250 µm. Samples were preserved in 10% formaldehyde and identified. In Gubi Dam, 62 individual macro-invertebrates belonging to 7 orders and 9 families were identified, while Waya Dam had 108 individuals from 8 orders and 10 families. Both dams had Coleoptera with three families, followed by Odonata with two families, and other orders with one family each. In Gubi Dam, the most abundant macro-invertebrates were *Psephenus* spp. (24.1%), *Paragomphus genei* (17.74%), and *Phaon camerunensis* (16.13%). In Waya Dam, *Paragomphus genei* (29.63%) and *Phaon camerunensis* (25.93%) were the most abundant. Gubi Dam had a Shannon-Wiener index of 2.00, a Margalef's index of 1.99, Pielou's evenness index of 0.91, and a Simpson's index of 0.86. Waya Dam had a Shannon-Wiener index of 1.88, a Margalef's index of 1.92, an evenness index of 0.82, and a Simpson's index of 0.81. The study concluded that both dams provide stable and moderate aquatic environments for the growth and survival of macro-invertebrates as well as other aquatic organisms. Continuous monitoring of the water bodies, especially Waya Dam, using water indices and pollution indicator macro-invertebrates to obtain vital information on ecological status is recommended." (Authors)] Address: Salifu, U.A., Department of Animal Production, Faculty of Agriculture and Agricultural Technology, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, Nigeria. Email: salifuugbedeaugustine@gmail.com

23664. Satour, A.; Hezil, W.; Taferghoust, M.; Boucenna, H.; Samraoui, F.; Samraoui, B. (2024): Land use and beyond: unraveling environmental determinants of odonate assemblages in northeastern Algeria. *International Journal of Odonatology* 27: 172-186. (in English) ["Freshwater ecosystems, recognized as hotspots of biodiversity, are under increasing threat from human activities. Odonata, the iconic inhabitants of these ecosystems, are highly sensitive to changes in habitat morphology, hydrology and land-use dynamics. In this study, the odonate assemblages in four different regions in northeastern Algeria are investigated to identify the key environmental factors that influence them. These regions differ in terms of climate, altitude and land use. Over the course of the study, we documented twenty-one species, including ten Zygoptera and eleven Anisoptera, which together account for a substantial proportion (~47%) of regional odonate diversity. Species composition is correlated with habitat typology and land cover. Multivariate analyses revealed distinct ecological patterns, highlighting streambed width, flow velocity and, to a lesser extent, land cover and altitude as influential factors in assemblage segregation. This study underscores the importance of flow velocity, which is known to facilitate oxygen uptake by larvae and influence the distribution and composition of species. Altitude, a key factor influencing phenology, growth and development, and land use (including forests, urbanization, agriculture and pasture) are also identified as potential determinants of odonate assemblages. To effectively tailor conservation strategies to specific regional conditions around the world, the study emphasises the importance of identifying the key environmental factors affecting odonate assemblages." (Authors)] Address: Samraoui, B., Dept of Biology. University Badji Mokhtar, Annaba, Algeria. Email: bsamraoui@gmail.com

23665. Senn, P. (2024): Dragonflies and damselflies (Odonata) at selected localities in the city of Gdynia – records from 2005-2023. *Odonatrix* 208 (2024): 31 pp. (in Polish,

with English summary) ["17 localities within the boundaries of the city of Gdynia (N Poland) were surveyed. A total of 48 species of Odonata (mostly eurytopes) were found (64.9% of the Polish odonate fauna), 32 of which were confirmed or probable breeders. Two species protected in Poland were recorded – *Ophiogomphus cecilia* and *Leucorrhinia pectoralis* – as were seven so-called southern species: *Lestes barbarus*, *Anax ephippiger*, *Orthetrum albistylum*, *O. brunneum*, *Sympetrum fonscolombii*, *S. meridionale* and *Crocothemis erythraea*." (Author)] Address: Senn, P., ul. Kańskiego 7D/9, 81-306 Gdynia, Poland. Email: petersenn47@gmail.com

23666. Sharma, M.; Oli, B.R.; Gautam, I. (2024): Dragonflies and Damselflies (Insecta, Odonata) from the western region of Nepal with new records of four species. *Journal of Insect Biodiversity and Systematics* 10(3): 535-546. (in English) ["The research was conducted in the Karnali River basin from April to early October 2022 to contribute and update the Odonata checklist of Nepal including documenting regional new species. From the odonatological survey, four species viz., *Aristocypha spuria* Selys, 1879, *Pseudocopteryx ciliata* (Selys, 1863), *Aciaagrion occidentale* Laidlaw, 1919 and *Zyxomma petiolatum* Rambur, 1842 were recorded for the first time from Nepal. Besides these, *Copteryx marginipes* (Rambur, 1842), *Copteryx vittata* (Selys, 1863), *Prodasineura autumnalis* (Fraser, 1922), *Agriocnemis clauseni* Fraser, 1992, *Ceragrion cerinorubellum* (Brauer, 1865), *Cephalaeschna viridifrons* (Fraser, 1923), *Gynacantha incisura* Fraser, 1935, *Gynacanthaeschna sikkima* (Karsch, 1891), *Lamelligomphus risi* (Fraser, 1922), *Scalmogomphus bistrigatus* (Hagen in Selys, 1854), *Rhodothemis rufa* (Rambur, 1842), *Tetrathemis platyptera* Selys, 1868 and *Urothemis signata signata* (Rambur, 1862) were newly recorded for western region of Nepal." (Authors)] Address: Gautam, I., Natural History Museum, Tribhuvan University, Swayambhu, Kathmandu, Nepal. Email: ishan.gautam@nhm.tu.edu.np

