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2000

25224. Contreras Ramos, A.; García Aldrete, A. N.; González Soriano, E. (2000): Reconocimiento de la biodiversidad de la Reserva de la Biósfera Calakmul: Odonata, psocóptera y díptera acuáticos (Insecta). Universidad Nacional Autónoma de México. Instituto de Biología. Informe final SNIBCONABIO proyecto No. M003. México, D.F: 28 pp. (in Spanish) ["This project begins the formal study of the diversity of the aquatic Odonata, Psocoptera and Diptera (Chironomidae) of the Calakmul Biosphere Reserve. The Calakmul Reserve, southeast of Campeche, is one of the largest in Mexico and is continuous to the south with the Maya Biosphere Reserve of Guatemala. The wide extension of jungles and floodable vegetation, location, good state of conservation, particular bodies of water (permanent and temporary waters) and little knowledge of its entomofauna, make Calakmul an area of special interest for biodiversity studies. This project records 74 species of Odonata, 96 of Psocoptera and 15 of Chironomidae; of these, 2, 30 and 5, respectively, are new to science. The continuation of the study of the specimens will yield additional findings in the taxonomic knowledge of these groups. The results also include 1421 computerized records from the groups studied. In addition, comments are included for the conservation of the area, based on the occurrence of the species and their possible use as bioindicators, as well as direct observations of habitat conditions and anthropogenic practices. ... A total of 906 adult specimens belonging to 74 species, 40 genera, and 9 families were obtained. The species Megaloprepus caerulatus (Pseudostigmatidae), Erythrodiplax fervida, and Macrothemis inacuta (Libellulidae) were recorded visually." (Authors/Google translate) http://www.conabio.gob.mx/institucion/proyectos/resultados/InfM003.pdf] Address: González Soriano, C.E., Instituto de Biología, UNAM, Depto. de Zoología, Apdo. Postal 70-153, 04510 México, D.F. Email: esoriano@mail.ibiologia.unam.mx

2009

25225. FRAPNA Drôme (2009): Mise en place d'un suivi des Odonates, macrophytes aquatiques et semi-aquatiques; Inventaire des habitats naturels des zones humides du bassin versant du Lez. Rapport intermédiaire 2009 – (Communes de Valréas, Venterol, Grillon et Richerenches): 53 pp. (in French) [https://www.sandre.eaufrance.fr/ftp/public/incoming/AERMC/Metadonnees%20AERMC_Juillet%202012-/R144/1. pdf

25226. "The 2009 site survey campaign took place in the middle part of the Lez River watershed, specifically in the La Coronne area. The municipalities involved are Richerenches, Grillon, Valréas, and Venterol. The summary of odonatological data for this area consists of analyzing data prior to 2009 from the "Entre Amis" database (FRAPNA, GRPLS, and other contributors). This summary also incorporates data from this survey campaign. For this area, we currently have 299 records, 203 (68%) of which were generated as part of our study. Taxonomically, we have identified 30 taxa, 10 (33%) of which were discovered during this study." (Authors/Google translate)

2011

25227. Giroud, M.; Maas, S.; Franzoni, A.; Mora, F. (2011): Quelques observations odonatologiques intéressante: effectuées dans le Jura entre 2007 et 2009 (Bresse jurassienne & basse vallée de l'Ognon). Bilan comparé des connaissances et perspectives. Falco 41: 53-62. (in French) [Records of the following species are discussed: Leucorrhinia pectoralis, Ceriagrion tenellum, Ischnura pumilio, Epitheca bimaculata, Oxygastra curtisii, Isoaeschna isoceles, Orthetrum coerulescens, O. brunneum, Coenagrion ornatum, C. mercuriale, C. scitulum, Cordulegaster boltonii, Lestes barbarus, Anax parthenope.] Address: Franzoni, Adeline, OPIE Franchie-Comte, 7 rue Voirin, MEFC, 25000 Besancon, France

25228. Mora F. (2011): Agir en faveur des libellules en Franche-Comté. Déclinaison du plan national d'actions Odonates. Plan régional d'actions en faveur des espèces menacées. 2011-2014. Office pour les insectes et leur environnement de Franche-Comté / Direction Régionale de l'Environnement, de l'Aménagement et du Logement de Franche-Comté: 105 pp. + annexes. (in French) [https://libellules.pnaopie.fr/wp-content/uploads/2023/08/PRA-Odonates-Grand-Public_franche_comte_compress ed.pdf. Fact sheets of the following species are presented: Aeshna subarctica elisabethea, Coenagrion mercuriale, Leucorrhinia albifrons, L. caudalis, L. pectoralis, Nehalennia speciosa, Ophiogomphus cecilia, Oxygastra curtisii, and Somatochlora alpestris, Stylurus flavipes, Sympetrum depressiusculum, Sympecma paedisca. Distribution maps with brief annotations to habitats are given for Isoaeschna isoceles, Cordulegaster bidentata, Epitheca bimaculata, Lestes dryas, L. virens, Leucorrhinia dubia, Sympetrum flaveolum, S.pedemontanum.] Address: https://libellules.pnaopie.fr/wp-content/uploads/2023/08/PRA-Odonates-Grand-Public_franche_comte_compress ed.pdf

25229. Pelletier, D. (2011): Premières observations de Trithemis annulata (Palisot de Beauvois, 1807) dans le département du Tarn-et-Garonne (France), et interrogations concernant son impact éventuel sur l'odonatofaune [Odonata, Anisoptera, Libellulidae]. Ephemera 12(1) (2010): 37-42. (in French, with English summary) [T. annulata was recorded for the first time in the Tarn-et-Garonne department in 2009, on the bank of fish ponds, and was found again on the shore

of two artificial lakes in July and August 2010.] Address: Pelletier, D., Les Martinots, 82700 Bourret, France. Email: pelletier.dom82@orange.fr

2012

25230. Hagen, E.M.; Sabo, J.L. (2012): Influence of river drying and insect availability on bat activity along the San Pedro River, Arizona (USA). Journal of Arid Environments 84: 1-8. (in English) ["We evaluated the effects of flow reduction and drying on prey availability and bat activity along a desert river in southeastern Arizona. We sampled bat activity and insect availability during the dry season at perennial and intermittent sites along the San Pedro River. Intermittent sites included both temporally flowing and dry conditions during the study period. Bat activity significantly declined between May and June sampling periods but was not related to whether sites had perennial or intermittent flow. Declines in bat activity corresponded to reductions in insect availability, but only at perennial sites. Bats tracked aquatic insect availability at perennial sites but not at intermittent sites, where insects appear to actively aggregate above localized wet portions of the intermittent reaches. Finally, both bat and insect availability declined to nearly undetected levels when the river dried at 2 of 16 sites in despite increases in terrestrial insect availability. Our results indicate that intermittency affects bat activity indirectly via its effects on prey availability. Seasonal river drying appears to have complex effects on foraging decisions by bats, initially causing imperfect tracking by consumers of localized concentrations of resources, but later resulting in disappearance of both insects and bats after complete drying." (Authors) Taxa are treated at order level." (Authors)] Address: Hagen, Elizabeth, School of Life Sciences, Arizona State University, PO Box 874501, Tempe, AZ 85287, USA. E-mail: Elizabeth.M.Hagen@asu.edu

25231. Meurgey, F. (2012): Liste Rouge provisoire des Odonates des Antilles françaises et liste des espèces à suivi prioritaire. Guadeloupe et Martinique. Société d'Histoire Naturelle L'Herminier (SHNLH): 57 pp. (in French) ["A Red List of Odonata of the French Antilles is presented. The methodology used follows the national application guidelines of the IUCN protocol. The approach adopted is the assessment of the status of each species of the fauna of the French Antilles to obtain a classification according to the categories proposed by the IUCN. The assessment was carried out based on eligibility conditions (reference period, native status, etc.), then through "species" and "habitat" criteria. The "species" criteria include: 1) the analysis of data from the ODO-AF program, and 2) other criteria such as population fragmentation, endemism, etc. The "habitat" criteria were added and take into account euryecic species, which use varied environments that are generally not threatened, and stenoeceic species, which develop in a more limited range of habitats and are more threatened. The difficulties encountered demonstrate that relying solely on an inventory database is insufficient for such an assessment and that it is important to supplement the analysis with expert-based criteria. The Red List of Threatened Odonata in Guadeloupe covers 28% of the dragonfly fauna, including one critically endangered species, four endangered species, and four vulnerable species. In Martinique, the Red List covers 39% of the species, representing more than a third of the dragonfly fauna, including four considered extinct, three endangered species, and four vulnerable species. Species on the Red List and those classified as "Near Threatened" are included in the SHNLH's priority species monitoring program. The Red List of Threatened Odonata of the French Antilles was established following a regional inventory program conducted from 2000 to 2012. This significant undertaking resulted in a comprehensive bibliographic inventory and the collection of over 5,000 original records. This Red List is intended as a tool to support policies for the preservation of ecosystems and species. Certain actions can and must be taken quickly. Indeed, the situation of some Odonata species is clearly deteriorating, making their conservation within the region's natural heritage extremely precarious." (Author/Google translate) https://www.researchgate.net/publication/281782558_Liste_Rouge_Provisoire_des_Odonates_des_Antilles_francaises] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, 44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

2013

25232. Sansault, E.; Baeta, R.; (ANEPE CAUDALIS) (2013): Od'SPOT, axe 1: Atlas des Odonates d'Indre-et-Loire. Compte-rendu de la saison 2013 (rapport + annexes). Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS, Institut de Recherche sur la Biologie de l'Insecte, Fondation LISEA Biodiversité, Conseil Général d'Indre-et-Loire, DREAL Centre: 14 pp. (in French) [https://www.anepe-caudalis.fr/wa_files/Od_27SPOT_2013_AN1.pdf] Address: Sansault, E., A.N.E.P.E. Caudalis, 118, rue de l'Ermitage, 37100 Tours, France. E-mail: anepe.caudalis@gmail.com

2014

25233. Batty, P. (2014): Site condition monitoring for northern damselfly at Logierait mires SSSI. Scottish Natural Heritage Commissioned Report No. 708: 16 pp. (in English) ["Background: Site Condition Monitoring (SCM) is a six year rolling programme of assessment of the state of notified features on Sites of Special Scientific Interest (SSSI). This report is concerned with the monitoring of Coenagrion hastulatum on Logierait Mires SSSI. Main findings: From the numbers of larvae found, Logierait curling pond is one of the best sites for C. hastulatum in Scotland and likely to be a source of adult dispersal. The area amongst pine woods on the Eastertyre ridge is an important subsidiary site; it is in good condition and holds a strong population of C. hastulatum. However, it is infilling as part of natural vegetation succession and should be monitored. Lochan Buidhe, the original site for C. hastulatum, no longer has the species because the habitat has become unsuitable. Work should be done to create more open water to restore the site. Both sites should continue to be regularly monitored for this rare dragonfly. Coenagrion puella is spreading northwards as a result of the changing climate. It is now present at Logierait curling pond and could compete with the northern damselfly." (Author)] Address: Batty, Pat M., Kirnan Farm, Kilmichael Gien, Lochgilphead, Argyll PA31 8QL, UK