23667. Sinambela, M.; Napitupulu, M.A.; Sinaga, T. (2024): Macrozoobenthos communities found in the waters of Mariah Bandar springs. *International Journal of Science, Technology & Management* 5(4): 834-839. (in English) ["Macrozoobenthos found in the waters of Mariah Bandar Springs, Pematang Bandar District, Simalungun Regency, along with physical and chemical parameters, where biological samples, namely macrozoobenthos, were taken using a quadrant and physical and chemical parameters of the water were taken using a dark colored sample bottle and then analyzed at the BTKL The waters that originate from the Mariah Bandar spring have very clear and shallow water, so that the bottom of the waters (substrate) can be seen directly, which consists of sandy rocks. The macrozoobenthos community in the waters of Mariah Bandar spring consists of four classes, namely Clitellata, Gastropod, Bivalvia, Insecta, and eight families, namely Lumbricidae, Thiaridae, Cyrenidae, Chironomidae, Gomphidae, Paludicola, Coenagrionidae, Libellulidae. The temperature at each observation station ranges from 22.0°C – 35.0°C, brightness ranges from 4 – 4.5 m from the surface, dissolved oxygen (DO) ranges from 6.84-8.25 mg/l, pH ranges from 7.36-8.85, BOD ranged from 1.01-3.42 mg/l. In general, the physical and chemical parameters measured still support the life of freshwater organisms, unless the pH is classified as acid." (Authors)] Address: Sinambela, Masdiana, Biology Department, Mathematics And Natural Sciences Faculty, Universitas Negeri Medan, Medan Indonesia. Email: masdianasinambela@gmail.com

23668. Singh, N.; Singh, S. (2024): *Urothemis signata* from Delhi/NCR Region, Dhanauri wetlands. *Bradinopyga* 7 &

8(11-13): 136-139. (in English) ["Dragonflies have carved indelible imprints in our childhood memories about them that keep on flashing in our mind ever since. In nature, it becomes even more fascinating and exciting when you come across a dragonfly, like in my case, *U. signata*, which I marked for its entry Delhi NCR for the first time in the annals of its history in the country. The COVID-19 pandemic was a bane for the whole world of human being, but for wild life like the dragonflies it descended as a boon, with a fresh air of chastened environment. Whether the improved environment had an impact on the virgin entry of *Urothemis signata* in the Delhi NCR Region's Dhanauri wetland. In brief, the instance of finding the species here is truly an epic moment to describe it from an otherwise a terra incognita for the species so far!" (Authors)] Address: Singh, Nazneen & Santosh. Email: nazneen@gmail.com

23669. Surdo, S.; Barbera, A. (2024): Checklist Odonata of Wetlands in south-western Sicily (Italy): Pantano Leone, Capo Feto, Margi Spanò, Nespolilla and Milo. *Biodiversity Journal* 15(2): 391-397. (in English) ["Over time, the significance of checklists as essential tools for managing Sicily's natural heritage has been underscored by the requirements outlined in international biodiversity conventions, particularly in relation to implementing the Habitats Directive. Compiling and updating checklists of fauna and flora for each specific region is necessary due to the growing interest in biodiversity today, which serves as a foundational and indispensable knowledge base. In this paper, a first detailed and complete checklist of the 17 Odonata species of these areas of Sicily (Italy) is presented. Regarding the Capo Feto and Margi Spanò wetland (Trapani, Mazara del Vallo, Italy), the checklist includes 10 species of dragonflies, 13 species for Margi Milo (Trapani, Mazara del Vallo, Italy). As far as the Pantano Leone wetland (Trapani, Campobello di Mazara, Italy) is concerned 13 species of dragonflies are listed." (Authors)] Address: Surdo, S., Dipartimento di Scienze agrarie, alimentari e forestali, viale delle Scienze, Edificio 4, 90128 Palermo, Italy. Email: salvatore.surdo@unipa.it

23670. Szivák, I.; Csabai, Z.; Schmera, D.; Móra, A. (2024): The spatial extent and the dispersal strategy of species shape the occupancy frequency distribution of stream insect assemblages. *Ecology and Evolution*. 2024;14:e11663. <https://doi.org/10.1002/ece3.11663>: 24 pp. (in English) ["Several theoretical models have been proposed as the underlying mechanisms behind occupancy frequency distribution (OFD) patterns. For instance, the metapopulation dynamic model predicts bimodal OFD pattern indicating the dominance of dispersal processes in structuring the assemblages, while the niche-based model predicts unimodal right-skewed OFD pattern, and thus assemblages are driven mostly by niche processes. However, it is well known that the observed OFD pattern reflects the interplay of several other factors (e.g. habitat heterogeneity, species specificity and sampling protocol parameters). It follows that the individual contribution of each factor to the OFD pattern is rather complicated to explore. Our main objective was to examine the role of the spatial extent of the sampling and the dispersal strategies of species in shaping OFD pattern. For this, we collected samples of stream insect assemblages [including "Odonata"] inhabiting near-natural streams in the Pannon Ecoregion. We formed groups of species representing contrasting dispersal strategies (referred to as dispersal groups). Applying a computer program algorithm, we produced samples with different spatial extent. We found that with increasing spatial extent, the OFD pattern changed from bimodal to unimodal for active dispersers. Insect groups with different