25234. CIE de Haute Auvergne (2014): Les Odonates du site ENS Zones humides du SIVU Auze Ouest-Cantal (Lacapelle-Viescamp, Saint-Etienne-Cantalès, Saint-Paul-des-Landes) 2012-2013. CPIE de Haute Auvergne: 54 pp. (in French) [The "Auze Ouest-Cantal SIVU Wetlands" Sensitive Natural Area comprises a multitude of diverse wetlands and aquatic habitats potentially favorable to Odonata. This study has confirmed this significant potential, as no fewer than 45 species have been recorded there, including 2 protected species and 9 heritage species. This is an exceptional area for dragonflies and damselflies, and undoubtedly one of the most beautiful collections of odonate sites in Auvergne. This richness is mainly due to the great diversity of habitats present (ponds, bodies of water, wet meadows, streams, and

brooks). This diversity of habitats must be preserved if we are to maintain this dragonfly and damselfly wealth. Restoration and/or creation of ponds and pools, as well as stream restoration projects, could improve the conditions for certain rare species. Furthermore, sites in the immediate vicinity of the ENS (Sensitive Natural Area) are also very interesting from an odonatological perspective and deserve to be included in the ENS and/or Natura 2000 network so that they can benefit from monitoring and habitat management tools that support dragonflies and biodiversity in general. Finally, the site's importance should extend beyond its immediate boundaries, as it likely acts as a reservoir for this taxonomic group, from which individuals can disperse and potentially establish themselves elsewhere in the territory, wherever suitable sites exist." (author/Googletranslate) Calopteryx splendens, Lestes barbarus, Lestes virens virens, Ceriagrion tenellum, Coenagrion mercuriale, Coenagrion scitulum, Aeshna affinis, Aeshna mixta, Oxygastra curtisii, Libellula fulva, and Sympetrum meridionale are treated in detail.] Address: https://marais-du-cassan-et-de-prentegarde.fr/images/TELECHARGEMENT/Les%20odonates%20du%20site%2 0ENS%20Zones%20humides%20du-%20SIVU%20Auze%20Ouest-Cantal.pdf

25235. Iorio, E. (2014): es habitats des espèces de la déclinaison régionale bas-normande du Plan national d'actions en faveur des Odonates: le Sympétrum noir (Sympetrum danae) et le Sympétrum jaune d'or (Sympetrum flaveolum). Fiche GRETIA pour la DREAL Basse-Normandie, l'Europe et l'Agence de l'Eau Seine-Normandie: 19 pp. (in French) [http://www.old-.gretia.org/dossiers_liens/nosact/pna_odonates/Docs%20-Odonates%20BN/Habitats_Sympetrum _danae-flaveolum-_FINAL.pdf] Address: Iorio, E., chargé d'études au GRoupe d'ETude des Invertébrés Armoricains (GRETIA) - Antenne Pays-de-la-Loire – 5 rue Général Leclerc – 44390 Nort-sur-Erdre, France. E-mail: e.iorio@gretia.org

25236. Jolivet, S. (2014): De l'Ubaye aux Merveilles - explorer les milieux aquatiques superficiels. Insectes 172: 39-42. (in French) [26 species of Odonata were recorded but no details are given with the exception of Somatochlora alpestris: "A mountain dragonfly - Odonata are the aquatic insects least adapted to life at high altitudes, but a few species, at the edge of their range in our region, find unique but often extremely fragile habitats there. Somatochlora alpestris is a boreal-alpine species with a discontinuous range. In France, it is found only in the Alps and Jura mountains, where it thrives in sphagnum bogs and fishless peat bogs between 1,800 and 2,250 meters in altitude. Adults fly from early June to early September. Males patrol above the nesting sites, waiting for females. After mating, the females lay their eggs alone by touching the water's surface with the tip of their abdomen, releasing clusters of eggs that hatch 3 to 6 weeks later. During egg-laying, the females move from one pool to another, flying close to the water's surface and escaping the males by dropping into the vegetation. Larval development lasts 2 to 5 years, and emergence is synchronized over a period of about a month, with a very strong peak spread over a week. The larvae can survive periods of drought and frost, but the adults, on the other hand, struggle to withstand summer snowstorms. This glacial relict is found at the edge of its range in our region, which makes it all the more vulnerable. It is, in fact, this status (vulnerable species) that it was given when the 2011 Red List of Odonata of the PACA region was compiled using the IUCN methodology. It is also a key species for ZNIEFFs (Areas of Ecological, Faunistic and Floristic Interest) in the PACA region and a nationally relevant species for the Green and Blue Infrastructure network. The PACA regional adaptation of the National Action Plan for Odonata assigns it a level 2 regional priority. It reaches its southernmost limit of distribution in the Mercantour National Park. The southernmost known location to date is in the commune of Tende, and its presence has been confirmed at at least 11 sites throughout the Park. The main threats it faces are related to habitat degradation caused by eutrophication from grazing livestock, as well as potential modifications to wetlands linked to hydroelectric power generation or the creation of reservoirs for artificial snow production. The Park regularly sends recommendations to EDF (the French electricity company) in this regard and tries to raise awareness of this issue among elected officials. That said, tourism, and particularly winter sports, are not compatible with conservation objectives, however clear they may be. For example, there is cause for concern about the future of the beautiful populations present in Isola, as the commune did not renew its membership in the Park's charter in 2013." (Author/Google translate)] Address: Jolivet, S., Syndicat mixte d'aménagement et de gestion du Parc naturel régional du Vexin français, Maison du Parc naturel régional du Vexin français, 95 450 Théméricourt, France

2015

25237. Berquier, C.; Andrei-Ruiz, M.-C. (2015): Nouvelle mention en Corse d'une espèce patrimoniale: Coenagrion caerulescens (Odonata: Coenagrionidae). Martinia 31(2): 87-89. (in French) [03/06/2015, Zonza, Cavu-River] Address: Berquier, C., Office de l'Environnement de la Corse, Observatoire - Conservatoire des Insectes de Corse, Avenue Jean Nicoli, F-20250 Corte, France. Email: cyril.berquier@oec.fr

25238. Bourgouin, L.; Bailleux, G. (2015): Découverte de Macromia splendens dans le Lot-et-Garonne (Odonata: Macromiidae). Martinia 31(2): 87-90. [Verbatim: "On July 12, 2012, during a survey to search for lepidoptera at the Peyroutet site (in the municipality of Moncrabeau), characterized by dry limestone grasslands under a management agreement between the Aquitaine Conservatory of Natural Areas and the landowner, one of us (LB) captured a female Anisoptera, took a few photos for identification, and then released it. These photos enabled us (GB) to determine that it was M. splendens. The individual was flying quite high (at about 3-4 m) back and forth over a strip of dry grass dotted with a few common junipers (Juniperus communis Linnaeus, 1753), a sign of hunting behavior. About 200 m below the limestone hillside is the Osse, a small stream that may be where the individual emerged. However, the Baïse, located a few hundred meters away, may be more suitable for the larval development of this species given its ecology. This observation highlights the importance of environments adjacent to larval habitats in the development cycle of Odonata, particularly for the nutrition and maturation of adults. This species is covered by the Regional Action Plan for Odonates in Aquitaine. No data on this species was available in Lot-et-Garonne, either in the summary of knowledge compiled for the 2012 document or in DOMMANGET's national summary in 1987 (Faunistic and bibliographic study of the Odonata of France. Inventory of Fauna and Flora, fascicle 36, 284 pp). This is therefore the first known mention of this species in the department of Lot-et-Garonne. M. splendens has been observed in neighboring departments, particularly in northern Gironde and eastern Dordogne in Aquitaine, as well as in Tarn-et-Garonne and Lot in Midi-Pyrénées ([Costes A., 2011: État des lieux des connaissances des populations de trois espèces de libellules d'intérêt communautaire en Midi-Pyrénées: M. splendens, Oxygastra curtisii et Gomphus graslinii. Rapport de stage, CEN Midi-Pyrénées, Toulouse, 32 pp]). Was this an erratic individual or is there a native population in Lot-et-Garonne? Several rivers in Lot-

et-Garonne appear to be favorable for the development of this Macromiidae and should be surveyed as part of the actions to improve knowledge of the Regional Action Plan for Odonates in Aquitaine (the Lot and Garonne rivers in particular)." (Authors) Translated with DeepL.com (free version)

25239. Calas, J.; Grisvard, P. (2015): Inventaire des libellules de la forêt de Bouconne (Haute-Garonne, Gers) (Odonata). Martinia 31(2): 73-86. (in French, with English summary) ["A project taking into account the biodiversity in the management of the Bouconne forest (Haute-Garonne and Gers departments) has been implemented by the National forestry office and Nature Midi-Pyrénées. In the frame of this study, an Odonata and wetlands inventory has been conducted in the massif in 2013 and 2014. The surveys highlight the occurrence of 36 species in the forest, which is half of the regional dragonfly fauna. Among them, nine (25 % of the inventoried species) are heritage (protected, endangered or decisive for ZNIEFF). Within an overall set of 58 forest ponds, at least 23 species have been identified, with seven heritage species, while most of individual ponds (31 %) contain only two to five species each. Therefore, the ponds network is essential to keep the diversity of dragonflies in the forest. Very positive results have been obtained from the first year of monitoring of new restored and created ponds, among them, the presence of heritage species and a successful reproductive cycle of Anax imperator implemented over less than five months." (Authors) Address: Calas, J., Nature Midi-Pyrénées, Maison de l'Environnement de Midi-Pyrénées, 14 Rue de Tivoli, 31000 Toulouse, France. Email: jeromecalasnmp@orange.fr

25240. Houard, X.; Ferrand, M. (2015): Utilisation du protocole STELI dans le cadre d'un inventaire initial des odonates avec diagnostic écologique May 2015. Exemple des parcs départementaux de Seine-Saint-Denis (93). Les invertébrés dans la conservation et la gestion des espaces naturels. Actes du colloque de Toulouse du 13 au 16 mai 2015: 10-15. (in French) ["This article reports on the implementation and exploitation of the results of the STELI protocol, deployed over several years in urban parks in Seine-Saint-Denis. It discusses the benefits of such an approach for managers and outlines the assessment and management elements that can be deduced from it for the conservation and restoration of aquatic habitats." (Authors/DeepL.com (free version)] Address: https://-libellules.pnaopie.fr/wp-content/uploads/2023/07/Protocole-STELI-et-etat-initial-odonatologique_HOUARD _FERRAND_2015.pdf

25241. Iiorio, E. (2015): Eléments de doctrine régionale pour la prise en compte des odonates dans le cadre des études réglementaires en Pays de la Loire. DREAL Pays-de-la-Loire & DREAL Basse-Normandie: 26 pp. (in French) [https://side-.developpement-durable.gouv.fr/NORM/doc/SYRACUSE/-347566/elements-de-doctrine-regionale-pour- la-prise-en-compte-des-odonates-dans-le-cadre-des-etudes-regleme?_lg-=fr-FR"Regional guidelines for taking odonates into account in regulatory studies in the Pays de la Loire region - The purpose of this doctrine is to provide the main elements necessary for the proper conduct of the odonatological component of regulatory studies such as impact studies, Natura 2000 impact assessments and applications for 'protected species' exemptions provided for in the Environment Code, as well as Water Law assessments in the context of single authorisations, particularly with regard to the quality of surveys and inventories to be carried out. It falls within the scope of action GE8.2 of the Pays-de-la-Loire regional version of the National Action Plan for Odonates (PNAO): 'Promoting better consideration of odonates in impact studies'. It will enable government departments to assess the quality of the odonate inventories carried out in these studies, or to specify the requirements to the project owners responsible for carrying out these inventories. It will also enable project owners to take better account of odonates in their studies. Compensatory measures that may arise from impact studies will not be addressed here, as this would go well beyond the scope of this report. They will need to be examined on a case-by-case basis in specific studies. The same applies to any follow-up measures that may be recommended. However, we would like to point out that creating habitats from scratch to compensate for an impact remains a risky proposition. The restoration of degraded habitats may, however, be an interesting compensation measure. In all cases, we would like to point out that compensation must be effective and functional before the impact occurs, in accordance with the principle of 'continuity' enshrined in the Environment Code." (Author/DeepL) The following odonate species are treated: Coenagrion mercuriale, Oxygastra curtisii, Gomphus graslinii, Ophiogomphus cecilia, Stylurus flavipes, Leucorrhinia albifrons, L. caudalis, and L. pectoralis.] Address: Iorio, E., chargé d'études au GRoupe d'ETude des Invertébrés Armoricains (GRETIA) - Antenne Pays-de-la-Loire – 5 rue Général Leclerc – 44390 Nort-sur-Erdre, France. Email: e.iorio@gretia.org

25242. Lebrun, J.; Duquef, Y. (2015): Déclinaison régionale Picardie du Plan national d'actions en faveur des Odonates (2016-2020). Conservatoire d'espaces naturels de Picardie – Picardie Nature / Direction Régionale de l'Environnement, de l'Aménagement et du Logement de la région Hauts-de-France: 66 pp. (in French) [https://libellules.pnaopie.fr/wp-content/uploads/2023/08/LEBRUN-DUQUEF_2015_PRA-_Odonates-Picardie_201 6-20201_compressed.pdf] Address: Picardie nature 1 rue Croÿ - BP 70010, 80097 Amiens cedex 3, France

25243. Sannier, D. (2015): Première observation en France de Selysiothemis nigra sur l'île de Corse (Odonata: Libellulidae). Martinia 31(2): 103-106. (in French, with English summary) ["First French record of Selysiothemis nigra on Corsica island). – An immature male of S. nigra was observed for the first time in France on 20 June 2015, in a coastal wetland of Haute-Corse department (Corsica island). This brings to 102 the number of taxa for the French metropolitan odonatological fauna. The estimated age of the individual, the distance of the nearest known stations and the ecology of the species suggest a local breeding. However, autochtony remains to be shown." (Author)] Address: Sannier, D., Biotope, 22 Bd Maréchal Foch, 34140 Mèze, France. Email: dsannier@biotope.fr

2016

25244. Barneix, M.; Bailleux, G.; Soulet, D. (2016): Liste rouge régionale des odonates d'Aquitaine. Observatoire Aquitain de la Faune Sauvage (coordination): 40 pp. (in French) ["15% of odonate species are threatened in the Aquitaine region. The International Union for Conservation of Nature (IUCN) Red List is a tool used to assess the extinction risk of species in a given area. In addition to its alert role, it is also recognized as one of the most influential barometers in the conservation field. The publication of this regional Red List therefore provides an initial overview of the level of threat facing dragonflies and damselflies in Aquitaine. Of the 65 species assessed, 10 were classified as threatened according to the official IUCN methodology; the causes include the destruction of wetlands, the degradation of water quality, and the presence of exotic species in breeding habitats.

Despite these pressures, Aquitaine currently possesses one of the most important Odonata collections in France. In light of this situation, it is therefore necessary to continue the measures implemented within the framework of the Regional Action Plan for Odonata in Aquitaine and to more broadly strengthen the preservation of wetlands, which support a rich and diverse fauna inhabiting these environments. This project was coordinated by the Aquitaine Wildlife Observatory in partnership with the Conservatory of Natural Areas and the League for the Protection of Birds. Its completion was made possible thanks to the numerous organizations within the network that shared their data, as well as the 12 members of the evaluation committee consulted for their expertise on this group." (Publisher/Google translate)] Address: https://www.nouvelle-aquitaine.developpement-durable.gouv.fr/IMG/pdf/liste_rouge_des_odonates_d_aquitaine_-_ synthese_des_resultats.pdf

25245. Charpentier, A.-L. (2016): Observation d'Hemianax ephippiger (Burmeister 1839) (Odonata, Aeshnidae) à la pointe de l'Aiguillon, L'Aiguillon-sur-Mer (Vendée). Le Naturaliste Vendéen 12: 97-99. (in French, with English summary) [A male of A. ephippiger was recorded on the Atlantic coast, at the Pointe de l'Aiguillon (commune of L'Aiguillon-sur-Mer) on the 14th of November 2013.] Address: Charpentier, Anne-Lise, Ap. 133, résidence Les Puys III, 25 rue des Puys, 85000 La Roche-sur-Yon, France. Email: al.charpentier@hotmail.fr

25246. Jacquot, P. (2016): Plan régional d'actions en faveur des Odonates - Prospection 2015. Conservatoire botanique national de Franche-Comté Observatoire régional des Invertébrés. Recherche de larves de cordulégastre bidenté Cordulegaster bidentata. Recherche d'exuvies de cordulie à corps fin Oxygastra curtisii. Enquête exuvies de libellules. Formation exuvies de libellules: 36 pp. (in French) [https://cbnfc-ori.org/sites/default/files/documentaton/files/115-pra_odonates_2015.pdf] Address: Jacquot, Perrine, Conservatoire botanique national de Franche-Comté - Observatoire régional des Invertébrés, France. E-mail: perrine.jacquot.ori@cbnfc.org

25247. Moncorps, S. (Coord.) (2016): La Liste rouge des espèces menacées en France. Libellules de France métropolitaine. Union Internationale pour la Conservation de la Nature & Museum National d'historire Naturelle. Edité par UICN. Paris: 12 pp. (in French) ["Conducted as part of the National Red List, this assessment was carried out by the French Committee of the IUCN and the National Museum of Natural History, in partnership with the Office for Insects and their Environment (OPIE) and the French Society of Odonatology (SfO). Along the banks of streams and ponds, in pools and peat bogs, eleven dragonfly species are currently threatened with extinction in France, out of the 89 species found in metropolitan France. Thirteen others are considered near threatened, meaning that the number of threatened dragonflies could double in the future if nothing is done to protect the wetlands on which they depend." (Publisher)] Address: https://uicn.fr/wp-content/uploads/2016/06/Liste_rouge_France_Libellules_de_metropole.pdf

25248. Viricel, G. (2016): Les libellules du parc Sandin – juin 2016. 28 pp. (in French) [Parc Sandin (https://paca.lpo.fr/-images/mediatheque/fichiers/section_association/editions-/cartes_decouverte/carte_decouvert e_parc_pre_sandin_-toulon.pdf), Toulon, France. 14 odonate species are briefly introduced.] Address: https://paca.lpo.fr/images/mediatheque/fichiers/section_actualite/2016/06/libellules_sandin_-2016_5_web.pdf

2017

25249. Berquier, C.; Malaty, S.; Sannier, D. (2017): Établissement en Corse de populations d'Orthetrum trinacria et de Selysiothemis nigra (Odonata: Libellulidae). Martinia 33(1/2): 27-35. ["Settlement in Corsica of populations of Orthetrum trinacria and Selysiothemis nigra – Since several years, new dragonfly species of exotic origins arrive in Corsica from Sardinian island. In less than 10 years, thanks to the mobilization of both professional and amateur observers, the number of data concerning these taxa in Corsica has significantly increased, particularly for O. trinacria and S. nigra. The compilation of available observations show that they are now among the autochthonous taxa. One site of the Bastian region, the gravels of Broncole, harbors both O. trinacria and S. nigra. The data seem to show that the dynamic and colonization potential of S. nigra could be more important than for O. trinacria in Corsica, because of their respective ecological requirements and of the availability of favorable habitats on the island. We should monitor the progression of these species in order to assess their effects on the local faunistic communities." (Authors)] Address: Berquier, C., Office de l'environnement de la Corse – Observatoire-conservatoire des insectes de Corse, lieu-dit Lergie, 20250 Corte, France. Email: cyril.berquier@oec.fr

25250. Berquier, C. & Andrei-Ruiz, M.-C. (coord.) (2017): Liste rouge des odonates de Corse. Office de l'Environnement de la Corse & DREAL de Corse. Corte: 12 pp. (in French) [https://libellules.pnaopie.fr/wp-content/uploads/2023/01/LR_Odonates_Corse_2017.pdf] Address: Observatoire-Conservatoire Osservatoriu-Cunservatoriu des Insectes de Corse di l'Insetti di Corsica, Office de l'Environnement de la Corse Uffiziu di l'Ambiente di a Corsica, 14 avenue Jean Nicoli 14 avenue Jean Nicoli 20250 Corte, France

25251. Cabaret, P.; Guerbaa, K. (2017): Découverte de Leucorrhinia pectoralis (Odonata: Libellulidae) dans le département de la Creuse. Martinia 33(1/2): 8. (in French) ["On 10 June 2016, during dragonfly monitoring as part of the STELI programme at the Étang des Landes National Nature Reserve, a male was observed (KG) on one of the monitoring transects, alternating between flight and rest phases. This is the only observation of the species made at the site, despite further searches during June and July. On 22 June 2016, a male was captured (PC) on the private Chandouille pond (Gentioux-Pigerolles). A search of the site on the day of the discovery failed to reveal the presence of any other individuals. Subsequent visits to the site and surrounding ponds were unsuccessful." (Author)] Address: Cabaret, Pauline, SLO, ZA du Moulin Cheyroux, F-87700 Aixe-sur-Vienne, France. Email: cabaretpauline@gmail.com