dispersal strategies differed in the strength of support for OFD patterns within all spatial extent. Furthermore, the strength of support for OFD patterns varied across dispersal groups differently as the spatial extent increased. Our results reflected underlying changes in mechanisms structuring assemblages along an increasing spatial extent. We also assumed that the stream insect dispersal strategy influences the relative role of dispersal and niche processes particularly as spatial extent increases from stream reaches to the extent of adjacent valleys. We could define spatial extents and dispersal strategies within which unique metacommunity processes could underlie the organisation of assemblages." (Authors)] Address: Móra, A., Dept of Hydrobiology, Faculty of Sciences, University of Pécs, Ifjúság útja 6, Pécs 7604, Hungary. Email: marnold@gamma.ttk.pte.hu

23671. Talmale, S.S. (2024): Insecta: Odonata In Fauna of Kawal Tiger Reserve, Telangana. In: Fauna of Kawal Tiger Reserve, Telangana. Zoological Survey of India, Kolkata: 300-317. (in English) ["An account of Odonata known from Kawal Tiger Reserve, Mancherial and Nirmal districts, Telangana, Maharashtra is presented here. The species wise detailed systematic account of 37 species belonging to 28 genera of 6 families is included." (Author)] Address: Talmale, S.S., Zoological Survey of India, Western Regional Centre, Vidyanagar, sector 29, Akurdi, Pune 411 044, India. Email: s_talmale@yahoo.co.in

23672. Talmale, S.S. (2024): Insecta: Odonata In Fauna of Amrabad Tiger Reserve, Telangana. In: Fauna of Amrabad Tiger Reserve, Telangana. Zoological Survey of India, Kolkata: 291-309. (in English) [An account of Odonata known from Amrabad Tiger Reserve, Nagarkarnool and Mehabubnagar, Telangana, Maharashtra is presented here. The species wise detailed systematic account of 35 species belonging to 25 genera of 6 families is included.] Address: Talmale, S.S., Zoological Survey of India, Western Regional Centre, Vidyanagar, sector 29, Akurdi, Pune 411 044, India. Email: s_talmale@yahoo.co.in

23673. Termaat, T.; Ketelaar, R.; van Kleef, H.H.; Verberk, W.C.E.P.; van Grunsven, R.H.A.; Wallis DeVries, M.F. (2024): Spearhead blues: How threats to the damselfly *Coenagrion hastulatum* changed over time. *Journal of Insect Conservation* 28: 211-224. (in English) ["Given the rapid response of insects to environmental changes, their most prominent threats may change quickly as well. For effective insect species conservation it is therefore necessary to discriminate between former and current drivers of decline and to focus conservation efforts on the latter. We investigated how various environmental pressures, including former drivers of decline, have affected populations of the regionally endangered damselfly *Coenagrion hastulatum* and how their relevance has evolved over time. In our analysis, we compared water quality, vegetation properties and population trends across three distinct time spans: 1921–2000, 2001–2015 and 2016–2021. We included all known reproduction sites in the Netherlands, both current and historical, and also considered adjacent sites that were never inhabited. Ponds suitable for the species were characterised by mesotrophic conditions and high coverage of emergent and floating vegetation. Never inhabited ponds differed from inhabited ponds in being either more acidic or more eutrophic. Ponds where *C. hastulatum* disappeared between 2001 and 2015 had less of the mentioned vegetation structures and higher concentrations of various minerals. Ponds where the species disappeared after 2015 experienced severe droughts during 2018–2020. Most primary threats to *C. hastulatum*

have shifted over time. In the past, changes in human use of ponds and increased sulphur and nitrogen deposition posed prominent threats. Presently, severe droughts, alongside nitrogen deposition have become the dominant concerns. Consequently, restoration of groundwater systems and re-wetting measures are now first conservation priorities. Implications for insect conservation: Our study highlights how threats to insect populations can rapidly evolve. Consequently, conservation strategies need regular evaluation and adjustment." (Authors)] Address: Wallis DeVries, M.F., De Vlinderstichting/Dutch Butterfly Conservation, Wageningen, The Netherlands

23674. Tiwari, S.; Chandel, S. (2024): Chapter 67]: The effect of downstroke angle of attack on the aerodynamic performance of dragonfly during take-off. In: Schuller, B., Gupta, R., Mote, R., Sharma, A., Giri, J.P., & Chadge, R.B. (Eds.). (2024). Recent Advances in Material, Manufacturing, and Machine Learning: Proceedings of 2nd International Conference (RAMMML-23) (1st ed.). CRC Press. <https://doi.org/10.1201/9781003450252>: 7 pp. (in English) ["A numerical analysis is performed to study the effect of the angle of attack during mid-downstroke (α_D) on the aerodynamic performance of dragonfly flight during the take-off procedure. A commercial software ANSYS Fluent is used to perform the two-dimensional simulation of tandem foils oscillation along an inclined stroke plane with asymmetric upstroke and downstroke. The downstroke angle of attack is varied between $45^\circ = \alpha_D = 90^\circ$ whereas pitch amplitude for upstroke is the same for all cases. The results show that increasing the value of α_D increases the vertical force as well as generates higher drag. This is due to stronger LEV created for higher and higher pressure region at the lower surface of the foils due to added mass effect. It is also observed that the presence of the forefoil reduced the performance of the hindfoil. The results obtained can help in the optimization of flapping wing-based MAVs." (Authors)] Address: unknown