25252. Chen, Q.; Zhang, X.; Shen, L.; Zhang, X.; Zhou, J.; Zhang, Y.; Niu, Z.-c.; Xu, D. (2017): Community structure and species diversity of benthic macroinvertebrates in Taihu Basin of Jiangsu Province. Journal of Lake Sciences 29(6): 1398-1411. (in Chinese, with English summary) ["To explore the characteristic of community structure and species diversity of benthic macroinvertebrates, samples were collected three times at 120 sampling sites in Taihu Basin of Jiangsu Province. 29 sampling sites were located in Lake Taihu. and the number of sites in other lakes, rivers, reservoirs and streams were 20, 40, 15 and 16, respectively. The three investigations were conducted in the periods from January to March, from July to August and from October to November in 2013. In total, 280 taxa of benthic macroinvertebrates from 124 families and 6 phyla were recorded. The taxa number (4-51), density (5.5-23363.4 ind./m²) and biomass (0.1-6269.2

g/m²) varied greatly among sites, and community structure differed significantly among water bodies. In the western hilly region, the community of streams were dominated by aquatic insects from Ephemeroptera, Trichoptera and Odonata [no details are given], while reservoirs were mainly dominated by Chironomidae larvae. In the eastern plain area, pollution-tolerant oligochaetes dominated the community of rivers, while lakes were dominated by Chironomidae larvae, Oligochaeta and Mollusca. Cluster analysis and One-way analysis of similarity classified the 120 sites into nine groups characterized by different characteristics species, showing the hierarchical gradient of sampling sites in lakes, rivers, reservoirs and streams. Streams (group IX) were the least stressed by integrating the results of abundance-biomass curves, characteristics species and diversity of each affinity group. Species richness and evenness were relatively lower in central region (group II) and maemphytes dominated areas (group M) of Lake Taihu, whose biomass curves were ahove the abundance curves and dominated by Mollusca, Malacostraca and Oligochaeta, indicating that the communities suffered relatively weak disturbance. The biomass curves of groups including reservoirs (group VH), lakes (group IV') and rivers (group VI), which were in the out-flow direction of Lake Taihu, were very close to or intersected with the abundance curves and dominated by Chironomidae larvae, Oligochaeta and Gastropoda, indicating that the communities were moderately disturbed. However, the other groups (group I, V and VTB) were only dominated by Chironomidae larvae and Oligochaeta, indicating intense disturbance. Community structure and spatial distribution of benthic macroinvertebrates in Taihu Basin of Jiangsu Province were strongly correlated to two ecological factors — habitat complexity and water quality, which could be used by managers and policy makers to evaluate and improve restoration practices." (Authors)] Address: Chen, Q., Jiangsu Environmental Protection Key Laboratory of Aquatic Biomonitoring. Changzhou Environmental Monitoring Center, Changzhou 213001, P.R.China

25253. Dumont, Q. (2017): Leucorrhinia caudalis (Odonata: Libellulidae) dans la tourbière de Marchiennes, nouvelle espèce pour le département du Nord. Martinia 33(1/2): 1-7. (in French) ["Leucorrhinia caudalis in the Marchiennes fen, a new species for the Nord department – In the surveying program for the regional atlas of the Odonata of the Nord-Pas-de-Calais region, a new species for this department, L. caudalis was discovered in 2014 in the bog of Marchiennes." (Author) Records from 14-VI-2014 and 8-V-2015 are document. In 2016, the species was not found.] Address: Dumont, Q., Groupe ornithologique et naturaliste du Nord-Pas-de-Calais, 23 rue Gosselet, 59000 Lille, France. Email: q.dumont-@hotmail.fr

25254. Franzoni, A. (2017): Fiche technique: Gestion et entretien des biotopes à Agrion de Mercure Coenagrion mercuriale (Charpentier, 1840). Aide à la gestion et à l'entretien des biotopes à agrion de Mercure Coenagrion mercuriale (Charpentier, 1840). Union européenne, Direction régionale de l'Environnement, de l'Aménagement et du Logement de Franche-Comté, Conseil régional de Franche-Comté: 6 pp. (in French) [https://cbnfc-ori.org/sites/default/files/documenttaton/files/plaquettefichemercurebrune_web.pdf] Address: Franzoni, Adeline, OPIE Franchie-Comte, 7 rue Voirin, MEFC, 25000 Besancon, France

25255. Guerbaa, K. (2017): Découverte de Libellula fulva (Odonata: Libellulidae) dans le département de la Creuse. Martinia 33(1/2): 26. (in French) [L. fulva, 01/07/16, Réserve naturelle nationale de l'étang des Landes (Lussat municipality, 23), France.] Address: Guerbaa, K., Conservatoire d'Espaces Naturels du Limousin, 6 ruelle du Theil, F-87510 Saint-Gence, France. Email: kguerbaa@conservatoirelimousin.com

25256. Guillon, B. (2017): Observation d'un trio hétérospécifique de Zygoptères (Odonata). Martinia 33(1/2): 36. (in French) [Heterospecific tandems including triple connections are documented: "On August 15, 2016, on the shores of Étang de Pérone (49), the temperature was 32°C, with very little wind, and Lestes sponsa were abundant, as usual. I observed numerous matings of Chalcolestes viridis, a few Ischnura elegans, but no matings of L. sponsa nor any females of this species. At 3:00 PM I observed and photographed a tandem L. sponsa × C. viridis, then at 3:45 PM a trio L. sponsa × C. viridis × C. viridis. Finally, at 4:50 PM, I photographed a trio I. elegans × L. sponsa × C. viridis, a heterospecific assemblage bringing together three species." (Author/Google translate)] Address: Guillon, B., Les Hautes Roches, 49600 Beaupréau en Mauges, France. Email: benoit.guillon@wanadoo.fr

25257. Jacquot, P.; Ruffoni, A. (2017): Odonates des milieux lotiques: Aide à la gestion et à l'entretien des biotopes à cordulie à corps fin, gomphe serpentin, gomphe à pattes jaunes et gomphe à crochets. Fiche technique. Conservatoire botanique national de Franche-Comté - Observatoire régional des Invertébrés: 8 pp. (in French) ["The Bourgogne-Franche-Comté region is home to Oxygastra curtisii, Ophiogomphus cecilia, and Gomphus flavipes, all of which are associated with flowing waters. They are protected at the national level and benefit from a national action plan that has been implemented in Bourgogne and Franche-Comté. Onychogomphus uncatus is also included in the conservation efforts, as it is considered endangered in Bourgogne." (Authors/Google translate) https://cbnfc-ori.org/sites/default/files/documentaton-/files/167_fichetechnique_lib-milieux-lotiques_v3_web.pdf] Address: Jacquot, Perrine, Conservatoire botanique national de Franche-Comté - Observatoire régional des Invertébrés, France. E-mail: perrine.jacquot.ori@cbnfc.org

25258. Lambret, P.; Ronne, C.; Bence, S.; Blanchon, Y.; Blettery, J.; Durand, É.; Leccia, M.-F.; Papazian, M. (2017): Révision de la Liste rouge des libellules (Odonata) de Provence-Alpes-Côte d'Azur – version. Martinia 33(1/2): 37-52. (in French, with English summary) ["Revised Red List of the Provence-Alpes-Côte d'Azur region dragonflies – version 2017 – In accordance with the regional implementation of the first national action plan for Odonata, the extinction risk of the Provence-AlpesCôte d'Azur (PACA) region dragonflies has been re-evaluated, thereby updating the 2011 regional Red List. Thousands of data were made available thanks to the regional atlas dynamic, which allowed us to compute the extent of occurrence (EOO) and the area of occupancy (AOO) for each species. Given the availability of this accurate and objective data, the re-evaluation of the Red List was necessary according to IUCN methods. A review showed that we actually have no evidence that Sympecma paedisca, considered in 2011 as Regionally Extinct (RE), had never been observed in the PACA region. Among the 70 species evaluated, eight are threatened: Somatochlora arctica and Leucorrhinia dubia are Critically Endangered (CR); Coenagrion pulchellum and S. meridionalis are Endangered (EN); Lestes macrostigma, C. caerulescens, S. alpestris, and Sympetrum depressiusculum are Vulnerable (VU). Among the non-threatened species, Gomphus graslinii, S. flavomaculata, Sympetrum danae and S. vulgatum are Nearly Threatened (NT). Somatochlora metallica was Data Deficient (DD). The IUCN methods were Not Applicable (NA) for C. hastulatum, Aeshna grandis and Hemianax ephippiger. Regarding

their extinction risk, other species present in the PACA region are Least Concerned (LC). We classified 26 species in different categories compared to the 2011 regional Red List (of which 18 downlistings and three up-listings), primarily for methodological reasons, underlying that the present Red List is more relevant and robust than 2011's. Compared to the 2016 national Red List, five and four species are, respectively, more and less threatened at the regional scale than at the French metropolitan scale. The main threat for the dragonflies is the decrease in habitat cover and quality due to human activities. Conservation politics should especially target the species listed here as threatened. A new evaluation of Odonata extinction risk should be planned in some years using especially EOO and AOO variations for each species." (Authors)] Address: Lambret, P., Tour du Valat, Institut de recherche pour la conservation des zones humides méditerranéennes, Le Sambuc, 13200 Arles, France. Email: lambret@tourduvalat.org

25259. Lamouille-Hébert, M. (2017): Actualisation des connaissances sur les Odonates de Haute-Savoie (2016-2020) – année. Martinia 33(1/2): 9-14. (in French, with English summary) ["Odonata distribution improvements in the Haute-Savoie department (2016-2020) – year 2016 – The Haute-Savoie department is economically very dynamic and therefore subject to growing human activities and pressures. It also has a national responsibility relative the conservation of Odonata. Since year 2000, no departmental updates have been carried out regarding their distribution. In 2016, field surveys were focused on Lestes dryas, Lestes sponsa, Ceriagrion tenellum, Coenagrion mercuriale, Leucorrhinia albifrons and Sympetrum flaveolum. Surveys guided by historical occupancy data enabled us to confirm their presence at some sites but also to identify sites which became unsuitable to Odonata. This work is a first step in updating the knowledge on the Odonata of the territory. Several years of studies will be necessary to impulse a departmental action plan targeting the rare and threatened Odonata." (Author)] Address: Lamouille-Hébert, Marie, Fédération Rhône-Alpes de Protection de la Nature Haute-Savoie, 84 route du Viéran, ZAE de Pré-Mairy, 74370 Pringy, France. Email: marie.hebert@frapna.org

25260. MNHN; UICN France; Opie; SfO (2017): La Liste rouge des espèces menacées en France - Chapitre Libellules de France métropolitaine. Paris, France. Rapport d'évaluation: 113 pp. (in French) [Red List of Odonata of France. The species are treated using "a fact sheet for each species assessed, presenting the information and key data used for the national Red List assessment according to IUCN methodology (pages 16–50 and 52–105). Species occasionally present in the territory but not assessed are also covered in fact sheets (pages 107-110). The fact sheets are classified by suborder (first the Zygoptera, then the Anisoptera), then by Red List category (from the most threatened to the least threatened taxa, then to DD), then according to a systematic classification for families (Boudot & Kalkman, 20155), and finally in alphabetical order of scientific names." (Authors/DeepL)] Address: https://geonature.arb-idf.fr/sites/default/files/articles/documents/-Liste_rouge_libellules_metropole_9_rapport_eval uation_-integral_v3.pdf

2018

25261. CPIE (Coord.) (2018): Mise en oeuvre des suivis d'espèces d'intérêt communautaire dans la région Champagne-Ardenne – Lot 1: mise en oeuvre du suivi « Odonates » – rapport final. CPIE du Pays de Soulaines / DREAL Grand Est: 64pp. (in French) ["The DREAL Grand Est (Regional Directorate for the Environment, Planning and Housing) has decided to implement standardized monitoring protocols to gain insight into the evolution of certain species listed in Annexes 2 and 4 of the Habitats Directive across the territory of the former Champagne-Ardenne region. Following a call for tenders, the study of the conservation status of odonate species of Community interest present in the region (Coenagrion mercuriale, Oxygastra curtisii, Leucorrhinia caudalis, Leucorrhinia pectoralis) was entrusted to a team of regional experts comprised of the CENCA (Conservatory of Natural Areas of Champagne-Ardenne), the LPO (League for the Protection of Birds), and RENARD (Group of Naturalists of the Ardennes), and coordinated by the CPIE (Permanent Center for Environmental Initiatives) of the Pays de Soulaines. The expected mission of this three-year study is to: • Compile a review of current knowledge on the four species of Community interest concerned, based on existing literature; • Verify the presence and assess the reproductive potential of the four species concerned on all Natura 2000 sites not yet sampled or for which data remains incomplete; • Collect data to assess the conservation status of the species concerned on the various selected sites and across the Natura 2000 network; • Define a network of Natura 2000 sites to assess and monitor the long-term conservation status of each of the species concerned across the Natura 2000 network; • Propose areas or sites outside the Natura 2000 network to supplement the list of sites already identified, thus enabling the assessment of the conservation status of the species considered at the regional level." (Author/Google translate) https://www.grand-est.developpement-durable.gouv.fr-/IMG/pdf/rf4_odonates_n2000_2018_vf.pdf] Address: Centre permanent d'initiatives pour l'environnement du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France

25262. David, G.; Nizan, P.-A. (2018): Libellules et demoiselles de L'agglomération lédonienne. Jura Nature Environnement, Décembre 2018: 81 pp. (in French) [49 odonate species are treated monographically.] Address: https://www-.fne-jura.fr/wp-content/medias/2019/05/Atlas-des-Libellules-et-demoiselles-de-lagglomeration-ledonie nne-VF-min.pdf

25263. Geneste, G. (coord); Billod, M.; Lorich, T., Petit, M. (2018): Etude régionale Odonates – Etude des végétations des plans d'eau. Conservatoire d'espaces naturels de Champagne-Ardenne: 13 pp + annexes. (in French) [Oxygastra curtisii, Leucorrhinia caudalis, and Leucorrhinia pectoralis are treated. https://www.grand-est.developpement-durable.gouv.fr/IMG/pdf/etude_habitats_odonates_2018_vf.pdf] Address: Geneste, G. E-mail: guillaumegeneste@yahoo.fr

25264. Huguet, C. (2018): Suivi des odonates sur le Cirque de l'Essonne 2017. Communes de Lisses. Villabé et Corbeil-Essonnes. NaturEssonne, 10 place Beaumarchais, 91600 Savigny-Sur-Orge, France: 18 pp. (in French) ["The richness of Odonata in the Cirque de l'Essonne is significant, representing more than 50% of the population in the Île-de-France region and the Essonne department. The C'orbeil-Essonnes wetland, with its diverse habitats, therefore plays a crucial role in the conservation of the existing odonate community. The main focus of the dragonfly population is Lestes dryas, which is well-established on the site and whose native status was confirmed in 2017. The results of these surveys will enable the Essonne Departmental Council to initiate the process for the creation of a ZNIEFF (Zone Naturelle d'Intérêt Écologique, Faunistique et Floristique - Natural Area of Ecological, Faunistic and Floristic Interest) in the Cirque de l'Essonne wetland, and will encourage the Essonne Departmental Council to further develop this Sensitive Natural Area (ENS)." (Author/Google

translate)] Address: https://cirquedelessonne.wordpress.-com/wp-content/uploads/2019/03/suivi-odonates-cirque-de-lessonne-rapport- steli-2017.pdf

25265. Jacquot, P. (2018): Bilan du plan régional d'actions en faveur des Odonates en Franche-Comté. Revue scientifi que Bourgogne-Franche-Comté Nature 27: 165-172. (in French, with English summary) ["Review of the regional action plan for odonates in Franche-Comté - The regional action plan for dragonflies in Franche-Comté was started in 2011, the same year as the national plan. CBNFC-ORI and its technical partners implemented many actions based on the improvement of knowledge, management, conservation, education and awareness. The permanent inventory or the specific researches made it possible to significantly increase the number of known stations, in particular for the Coenagrion mercuriale and Oxygastra curtisii. This plan was marked by rich exchanges with our technical partners, but also with our counterparts in neighboring regions through the establishment of interregional meetings. Many actions have been set up since 2011 but the way to the preservation of all the stations occupied by the species of the plan is still long. The information phase of municipalities and owners concerned will therefore be continued in the months and years to come. It will undoubtedly increase the percentage of perennial stations and preserve these protected and endangered dragonflies." (Author)] Address: Jacquot, Perrine, Conservatoire botanique national de Franche-Comté - Observatoire régional des Invertébrés, France. Email: perrine.jacquot.ori@cbnfc.org

25266. Jacquot, P. (2018): Plan régional d'action en faveur des odonates. Restitution des indicateurs Complément d'inventaire de la leucorrhine à front blanc (Leucorrhinia albifrons) - Complément d'inventaire du gomphe serpentin (Ophiogomphus cecilia) - Complément d'inventaire du caloptéryx méditerranéen (Calopteryx haemorrhoidalis) - Suivi de la station de déesse précieuse (Nehalennia speciosa) - Exemple d'actions d'animation - Stations d'espèces du PRA découvertes ou réactualisées. Prospections 2017. Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés: 21 pp. (in French) [https://cbnfc-ori.org/sites/default/files-/documentaton/files/201_pra-odonates_2018_web-version-diff-usable.pdf] Address: Jacquot, Perrine, Conservatoire botanique national de Franche-Comté - Observatoire régional des Invertébrés, France. Email: perrine.jacquot.ori@cbnfc.org

25267. Louboutin, B.; Besnard, A.; Blanchon, Y.; Gaymarda, M.; Houard, X.; Jaulin, S.; Monchaux, G.; Petitot, M. (2018): Détection des populations de Gomphus graslinii Rambur, 1842, Stylurus flavipes (Charpentier, 1825) et Oxygastra curtisii (Dale, 1834): Synthèse d'une étude sur le Rhône méridional (Odonata). Revue scientifi que Bourgogne-Franche-Comté Nature 27: 243-256. (in French, with English summary) ["The Rhône river is difficult to survey, not very appealing and odonatological knowledge remains fragmentary. A targeted study was launched from 2014 to 2016 to confirm the autochthony of 3 protected species: Gomphus graslinii, Stylurus flavipes and Oxygastra curtisii and to characterize their emergence habitats on sections of the southern Rhône. The monitored sites are located on 3 arms downstream from hydroelectric dams and on peripheral habitats: Mediterranean tributaries (Cèze and Gardon) and secondary arms. We carried out extensive searches for exuviae by surveying on a canoe both riverbanks in 2014 and on 130 plots with 50 m of riverbank in 2015 and 2016, with 4 annual passages. 3,495 exuviae of Anisoptera were identified including 43% of S. flavipes, 31% of O. curtisii and 3% of G. graslinii. S. flavipes is extremely rare on tributaries and secondary arms but emerges abundantly from the Rhône, on both wooded and artificial banks, its presence being mainly conditioned by the existence of areas where fines sediments accumulates. Emergences and exuviae, observed on various supports, are vulnerable to waves and water level variations. G. graslinii emerges mainly from a tributary, the Gardon, while on the Rhône it remains sporadic but annual. O. curtisii also rarely emerges from the Rhône but is locally abundant on tributaries and hydraulic annexes. This article presents the species assemblages, habitats, emergence supports, phenology, sex ratio, detectability and threats identified locally." (Authors)] Address: Louboutin, B.; Email: bastien.louboutin-@insectes.org

25268. Morvan, T.; Doucet, G. (2018): Amélioration de la connaissance de l'habitat larvaire de Cordulegaster bidentata (Selys, 1843) et C. boltonii (Donovan, 1807) dans le Châtillonnais. Revue scientifi que Bourgogne-Franche-Comté Nature 27: 257-264. (in French, with English summary) ["The study concerns a monitoring on C. bidentata which is considered as nearly threatened in the regional red list. The study is focused on its larval stage on karst marshlands located in the Châtillonnais (Bourgogne and Champagne-Ardenne). Indeed, even if it is a species with ecolocical stake, its ecology remains rather unknown. The protocol consists in looking for larvaes and characterizing larval micro-habitat of C. bidentata and C. boltonii in order to show their habitat preferences. This protocol allows us to encounter 25 larvaes of C. bidentata as well as 40 larvaes of C. boltonii, a species which inhabits the same habitats. The study highlights existence of a convergence area within micro-habitat where both species could be encountered. Microdistribution of the two species is influenced by some physical factors such as water height, substrate depth and flow width. Particle size also seem to play a role in microdistribution. C. bidentata appears to prefer silty sediment and springs with 3 cm of water and a depth of sediment between 2 and 15 cm." (Authors)] Address: Morvan, Tatiana, Conservatoire d'espaces naturels de Franche-Comté - 7 rue Voirin - 25000 Besançon, France. Email: tatiana.morvan@cen-franchecomte.org

25269. Ngoay-Kossy, J.C.; Zébazé Togouet, S.H.; Wango, S.P.; Bolevahe Ouantinam, S.F.; Tchakonté, S.; Piscart, C. (2018): Bioindicateurs des milieux aquatiques lotiques en République centrafricaine: macro-invertébrés benthiques et pression anthropique du cours d'eau Nguitto. Revue d'Ecologie (Terre et Vie) 73(4): 603-616. (in French, with English summary) ["Bioindicators of running freshwaters in Central African Republic: benthic macroinvertebrates and anthropogenic stress in the Nguitto Stream. — This study of benthic macroinvertebrates in Central African Republic (CAR) aimed at determining the structure of their assemblages in relation to the physico-chemical quality of the Nguitto River. The data were collected monthly from May 2015 to April 2016, in five selected sampling points on the Nguitto River. The physico-chemical parameters were measured using standard methods while the benthic macrofauna was collected using a handnet sampler of 150 ìm mesh size on a total area of about 6 m² per station. The physico-chemical analysis revealed a satisfactory water quality in the forest belt and an eutrophication in the urban area. A number of 2052 individuals of benthic macroinvertebrates belonging to 71 taxa were identified and counted. Arthropods was the most diversified (53 taxa) and the most abundant (80.75 %) taxonomic group, followed by molluscs (17 taxa; 23.94 %) and annelids (1 taxon; 0.24 %). The sampling points in the forest belt, which exhibit the lowest anthropogenic activity, were composed mostly of arthropods and dominated by insects.