23675. Tournayre, O.; Tian, H.; Loughheed, D.R.; Windle, M.J.S.; Lambert, S.; Carter, J.; Sun, Z.; Ridal, J.; Wang, Y.; Cumming, B.F.; Amott, S.E.; Loughheed, S.C. (2024): Enhancing metabarcoding of freshwater biotic communities: A new online tool for primer selection and exploring data from 14 primer pairs. *Environmental DNA* 6(4) e590: 20 pp. (in English) ["Freshwater ecosystems are complex, diverse, and face multiple imminent threats that have led to changes in both structure and function. It is urgent that we develop and standardize monitoring tools that allow for rapid and comprehensive assessment of freshwater communities to understand their changing dynamics and inform conservation. Environmental DNA surveys offer a means to inventory and monitor aquatic diversity, yet most studies focus on one or a few taxonomic groups because of technical challenges. In this study, we (1) create an eDNA metabarcoding dataset (natural water bodies) with 14 validated primer pairs; (2) create a free online, user-friendly tool for primer selection that can be used for any metabarcoding data (SNiPe); and (3) using SNiPe, explore our dataset to derive subsets of informative, cost-effective primer pairs that maximize detection of freshwater diversity. We first evaluated the completeness of public reference sequence databases and the efficiency of 14 primer pairs in silico, in vitro on five mock communities (mix of DNA from tissues of select taxa), in vivo on water samples from aquarium samples with known taxonomic composition, and finally in vivo on water samples from freshwater systems in Eastern Canada. Results from analyses using SNiPe revealed that 13 or 14 primer pairs are necessary to recover 100% of the species in water samples (natural

systems), but that four primer pairs are sufficient to recover almost 75% of taxa with little overlap. Our work highlights the power of eDNA metabarcoding for reconstructing freshwater communities, including prey, parasite, pathogen, invasive, and declining species. It also emphasizes the importance of marker choice on species resolution, and primer characteristics and filtering parameters on detection success and accuracy of biodiversity estimates. Together, these results highlight the usefulness of eDNA for freshwater monitoring and should prompt more studies of tools to survey all communities." (Authors) The paper includes a few references to Odonata.] Address: Orianne Tournayre, Department of Biology, Queen's University, Kingston, Ontario, Canada. Email: orianne.tournayre@gmail.com

23676. Tyagi, B.K. (2024): Memoirs of the International Congress of Odonatology held in Paphos (Cyprus) during June 25-30, 2023. *Bradinopyga* 7 & 8(11-13): 141-148. (in English) [The authors gives a few private impressions from the congress and field trips, and documents the program of lectures.] Address: Tyagi, B.K., Centre for Research in Medical Entomology (ICMR), 4-Sarojini Street, Chinna Chokkikulam, Madurai 625005 (Tamil Nadu), India. Email: abktyagi@gmail.com

23677. Vladislavovna, T.A. (2024): Benthic invertebrates in assessing the water quality of Lake Uchum, Krasnoyarsk region. *Innovative Trends in the Development of Russian Science* 2024. Publisher: Krasnoyarsk State Agrarian University Conference: March 04–06, 2024 Organizers: Krasnoyarsk State Agrarian University: 367-369. (in English, with Russian summary) ["Some representatives of benthofauna are sensitive to pollution, and by their dominance or small numbers can judge the condition of the lake. The benthos of some lakes is still poorly studied. The purpose of the work is to study the structure of zoobenthos of Lake Uchum. As a result, it was possible to obtain data on the species composition of the zoobenthos of Lake Uchum in the Krasnoyarsk Territory, the spatial and temporal dynamics of its abundance and biomass, and to assess the lake water quality. ... Rowing turned out to be subdominant in 2022 *Corixidae* sp., found both as larvae and adults of *Sigara assimilis* and *Cymatia rogenhoferi*, as well as the dragonflies *Coenagrion vernale* and *Ischnura elegans*. ... Dragonflies dominated in June in the area of station No. 1. In 2021, the subdominant species in terms of biomass was also the dragonfly *Coenagrion vernale*." (Author) *Coenagrion lunulatum*?] Address: Vladislavovna, Tolstikhina Alexandra, Siberian Federal University, Krasnoyarsk, Russia. Email: tos965@gmail.com

23678. Walia, G.; Dhillon, G. (2024): DNA barcoding and molecular phylogeny of genus *Pseudagrion* (Odonata: Coenagrionidae) based on mitochondrial COI, ND1 and 16S rRNA genes. *International Journal of Tropical Insect Science* 44: 1567-1590. (in English) ["Genus *Pseudagrion* is one of the largest genera of order Odonata and 14 species of this genus have been reported in India. The current research aims to reconstruct the phylogenetic trees by amplifying the partial sequences of the following three mitochondrial genes: COI, ND1 and 16 S rRNA genes, to produce a DNA reference library and determine the evolutionary relationships among the species of genus *Pseudagrion*. Sequences of mitochondrial genes of eight species have been submitted to NCBI, out of which *Pseudagrion decorum*, *P. hypermelas* and *P. indicum* barcoded for the first time. Since no work has been reported to far for CUB in genus *Pseudagrion*, the MT-ND1 gene appears to be a good choice for analyzing codon usage pattern. Codon usage bias for mitochondrial genes is low because of high effective number of codons. The