In the urban zone, the strong abundance of molluscs and the presence of annelids indicated an anthropogenic pressure and the usefulness of invertebrates as bioindicators of waste waters in this area." (Authors) The list of taxa includes Phyllogomphus brunneux [sic], Orthetrum sp., Brachythemis leucosticta, Diplacodes lefebvrii, Coenagrion sp., Cordulegaster sp., Epitheca bimaculata, Gomphus sp., Lestes plagiatus, Chlorolestes fasciatus, Chalcolestes viridis, Aeshna sp., Boyeria irene, and representing many misidentifications.] Address: Zébazé Togouet, S.H., Laboratoire d'Hydrobiologie et Environnement (LHE), Faculté des Sciences, Université de Yaoundé I, BP 812 Yaoundé. Cameroun. Email: zebasehu@yahoo.fr

25270. Shkembi, E.; Paparisto, A.; Pepa, B.; Qirinxhi, X.; Misja, K. (2018): Confirmation of the presence of Trithemis annulata (Odonata, Anisoptera) in Albania. International Journal of Ecosystems and Ecology Science 8(4): 717-722. (in English) ["The present paper brings the first records of T. annulata in Albania. T. annulata is a widespread species in southwestern Europe, in Mediterranean countries and Balkan Peninsula. Despite this widespread, this species is reported for the first time for Albania's odonatofauna. T. annulata is part of the family Libellulidae, which has the largest number of species in Albania, 19 species, belonging to 5 genera: Libellula, Orthetrum, Sympetrum, Crocothemis and Selysiothemis. Trithemis is the sixth genus to be added to the family Libellulidae and T. annulata is the 66-th species in the list of Odonata for Albania (Shkëmbi et al. 2016). Nine male individuals of T. annulata were captured in two expeditions conducted in summerfall 2017, in Belshi Lakes, in the central part of Albania and in Pishë-Poro, the Vjosa River Delta." (Authors)] Address: Shkembi, E., University of Tirana, Faculty of Natural Science, Department of Biology, Albania. Email: enilda07@gmail.com

2019

25271. Nicolas, V. (2019): Amélioration et valorisation des connaissances naturalistes. Les libellules et demoiselles de Mayotte (Insectes odonates). Compte-rendu de mission. D.E.A.L. MAYOTTE: 9 pp. (in French) [https://www.researchgate.net/-publication/363536735_Les_libellules_et_demoiselles_de-_Mayotte_Insectes_odon ates_compte-rendu_de_mission. "In total, 26 species were observed during the mission, representing three-quarters of the known taxa of Mayotte. This constitutes a comprehensive array of species present year-round and reproducing in the archipelago, with migratory species arriving later during the dry season. The following table establishes a hierarchy of species according to their frequency of observation during this study. The dominance of Pantala flavescens is linked to its ease of observation in a wide range of habitats, including the most human-modified. The next three, Azuragrion kauderni, Orthetrum stemmale, and Palpopleura lucia, represent a widespread group in stagnant to slow-moving waters. In addition, Proplatycnemis agrioides, Trithemis arteriosa, and Trithemis maia form a characteristic group of flowing waters, although the first is more closely associated with wooded sections of rivers. Conversely, the less frequent species appear to be present in a relatively small number of locations in Mayotte. However, a dragonfly like Orthetrum lugubre is not truly rare, but few suitable locations for this species (rather pristine sections of waterways in the north of Grande Terre) have been recorded here. Main Achievements: Besides improving our knowledge of species distribution, a large number of ecological observations were carried out. This data was immediately put to use in the revision of the Red List of dragonflies and damselflies of the Malagasy region, as we collaborated with the IUCN working group to establish the status of endemic fauna in Mayotte and the Comoros. As a result, three species from Mayotte are now listed as "vulnerable" (Gynacantha comorensis, Pseudagrion pontogenes, T. maia) and two as "near threatened" (Proplatycnemis agrioides, O. lugubre). Furthermore, following a request from the National Museum of Natural History in Paris (UMS Patrinat), we submitted proposals for the implementation in Mayotte of a National Action Plan dedicated to endemic Odonata. From a taxonomic perspective, targeted sampling of unprotected species has clarified previously uncertain systematic positions. First, a new species has been described: Zygonyx constellatus Nicolas, 2019 [see: Nicolas, V. (2022): Description d'une nouvelle libellule de Mayotte: Zygonyx constellatus n. sp. (Odonata Libellulidae). Plume de Naturalistes 6: 15-26.] Known for nearly 20 years, its identity had never been definitively established. Second, the Mayotte representative of the genus Acisoma has been confirmed as variegatum, a species from mainland Africa. However, this is a distinct, clear variety that could eventually warrant further systematic work (island speciation currently underway?). Furthermore, a significant number of female Palpopleura with hyaline wings raised questions about the existence of a second (new) species of the genus in Mayotte. The male of this form was known only from a brief description provided by a colleague who had lived there. This year, we discovered that this description actually applies to an andromorphic form of the "hyaline" female, which we ultimately classify as lucia. Finally, new individual morphological variations were observed in several species, which is always interesting to document in an island setting." (Author/Google translate)] Address: Nicolas, V., Expertises Faune-Flore-Milieux naturels, 38, Glane - 87200 Saint-Junien, France. Email: vince_nicolas@yahoo.fr

25272. Siji, P.K.; Bijoy, C. (2019): Diversity of Odonata in Palakkal Kole wetland, Thrissur, Kerala before and after deluge. Scientia 15(1): 112-116. (in English) ["A study was conducted to analyze the impact of the deluge on the Odonata diversity at Palakkal kole wetland, Thrissur, Kerala. The paper deals with the study of Odonata diversity of Palakkal Kole wetland, Thrissur before and after Kerala deluge, 2018. The comparison of Odonata diversity was made between 4 months (September to December) of 2017 and 2018. The diversity of Odonata of pre-deluge was 21 species and post-deluge was 22 species and the abundance were 1659 and 1042 respectively." (Authors)] Address: Siji P.K., Department of Zoology, Christ College, Irinjalakuda, Kerala- 680125, India

2020

25273. Cherpitel, T. (2020): Inventaire des odonates des mares des communes d'Herbignac et d'Assérac (44). Note d'étape – année 2020. Note du GRETIA pour Cap Atlantique: 25 pp. (in French) [https://base-aer.fr/biblio/docpdf/Cherpitel2020-112.pdf]

25274. Wang, Z.; Jin, H.; Wang, X.; Shi, L. (2020): Dragonflies and Damselflies of Northeastern China. China Forestry Publishing House: 242 pp. (in Chinese) ["Currently, approximately 10% of dragonfly species worldwide may be facing varying degrees of survival threats. To raise awareness of dragonfly conservation and provide basic information about dragonflies, the author presents research findings on dragonflies in Northeast China in four chapters, using the natural landscape of Northeast China as a backdrop. Chapter 1 provides an overview of the dragonfly's place in the biological world, its biological and ecological characteristics, and

the significance of understanding dragonflies. Chapter 2 introduces the morphological characteristics of adult dragonflies and their terminology. Chapter 3 briefly describes folk sayings and the history of dragonfly research in Northeast China. Chapter 4, primarily featuring adult ecological images and accompanying text, introduces the morphological characteristics, biological characteristics, habitats, and related domestic and international reports of 84 dragonfly species observed in Northeast China over the years." (Publisher)]

2021

25275. Jin, H. (2021): Dragonflies and Damselflies. Chongqing University Press: 216 pp. (in Chinese) ["Odonata have witnessed millions of years of dramatic changes on Earth, leaving behind countless topics of conversation for centuries. Ancient people have fascinated them with their art, depicting the beautiful dragonflies in a myriad of colors, sizes, and shapes. The most important mission of a dragonfly is reproduction; all its behaviors revolve around this central theme: finding a mate, laying eggs, and the end of its life. This book provides a detailed explanation of these biological behaviors. The author conducted in-depth observations in the wild, capturing and recording details. Combining knowledge, popular science, and entertainment, the book vividly introduces the basics of dragonflies, guiding readers to understand their origins and the entire life cycle. This book is highly engaging in understanding the wonders of nature and is recommended for all readers." (Publisher/Google translate)

25276. Petsch, D.K.; Saito, V.S.; Landeiro, V.L.; Silva, T.S.F.; Bini, L.M.; Heino, J.; Soininen, J.; Tolonen, K.T.; Jyrkänkallio-Mikkola, J.; Pajunen, V.; Siqueira, T.; Melo, A.S. (2021): Beta diversity of stream insects differs between boreal and subtropical regions, but land use does not generally cause biotic homogenization. Freshwater Science 40(1): 53-64. (in English) ["Previous studies have found mixed results regarding the relationship between beta diversity and latitude. In addition, by influencing local environmental heterogeneity, land use may modify spatial taxonomic and functional variability among communities causing biotic differentiation or homogenization. We tested 1) whether taxonomic and functional beta diversities among streams within watersheds differ between subtropical and boreal regions and 2) whether land use is related to taxonomic and functional beta diversities in both regions. We sampled aquatic insects in 100 subtropical (Brazil) and 100 boreal (Finland) streams across a wide gradient of land use, including agriculture and exotic planted, secondary, and native forests. We calculated beta diversity at the watershed scale (among 5 streams in each watershed). We found higher taxonomic beta diversity among subtropical than among boreal streams, whereas functional beta diversity was similar between the 2 regions. Total land use was positively correlated with taxonomic and functional beta diversity among subtropical streams, while local environmental heterogeneity was positively correlated with beta diversity among boreal streams. We suggest that different types and intensities of land use may increase among-stream heterogeneity, promoting distinct insect assemblage compositions among streams. Our findings also suggest that beta diversity patterns and their underlying determinants are highly context dependent." (Authors)] Address: Petsch, Danielle, Programa de Pós-Graduação em Ecologia e Evolução, Instituto de Ciências Biológicas, Universidade Federal de Goiás, Avenida Esperança, s/n, Térreo bloco ICB5, Câmpus Samambaia, Goiânia, Goiás 74690-900 Brasil