most frequent codons, favored A or T at the 3rd codon position which indicate the significant role of compositional constraint in codon usage bias. Genetic divergence based on COI and 16 S rRNA ranges from 2.4 to 15.8%. 12 S rRNA and 16 S rRNA genes show minor genetic diversity, whereas NDI and COI genes reveal higher genetic diversity because of high mutation rate. In phylogenetic tree, 34 *Pseudagrion* species get segregated into five major clades as: ((*P. pruinosum* + *P. spencei* + *P. hypermelas* + *P. rubriceps*) + *P. microcephalum*) + (*P. decorum* + *P. indicum* + *P. australasiae*) + ((*P. aureolum*) + *P. massaicum* + *P. tanganyicum* + *P. hamoni* + *P. pacale* + *P. niloticum* + *P. acacia*) + (*P. ignifer* + *P. pilidorsum* + *P. pruinosum*) + ((*P. dactylidium*) + *P. bicoeruleans* + *P. munte* + *P. sarepi* + *P. kersteni*) that depicts their evolutionary relationships." (Authors)] Address: Walia, Gurinder, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

23679. Wallbom, F. (2024): Temperature- and species-dependent variation in the breeding phenology of damselflies in Sweden. MSc thesis, Faculty of Health, Science, and Technology, Biology: Ecology and Conservation Biology, Karlstad University: 31 pp. (in English, with Swedish summary) ["Phenology, or the timing transitions in an organism's life cycle, is an underappreciated trait that could affect ecological communities, especially during predicted changing environments. Aquatic insects, such as Odonates, are sensitive to these changes as they exhibit complex life cycles which requires them to change habitat; aquatic through most of its lifetime and aerial in the reproductive stage. Therefore, they are most likely to display shifts in phenology due to environmental cues that will impact some of the most important life-history traits, e.g. reproduction, hunting and feeding behavior, and diapause. Some cues that have been identified to impact phenology are temperature fluctuations and latitudinal gradients. This study aimed to investigate the drivers of variation in phenology in six ecologically different damselfly species [*Coenagrion hastulatum*, *C. puella*, *C. pulchellum*, *Enallagma cyathigerum*, *Ischnura elegans*, *Lestes sponsa*] by assessing the effect of temperature on within-season variation in phenology, identifying if there are any evidence of niche partitioning based on phenology, and if phenology changes across latitudinal gradients. Two large datasets with taxonomic expert-collected data and data collected through publicly available citizen observed data were used in the study, and these were analyzed using a combination of inferential statistics such as regression and Pearson's correlation, and linear mixed effect models, as well as descriptive statistics including principal component analysis of matrices of Schoener's niche overlap. Within a breeding season, short term temperature variation was most strongly correlated with abundance for the most early emergent species, *C. hastulatum*. There was no evidence of niche partitioning depending on morphological traits (total length), however closely related species were more likely to share phenological niche. The niche partitioning did not differ across latitudinal degrees, suggesting that there might be different life-history traits among the species that aids in their survival and reproduction through environmental gradients. The results from this study will contribute to understand the shifts in phenology across ecological communities, and future changes in environments." (Author) *Coenagrion hastulatum*, *C. puella*, *C. pulchellum*, *Enallagma cyathigerum*, *Ischnura elegans*, *Lestes sponsa*.] Address: <https://www.diva-portal.org/smash/get/diva2:188-1772/FULLTEXT01.pdf>

23680. Wickramasingha, P.D.; Morrissey, C.A.; Phillips, I.D.; Crane, A.L.; Chivers, D.P.; Ferrari, M.C.O. (2024): Sublethal effects of the insecticide, imidacloprid, on the responses

of damselfly larvae to chemosensory cues indicating predation risk. *Chemosphere* 356:141926: 8 pp. (in English) ["Highlights: • Imidacloprid at 1.0 and 10.0 µg/L caused significant reductions in foraging. • 0.1 µg/L caused the loss of responses toward a predator odour after 10 days. • 1.0 µg/L caused lost responses toward predator odour and alarm cues after 2 days. • At 10.0 µg/L, larvae behaved appropriately, revealing compensatory responses. • These findings suggest cognitive impairment from low imidacloprid concentrations. Abstract: Insecticides, including the widely used neonicotinoids, can affect both pest and non-target species. In addition to lethal effects, these insecticides at sub-lethal levels may cause disruption to sensory perception and processing leading to behavioural impairments. In this laboratory experiment, we investigated the effects of a 10-day exposure to the neonicotinoid insecticide, imidacloprid, on the behaviour of larvae of the damselfly, *Lestes congener*. In tests of baseline activity, imidacloprid concentrations of 1.0 and 10.0 µg/L caused significant reductions in foraging behaviour. Moreover, in response to chemical cues that indicate a potential risk to the larvae, imidacloprid caused the loss of an appropriate antipredator response (reduced foraging) depending on the concentration and duration of exposure. Imidacloprid at 0.1 µg/L caused the loss of responses toward the odour of a beetle (*Dytiscus* spp.) predator after 10 days of exposure, whereas 1.0 µg/L caused lost responses toward both the predator odour and injured conspecific cues (i.e., alarm cues) and after only 2 days of exposure. However, at 10.0 µg/L, larvae responded appropriately to both cues throughout the duration of the study, suggesting compensatory responses to imidacloprid at higher concentrations. Hence, the lack of appropriate responses at 1.0 µg/L likely resulted from a cognitive impairment rather than chemical alteration of these important chemosensory cues. In the natural environment, such effects will likely cause decreased survivorship in predator encounters. Hence, imidacloprid exposure, even at low concentrations, could have adverse consequences for chemosensory ecology of this damselfly species." (Authors)] Address: Wickramasingha, P.D., Department of Biology, University of Saskatchewan, 112 Science Pl., Saskatoon, SK, S7N 5E2

23681. Wilson, K.D.-P. (2024): Editors notes. *Agriion* 28(2): 30-31. (in English) [WDA Membership; Conference news; WDA and social media; Next issue of *AGRION*] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

23682. Worthen, W.N.; Guevara-Mora, M. (2024): The effects of light environment on adult odonate communities in disturbed and intact forest: The importance of small-scale effects. *Diversity* 2024, 16(9), 557; <https://doi.org/10.3390/d16090557>: 14 pp. (in English) ["Deforestation in the tropics causes shifts in adult odonate community structure, from forests dominated by thermoconforming zygopteran specialists to open areas with higher representations of heliothermic anisopterans. We tested for these shifts in the Maquina and Cucha rivers in Monteverde, Costa Rica. We compared adult odonate communities in 100 m plots (subdivided into twenty 5 m subplots) located in disturbed, partially open areas with those in 100 m plots located in intact forest and used general linear models to describe how odonate abundance, species richness, species diversity, and the Anisoptera/Zygoptera ratio varied among plots, subplots, habitat type (disturbed/forested), rivers, and as functions of percent canopy cover and light levels. Plots varied in light levels and percent canopy cover, but there were no significant differences in species richness or diversity. Community composition, however, varied across

plots and subplots in NMDS and PERMANOVA analyses, largely as a consequence of the preference of *Hetaerina cruentata* and *Paltorthemis lineatipes* for high light subplots and *H. majuscula* for low light subplots. NMDS axes were significantly correlated with percent canopy cover and light level in subplots, and the Anisoptera/Zygoptera ratio correlated with NMDS axes at both the plot and subplot scales, indicating that the relative abundance of anisopterans did increase with increasing light and decreasing canopy cover. Differences among plots and habitats can largely be attributed to species-specific differences in habitat selection at a small spatial scale, causing predicted shifts in the Anisoptera/Zygoptera ratio as dominance shifts from endemic forest species to wide-ranging generalists. This is one of the first studies that confirms these patterns for a cloud forest community." (Authors)] Address: Guevara-Mora, M., Laboratorio de Entomología (LEUNA), Escuela de Ciencias Biológicas, Universidad Nacional, Heredia 40101, Costa Rica. Email: meyer.guevara.mora@una.ac.cr

23683. Wu, J.; Tang, W.; Li, Z.; Chakraborty, A.; Zhou, C.; Li, F.; He, S. (2024): Duplications and losses of the detoxification enzyme glycosyltransferase are related to insect adaptations to plant feeding. *Int. J. Mol. Sci.* 2024, 25, 6080. <https://doi.org/10.3390/ijms25116080>: 16 pp. (in English) [Insects have developed sophisticated detoxification systems to protect them from plant secondary metabolites while feeding on plants to obtain necessary nutrients. As an important enzyme in the system, glycosyltransferase 1 (GT1) conjugates toxic compounds to mitigate their harm to insects. However, the evolutionary link between GT1s and insect plant feeding remains elusive. In this study, we explored the evolution of GT1s across different insect orders and feeding niches using publicly available insect genomes. GT1 is widely present in insect species; however, its gene number differs among insect orders. Notably, plant-sap-feeding species have the highest GT1 gene numbers, whereas blood-feeding species display the lowest. GT1s appear to be associated with insect adaptations to different plant substrates in different orders, while the shift to non-plant feeding is related to several losses of GT1s. Most large gene numbers are likely the consequence of tandem duplications showing variations in collinearity among insect orders. These results reveal the potential relationships between the evolution of GT1s and insect adaptation to plant feeding, facilitating our understanding of the molecular mechanisms underlying insect-plant interactions." (Authors) GT1 gene numbers in 160 insect genomes from different families and orders and including five odonate families are presented in figure 1 of the paper.] Address: He, S., College of Life Science, Chongqing Normal Univ., Chongqing 401331, China. Email: leef0925@cqnu.edu.cn

23684. Xu, Z.; Lu, Q.; Jia, D.; Li, S.; Luo, K.; Su, T.; Chen, Z.; Qiu, G. (2024): Significant biomagnification of methylmercury in songbird nestlings through a rice-based food web: Insights from stable mercury isotopes. *Journal of Hazardous Materials* 468, 15 April 2024, 133783: (in English) ["Highlights: • Dietary composition of Russet Sparrow nestlings was systematically identified. • Aquatic origin Hg is an important source of Hg for Russet Sparrow nestlings. • The dietary route provides more MeHg compared to maternal transfers to nestlings. Abstract: To elucidate the sources and transfer of mercury (Hg) in terrestrial food chains, particularly in heavily Hg-contaminated rice paddy ecosystems, we collected rice leaves, invertebrates, and Russet Sparrow nestlings from a clear food chain and analyzed the dietary compositions and potential Hg sources using stable Hg isotopes coupled with a Bayesian isotope mixing model (BIMM). Our