25277. Soldati Lacerda, D.S.; Lencioni, F.A.A.; Eustáquio dos Santos Júnior, J.; Bedê, L.; Ávila Júnior, W.F. (2021): Obituary. Angelo Barbosa Monteiro Machado - the student charmer (1934-2020). Agrion 25(1): 18-21. (in English) [Obituary.] Address: Soldati Lacerda, Déborah, Departamento de Zoologia, Universidade Federal de Minas Gerais, Brazil. E-mail: desoldati@gmail.com

2022

25278. Baeta, R. (coord .) (2022): Liste rouge des libellules et demoiselles du Centre-Val de Loire. ANEPE Caudalis & FNE Centre Val-de Loire: 25 pp. (in French) ["Of the 68 species of dragonflies and damselflies observed in the Centre-Val de Loire region, 17 are currently threatened with extinction, representing one in four species (in the previous assessment, only 13 species were considered threatened). Both relatively widespread and highly localized species, confined to specific areas of the region, are now affected. Behind these threats lie diverse issues requiring tailored actions. We therefore hope that the results of this new Red List will contribute to better consideration of the dragonflies in our region and to the conservation of their habitats, upon which we all depend." (Authors)] 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. Email: renaud.baeta@anepe-caudalis.fr

25279. Bailleux, G. (coord.) (2022): Déclinaison régionale en Nouvelle-Aquitaine du Plan National d'Actions en faveur des libellules 2022-2031. Conservatoire d'espaces naturels de NouvelleAquitaine – Poitou-Charentes Nature. DREAL Nouvelle-Aquitaine: 78 p + annexes. (in French) [The following species are treated in a monographic style: Lestes macrostigma, Lestes sponsa, Coenagrion hastulatum, Coenagrion mercuriale, Coenagrion pulchellum, Aeshna juncea, Gomphus graslinii, Ophiogomphus cecilia, Stylurus flavipes, Oxygastra curtisii, Macromia splendens, Somatochlora arctica, Leucorrhinia albifrons, Leucorrhinia caudalis, Leucorrhinia dubia, Leucorrhinia pectoralis, Sympetrum danae, Sympetrum flaveolum, Sympetrum vulgatum, Lestes dryas, Erythromma najas, Isoaeschna isoceles, Brachytron pratense, Cordulegaster bidentata, Epitheca bimaculata, Somatochlora flavomaculata, Somatochlora metallica.] Address: https://libellules.pnaopie.fr/wp-content/uploads/2024/03/Declinaison-du-PNA-en-faveur-des-libellules-menacees-e n-Nouvelle-Aquitaine_2022-2031-VF.pdf

25280. Itrac-Bruneau, R. (2022): Plan régional d'actions en faveur des libellules. Bilan des actions menées 2022. Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés: 15 pp. + annexe. (in French) [https://cbnfc-ori.org/sites/default/files/2023-07/507_Rapport-PRA-Libellules_2022_WEB.pdf] Address: Itrac-Bruneau, Raphaëlle, 8F, rue Maurice Deslandres, 21000 Dijon, France. Email: r.itracbruneau@yahoo.fr

25281. Racine, A.; Simon, A. (2022): Liste rouge des odonates de Normandie. Évaluation des menaces selon la méthodologie de l'UICN. GRETIA et CEN Normandie: 14 pp. (in French) ["Of the 59 odonate species studied, four were classified as "Not Applicable": Aeshna isoceles, Hemianax ephippiger, Leucorrhinia pectoralis, and Sympetrum pedemontanum. These species have only been observed in the presence of vagrant or migratory individuals. Therefore, they are not considered native to Normandy, do not have established populations there, and were not assessed. The assessment for the Red List of Odonata in Normandy thus covers 55 species. The proportion

of threatened species (CR/EN/VU) in Normandy is 12.7%, to which should be added 10.9% of near-threatened (NT) species and 7.3% of species with an undetermined threat status due to insufficient data (DD)." (Authors)] Address: https://libellules.pnaopie.fr/wp-content/uploads/2023/01/LR_Odonates_Normandie_2022.pdf

25282. Van Eupen, C.; Maes, D.; Herremans, M.; Swinnen, K.R.R.; Somers, B.; Luca, S. (2022): Species profiles support recommendations for quality filtering of opportunistic citizen science data. Ecological Modelling 467, 109910: (in English) ["Opportunistic citizen science data are commonly filtered in an attempt to improve their applicability for relating species occurrences with environmental variables. Recommendations on when and how to filter, however, have remained relatively general and associations between species traits and filtering recommendations are sparse. We collected six traits (body size, detectability, classification error rate, familiarity, reporting probability and range size) of 52 birds, 25 butterflies and 14 dragonflies. Both absolute (values not rescaled) and relative traits (values rescaled per taxonomic group) were linked to filter effects, i.e. the impact on three different measures of species distribution model performance caused by applying three different quality filters, for different degrees of sample size reduction. First, we applied multiple regressions that predicted the filter effects by either absolute (including taxonomic group) or relative traits. Second, a principal component and clustering analysis were performed to define five species profiles based on species traits that were retained after a multiple regression model selection. The analysis of the profiles indicated the relative importance of species traits and revealed new insights into the association of species traits with changes in model performance after data quality filtering. Both taxonomic group (more than absolute traits) and relative species traits (mainly classification error rate, range size and familiarity) defined the impact of data quality filtering on model performance and we discourage the selection of a quality filtering strategy based on one single species trait. Results further confirmed the importance of considering the goal of the study (i.e. increasing model discrimination capacity, sensitivity or specificity) as well as the change in sample size caused by stringent filtering. The general species knowledge amongst citizen scientists (importance of observer experience), together with the mechanism of record verification in an opportunistic data platform (importance of verifiable metadata) have the largest potential for enhancing the quality of opportunistic records." (Authors)] Address: Van Eupen, Camille, Ghent Univ. Dept of Data Analysis & Mathematical Modelling, Coupure Links 653, B-9000 Ghent, Belgium. Email: camille.vaneupen@kuleuven.be

2023

25283. Csar, D.; Pichler-Scheder, C.; Gumpinger, C.; Chovanec, A.; Kudrnovsky, H.; Hayes, D.S.; Muhar, S. (2023): evaRest – Evaluierung von gewässerökologischen Aufwertungsmaßnahmen. Anleitung zur Bewertung ausgewählter Indikatorgruppen. Medieninhaber und Herausgeber: Bundesministerium für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft, Stubenring 1, 1010 Wien, Austria: 102 pp. (in German) ["Preliminary summary: This paper presents the results of a newly developed tool for the documentation, assessment and presentation of aquatic ecological changes resulting from the implementation of (hydro)morphological measures in watercourses. The methodological recording of the selected biological indicators requires only slightly more effort than the guidelines that are conventionally used to assess water bodies. Additional calculation procedures were developed to enable more precise and targeted statements on relevant changes. Clear calculation and assessment procedures have been defined for all proposed indicators, which are summarised in an Excel assessment tool provided. The aim is to use this largely standardised evaluation method to achieve results that enable a comparison to be made between sections before and after the implementation of measures as well as with the model situation. The authors wish all those who work in and around water bodies continued motivation and enjoyment in their important work. At the same time, we hope that the application of evaRest will contribute to numerous aquatic ecological learning effects. These findings should help to drive forward the individual implementation of measures in each river and, in the course of renaturalisation, create ever more natural watercourses that once again provide aquatic flora and fauna with the habitat to which they have adapted over thousands of years of evolution. The evaRest documentation and evaluation system is now undergoing a test phase and is being used in practice. To ensure continuous improvement, problems and errors as well as methodological and technical criticism are welcome and should be communicated directly to the authors. After a certain period of use, it is planned to subject evaRest to a revision in which new findings and criticism will be taken into account in order to successively optimise the system." (Authors/DeepL) Odonata are treated in Chapter 7.6 on pages 64-69.] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

25284. Fouilloux, C.A.; Stynoski, J.L.; Yovanovich, C.A.M. (2023): Visual environment of rearing sites affects larval response to perceived risk in poison frogs. Journal of Experimental Biology 226 (12): jeb245822: 11 pp. (in English) ["Turbidity challenges the visual performance of aquatic animals. Here, we use the natural diversity of ephemeral rearing sites occupied by tadpoles of two poison frog species to explore the relationship between environments with limited visibility and individual response to perceived risk. To compare how species with diverse natural histories respond to risk after developing in a range of photic environments, we sampled wild tadpoles of (1) Dendrobates tinctorius, a rearing-site generalist with facultatively cannibalistic tadpoles and (2) Oophaga pumilio, a small-pool specialist dependent on maternal food-provisioning. Using experimental arenas, we measured tadpole activity and space use first on a black and white background, and then on either black or white backgrounds where tadpoles were exposed to potentially predatory visual stimuli. The effects of rearing environment on D. tinctorius tadpoles were clear: tadpoles from darker pools were less active than tadpoles from brighter pools and did not respond to the visual stimuli, whereas tadpoles from brighter pools swam more when paired with conspecifics versus predatory insect larvae [dragonflies, not further specified], suggesting that tadpoles can visually discriminate between predators. For O. pumilio, tadpoles were more active on experimental backgrounds that more closely matched the luminosity of their rearing sites, but their responses to the two visual stimuli did not differ. Larval specialisation associated with species-specific microhabitats may underlie the observed responses to visual stimuli. Our findings demonstrate that light availability in wild larval rearing conditions influences risk perception in novel contexts, and provides insight into how visually guided animals may respond to sudden environmental disturbances." (Authors)] Address: Fouilloux, Chloe, University of Jyväskylä, Dept of Biology and Environmental Science, 40014 Jyväskylä, Finland. Email: chloe.a.fouilloux@jyu.fi

25285. Itrac-Bruneau, R.; Barbotte, Q.; Jacquot, P.; Mora, F. (coord.) (2023): Déclinaison régionale du Plan national

d'actions en faveur des libellules - Bourgogne-Franche-Comté - 2021-2030 - Agir pour la préservation de nos libellules et demoiselles patrimoniales. Société d'histoire naturelle d'Autun-Observatoire de la Faune de Bourgogne & Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés - OPIE Franche-Comté – Conservatoire d'espaces naturels de Bourgogne - Conservatoire d'espaces naturels de Franche-Comté: 181 pp. (in French) [https://cbnfc-ori.org/sites/default/files/documentaton/files/PRA_Libellules_BFC.pdf Fact sheets of the following species are presented: Oxygastra curtisii, Ophiogomphus cecilia, Stylurus flavipes, Onychogomphus uncatus, Gomphus simillimus, Sympetrum pedemontanum, Coenagrion ornatum, Coenagrion mercuriale, Coenagrion pulchellum, Sympetrum depressiusculum, Thecagaster bidentata, Leucorrhinia pectoralis, Leucorrhinia caudalis, Sympetrum vulgatum vulgatum, Isoaeschna isoceles, Epitheca bimaculata, Nehalennia speciosa, Somatochlora arctica, Somatochlora alpestris, Coenagrion hastulatum, Aeshna subarctica elisabethae, Sympetrum danae, Leucorrhinia dubia, Sympetrum flaveolum, Aeshna juncea, Lestes virens, Somatochlora flavomaculata] Address: Itrac-Bruneau, Raphaëlle, 8F, rue Maurice Deslandres, 21000 Dijon, France. Email: r.itracbruneau@yahoo.fr