findings indicated that MeHg exposure is dominant through the dietary route, with caterpillars, grasshoppers, and katydids being the main prey items, while the less provisioned spiders, dragonflies, and mantises contributed the most of the Hg to nestlings. We found minimal MIF but certain MDF in this terrestrial food chain and identified two distinct MeHg sources of dietary exposure and maternal transfer. We firstly found that the dietary route contributed substantially (almost tenfold) more MeHg to the nestlings than maternal transfer. These findings offer new insights into the integration of Hg from the dietary route and maternal transfers, enhancing our understanding of fluctuating Hg exposure risk during the nestling stage. Our study suggested that Hg isotopes combined with BIMM is an effective approach for tracing Hg sources in birds and for gaining in-depth insight into the trophic transfers and biomagnification of MeHg in food chains. Conclusions: In this study, we investigated the terrestrial food chain of plant leaves–invertebrates–Russet Sparrow nestlings using artificial nest boxes around Hg-contaminated rice paddies. Our findings indicated that caterpillars, grasshoppers, and katydids were the primary prey items of Russet Sparrow nestlings, while the less consumed spiders, dragonflies, and mantises contributed the majority of the total THg and MeHg to the nestlings. MeHg exposure through the dietary route was found to be predominant ..." (Authors)] Address: Qiu, G., State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550081, China. Email: qiuguangle@vip.skleg.cn

23685. Yu, F.; Ye, X.; He, G. (2024): Analysis of fluid-structure coupling during the flapping of dragonfly hind wings under different flexible distributions. *Journal of Physics: Conference Series* 2791 012010: 11 pp. (in English) ["To investigate the influence of flexible distribution on the aerodynamic characteristics of a dragonfly hind wing during flapping flight, this study establishes a simplified plate model of the dragonfly hind wing based on the actual size, while neglecting the wrinkled microstructure. Six different flexible distribution patterns are proposed for the model. The overlapping grid technique is employed to achieve fluid-structure coupling calculations during the flapping motion of the dragonfly hind wing, by customizing the Young's modulus in the solid region to represent different levels of flexibility. The results show that gradually increasing the flexibility along the chordwise direction of the dragonfly wing can induce a stronger leading-edge vortex during flapping, intensifying the accumulation of vorticity near the wingtip and resulting in a higher peak lift coefficient. The flexible wing has a positive impact on the formation and development of the trailing-edge vortex, leading to an increase in the thrust coefficient peak and time-averaged thrust coefficient of the dragonfly hind wing. Consequently, all aspects of the aerodynamic characteristics are significantly improved." (Authors)] Address: He, G., College of Aircraft Engineering, Nanchang Hangkong University, Nanchang 330063, China. Email: 70190@nchu.edu.cn

23686. Zemo, M.A.T.; Menbohan, S.F.; Atchirimi, B.T.; Assou, D.; Biram à Ngon, B.E.; Betsi, N.C.W.; Nhiomock, S.G.; Harissou, Lactio, N.L.; Far Ndourwe, B.; Nwaha, M.; I'or Nyame Mbia, D.; Tchouapi, L.Y.; Tchouta, G.U.; Mboye, B.R.; Dzavi, J. (2024): Distribution profile of benthic macroinvertebrates in some rivers of Yaoundé city and its surroundings using self organizing map and indicator value methods. *Diversity* 2024, 16, 385. <https://doi.org/10.3390/d16070385>: (in English) ["Urban sprawl leads to the degradation of aquatic environments and, consequently, to the destruction of biodiversity. With the aim of highlighting the distribution profile of benthic macroinvertebrates in the city of Yaoundé and its surroundings

according to the level of degradation, this study was carried out in seven rivers. A total of 144 taxa of benthic macroinvertebrates, belonging to 74 families, 15 orders, five classes, and three phyla, were collected from seven rivers in urban, peri-urban, and forest environments on Yaoundé and its surroundings. The self-organizing map (SOM) analysis tool was used to group the collected taxa from all stations into three clusters or affinity cores. The indicator value analysis (IndVal) method was employed to determine, based on their ecological preferences, which organisms were most likely to belong to each group. Out of the 144 collected taxa, only 44 were indicated to represent the three different groups. Thus, three communities were defined: the Hydropsyche community, with *Hydropsyche* sp. as the predominant taxon in Group III, characterizing well-oxygenated and low-mineralized stations; the Hydrocyrius community, where the species *Hydrocyrius* sp. predominates in Group I, describing stations with low oxygenation and moderate mineralization; and the Lumbiculiidae community, where Lumbiculiidae is the taxon associated with environments with high mineralization and critical oxygenation. These two methods contribute to the biomonitoring of tropical aquatic environments, firstly by grouping organisms by affinity and then identifying those that reflect the environment conditions. This facilitates the detection of changes in the quality of hydrosystems and guides management and conservation efforts." (Authors) The study includes the following odonate species, definitely misidentified nearly in total: *Phyllogomphus brunneus*, *Chalcolestes viridis*, *Ictinogomphus* sp., *Calopteryx* sp., *Brachythemis leucostica*, *Oxygastra curtisii*, *Epitheca bimaculata*, *Hemicordulia olympica*, *Phyllo-macromia picta*, *Somatochlora pro parte*, *Nehalennia speciosa*, *Enallagma spermatum*, *Enallagma cyathigerum*, *Erythromma pro parte*, *Enallagma glaucum*, *Cordulegaster* sp., *Coenagrion* sp., *Pseudagrion*, *Platynemididae*, *Macromia splendens*, *Libellula* sp., *Sympetrum* sp., *Xyzomma* [sic] *petiolatum*, *Brachythemis lacustris*, *Orthetrum* sp., *Ophiogomphus* sp., *Lestonogomphus angus*.] Address: Temgoua Zemo, Marie Anita, Regional Center of Excellence on Sustainable Cities in Africa (CERViDA-DOUNEDON), Univ. of Lomé, Lomé 01BP 1515, Togo. Email: anitamtemgoua1@gmail.com

23687. Zohrabi, H.; Chamani, A.; Zamanpoore, M.; Tavabe, K.R. (2024): Exploring the interplay between water quality parameters and aquatic fauna in a human-dominated stream network in Iran. *Applied Water Science* 14(156): 10 pp. (in English) ["Rivers and streams are dynamic linear features that undergo numerous disturbances from nearby human activities. This is particularly evident in Iranian arid regions, where agricultural activities are concentrated along these water bodies to harness their freshwater resources. This study utilized 12 stations in the Maharlu stream network to assess the impact of human activities on its water quality and aquatic fauna. Results indicated that severe nutrient pollution attributed to a high mean nitrate concentration (67.77 ± 79.72 mg/L). By employing PCA analysis, three main principal components were extracted, explaining a variance of 82.61%. PC1 exhibited high positive loadings for dissolved oxygen (DO), while PC2 showed an elevated salt concentration. Midges and non-biting mosquitoes, predominantly from the Chironomidae family, emerged as the dominant taxon, contributing to over 98% of the total species abundance. Furthermore, integrated PCA-CCA analysis revealed downstream shifts in species composition toward more tolerant species, driven by decreasing DO levels and increasing salt concentrations. These shifts in trends found in water quality parameters and species composition were linked to agricultural runoff carrying substantial amounts of fertilizers, pesticides, and organic matter from livestock farming. Consequently,

there is an urgent need to implement conservation measures to mitigate their adverse effects." (Authors) Taxa are treated at order or family level.] Address: Chamani, A., Environmental Science and Engineering Dept, Waste & Wastewater Research Center, Isfahan (Khorasgan) Branch, Islamic Azad Univ. Esfahan, Iran. Email: atefehchamani@yahoo.com

23688. Zulhariadi, M.; Mirnawati, M.; Andriani, D.; Aesi, A.; Algipari, R (2024): Diversity of dragonflies (Order: Odonata) in the Suranadi Nature Tourism Park area, West Lombok. *Penbios* 9(1): 1-8. (in English) ["Dragonflies have an important role for ecosystem stability, namely as predators and prey. The availability of food resources and optimal environmental conditions influence the richness of dragonfly species in a habitat. The aim of this research is to identify the types of dragonflies in the Suranadi Nature Tourism Park area, West Lombok. This research was carried out on May 5, 2024, and was carried out in the morning and afternoon (09.30–13.00 WITA). The methods and techniques used in the research are field observation techniques using the free roam method. Observing dragonflies using the free-roaming method starts from the path area in the middle and edge of the forest, the field in the middle of the forest, and the pond. The research results showed that there were 8 species, belonging to 2 suborders and 2 families, with a total of 68 individuals. The species obtained include *Neurothemis terminata*, *Orthetrum sabina*, *Diplacodes trivialis*, *Copera marginipes*, *Zyxomma petiolatum*, *Agrionoptera insignis*, *Orthetrum testaceum*, and *Onychothemis culminicola*. The diversity index (H') of dragonflies in the Suranadi Nature Tourism Park area is 1.66, indicating that the diversity of dragonfly species in this area is included in the medium category. The dominance index (C) shows 0.23, which means that dominance in this area is low. The equality index (E) in this area is also relatively high, with a figure of 0.80." (Authors) The following species are listed: *Neurothemis terminata*, *Orthetrum sabina*, *Diplacodes trivialis*, *Copera marginipes*, *Zyxomma petiolatum*, *Agrionoptera insignis*, *Orthetrum testaceum* and *Onychothemis culminicola*.] Address: Zulhariadi, M., Biologi Education Department, Universitas Islam Negeri Mataram, Indonesia

23689. Zurlyte, K.G.; Gaidys, R.; Narijauskaitė, B (2024): Biomechanical study of the wing of the dragonfly *Aeshna cyanea*. *Mechanika* 30(3): 270-278. (in English) ["...Forewing geometric parameters were measured. The location of the nodus on the wing was measured. Average distance between the wing root and the wingtip from the 6 measured forewings was 43.94 mm. Calculated average distance between the root and the nodus was 21.43 mm. The ratio between the average wing length and the distance between the root and the nodus is 0.48. 3. The study also included an SEM study of the dragonfly forewing, which provided an overview of the wing structure and an insight into the different structural parts and their characteristics in relation to the overall wing. Several areas were observed during the study: root, overlapping veins, leading-edge vein, nodus. 4. Also, investigations were carried out to find the first resonant frequency of the wing. It was observed from the tests that both the bump test and the forced excitation test gave very similar results. The first resonant frequency of the first wing was found to be 81.56 Hz and that of the second wing tested was 101.75 Hz. Future research will further investigate the mechanics of dragonfly wings, dragonfly dynamics and its application to MAV's." (Authors)] Address: Zurlyte, Kamile, Kaunas University of Technology, Studentu g. 56-344, Kaunas, Lithuania, E-mail: kamile.zurlyte@ktu.edu