25286. Jégat, S. (2023): A mélioration des connaissances sur la répartition de Macromia splendens et application du protocole SOGAP en Lot – et – Garonne (47). Master 2 Mention Agrosciences Environnement Territoire Paysage Forêt Parcours ECOCAEN « Gestion et valorisation agri-environnementales » UFR des Sciences – Département Biologie SciencesdelaTerreUniversité Caen – Normandie Promotion 2022/-2023Salomé: 60 pp. (in French, with English summary) ["M. splendens ... is a rare and little know specie. A population was discovered in Lot-et-Garonne, on the river of Gélise. The objective of this study is to specify the distribution of this specie and realize SOGAP (odonate Gomphidae and priority Anisoptera monitoring). The established protocol made it possible to prospect a part of the linear of river per stretch of 500 meters, collecting exuviae deposited on the banks. Despite a flood episode, knowledge of the distribution of Macromia splendens, from the known station, could be improved. The station of the Gélise is essential in the conservation of this species, it would be necessary to continue the recolts of exuviae in the years to come." (Author] Address: https://libellules.pnaopie.fr/wp-content/uploads/2025/09/JEGAT2023-_Macromia-splendens-en-47_RS.pdf

25287. Tarkowski, A. (2023): Influence of selected environmental factors on the occurrence of dragonflies (Odonata) in calcareous fens in Central and Eastern Poland. PhD thesis, Instytut Nauk Biologicznych, Maria Curie-Sklodowska University Lublin: 268 pp. (in Polish, with English summary) ["Odonata of calcareous fens were studied in order to: describe so far poorly studied fauna on the background of factors shaping it, analyse the influence of habitat transformation on dragonfly populations, and collect reference data that can be used in the future to assess the status of these fens on the basis of their odonatofauna. Own data and archival materials were used in the thesis. For the purposes of the analysis, these data were divided into period I (2007-09) and period II (2015-18). A total of 50 dragonfly species were found (67.6% of the national fauna). Their occurrence in both periods was characterised and population change trends were indicated. The fauna of the different habitats within the fens was described, showing variation in: species richness, abundance and habitat specificity. The fauna from both study periods was compared, showing significant changes in its composition and abundance – general and in particular habitats. The influence of selected environmental factors, including anthropogenic ones, on dragonfly assemblages was described. The dragonflies were directly affected by the properties of the water (mainly pH, ORP and temperature), the structure of the aquatic and shoreline vegetation and the character of the site surroundings, including the presence of roads and railway tracks. The overriding factor, emerging especially from analyses of faunal change over time, appeared to be climate change and the associated warming and droughts. Habitat drying in particular made that the role of anthropogenic water, especially peat pools, was taking over as crucial for the survival of dragonflies in carbonate fens. The effectiveness of survey methods for dragonflies in calcareous fens was compared and it was found that observations of imagines were the most effective. The effect of reserve protection on the occurrence of dragonflies was also analysed: it was found to be minor and manifested mainly in a higher species richness of the fauna in nature reserves. The data presented in this dissertation greatly enhance our knowledge on the fauna and ecology of dragonflies of calcareous fens. It will allow to develop new research plans and conservation approaches." (Authors)] Address: https://dlibra.umcs.lublin.pl/Content/47320/Adam%20Tarkowski_Rozprawa%20doktorska.pdf

2024

25288. Akpan, A.U; Ukpan, O.M; Ehisianya, C.N; Esenowo, I.K. (2024): Community structure of Jaja Creek and downstream sections of Imo River in Uta Ewa village, Akwa Ibom State, Nigeria. J. Appl. Sci. Environ. Manage. 28(3): 889-899. (in English) [Arthropods are considered the most successful animals on earth. They are an essential part of the aquatic food chain and efficient bioindicators depicting the biotic community structure and water quality. This study aimed to generate baseline data on the arthropod community structure of Jaja Creek and downstream sections of Imo River in Uta Ewa village, Ikot-Abasi Local Government Area, Akwa-Ibom State, Nigeria. A variety of sampling techniques, including the scoop net method at low tides in the littoral zone, square lift net anchored on a paddling boat, sweep net, and locally made crab traps were adopted for the sampling of the arthropods. 46 arthropod species were identified and classified into three classes: Arachnida, Crustaceans, and Insecta, with nine orders and 26 families. Sesarma alberti, Aratus pisonii, Sesarma elegans, Armases sp, Neosarmatium meinerti, Nematopalaemon sp, and Macrobrachium caledonicum were among the various arthropod species identified in this study. The class Crustaceans had the highest individual abundance of 135,809 (94.74%), followed by the class Insecta, which had a total numerical individual abundance of 7,339 (5.12%), and the order Arachnida (206; 0.14%). For the first time, members of the class Insecta and the families Sesarmidae, Pilumnidae, and Penaeidae (Penaeus sp.) were collected and identified in this portion of the Niger Delta Creek and Imo River. Given the importance of aquatic arthropod species to the catchment region and the country, a comprehensive conservation strategy should be developed to conserve and defend their survival." (Author) Odonata are listed at genus level, including taxa which may be questionable.] Address: Akpan, A.U., Dept of Animal & Environmental Biology, Faculty of Biological Sciences, Univ. of Uyo, Uyo. Akwa Ibom State. Nigeria. Email: akpanau13001f@gmail.com

25289. Aracheloff, C. (2024): Etude mécanique et aérodynamique d'ailes de libellules (Insecta Odonatoptera). These, pour obtenir le grade the Docteur du Museum national d'histoire naturelle - MNHN PARIS: XIV + 110 pp. (in French, with English summary) ["Odonata have remarkable flight abilities

that are the result of complex fluid-structure interactions, particularly between their wings and the air. Wings are flexible heterogeneous structures composed of a membrane and a network of veins that locally influence rigidity. Their characteristics (size, geometry, network of veins, presence of specific structures such as nodus, etc.) are extremely diverse due to the number of Odonata species and their wide geographical distribution. Odonata have a flapping flight in which the wings are subject to considerable displacement and deformation. The shape taken during flight has an impact on the production of aerodynamic force, and this shape is linked to the mechanical properties of the wing. We studied wings from 23 specimens of seven different families using small-amplitude vibration tests to determine their resonance frequencies in the linear domain. In this regime, the resonance frequencies of the wings are much higher than the flight frequencies. We then focused on Pseudostigmatidae for which a large amplitude study was carried out, showing a non-linear wing behaviour. The resonant frequencies decreased until they fell within the range of flight frequencies for amplitudes similar to those observed during flight. In the final section, we looked at the design of artificial wings and the study of aerodynamic forces using a flapping flight device. We tested simplified Odonata wing models based on venation in order to carry out a comparative study. This device and the method used to design the wings could be used as a basis for a comparative study between current and past species. This will improve our understanding of the evolution of these insects and the flight capabilities of certain species that are now extinct, such as the Meganeuridae, a lineage of giant insects from the Paleozoic whose largest specimens had a total wingspan around 70 cm, by opening the door to a palaeobioinspiration using the immense fossil record of these insects." (Author)] Address: Aracheloff, Camille, Laboratoire de Physique et Mécanique des Milieux Hétérogènes (PMMH), CNRS UMR 7636, ESPCI Paris - PSL University, Sorbonne Université, Université Paris Cité, Paris 75005, France. Email: camille.aracheloff@mnhn.fr

25290. Behnke, R. (2024): Verbesserung und Schutz von Kalktuffquellen in OWL. Natur in NRW 4/2024: 11-17. (in German) [Nordrhein-Westfalen, Germany; "From 2018 to 2024, the Hochstift Regional Forestry Office (State Forestry and Timber Agency of North Rhine-Westphalia) implemented the Tuff-LIFE project, funded by the EU Commission and the state of North Rhine-Westphalia, in five Natura 2000 sites in the districts of Höxter and Paderborn. The project aimed to improve tufa springs (7220*) and the downstream headwaters, enhance and restore connectivity and structural diversity, and improve the interrelationships with the two riparian forest habitats 91E0* and 9180*. Furthermore, the spring habitat was to be specifically enhanced and improved, with a particular focus on the two indicator species, the fire salamander and Thecagaster bidentata. The successful implementation of these measures is highly relevant, not least because of the presence of Bsal (Batrachochytrium salamandrivorans), a species on the preliminary warning list for the fire salamander. This article presents the project components, the preparatory work, and the implemented measures. Extensive public relations activities and the professional exchange between all project participants also played a major role. The fire salamander (Salamandra salamandra), which is directly dependent on near-natural and structurally diverse (tufa) springs, the adjacent headwaters of streams, and the forest habitats along springs and streams, and T. bidentata served as indicator species for the project. ... T. bidentata ... is directly dependent on the habitat adjacent to springs, the oxygen-rich, undisturbed headwaters with high water quality, and an undisturbed streambed and stream sediment (interstitial) for laying its larvae. Under these conditions, the larva, which feeds predatorily on macrozoobenthos on the streambed, can develop into a fully fledged adult in four to five years. Subsequently, the striped dragonfly patrols and hunts for only about four to six weeks along the upper reaches of streams in the accompanying forest habitats.] Address: Behnke, R.: robert.behnke@gmx.net

25291. Brugger, M.; Itrac-Bruneau, R. (2024): Le Plan régional d'actions en faveur des libellules de Bourgogne-Franche-Comté. Revue scientifique Bourgogne-Franche-Comté Nature 39: 70-77. (in French) ["With 75 species present in its territory, including 26 damselflies and 49 dragonflies, the Bourgogne-Franche-Comté region boasts more than three-quarters of the 98 French species of dragonflies and damselflies and therefore bears a significant responsibility for the preservation of metropolitan dragonflies. Several factors explain this rich regional diversity, notably the different climatic and altitudinal influences, and the wide variety of habitats linked to wetlands (from springs and smaller streams to lowland rivers, ponds, lakes, reservoirs, tufa marshes, peat bogs, wet meadows in alluvial plains, etc.) which are the result of a dense hydrographic network. Following the publication in 2020 of the National Action Plan (NAP) for dragonflies, a regional version has been produced and has just been published at the beginning of 2023. Co-written by the Natural History Society of Autun – Burgundy Fauna Observatory (SHNA-OFAB) and the National Botanical Conservatory of Franche-Comté – Regional Invertebrate Observatory (CBNFC-ORI), with the support of the Opie Franche-Comté and the two Conservatories of Natural Areas (CEN) working in the territory, this Regional Action Plan (RAP) lists the issues and actions put in place for the benefit of the Odonata of the region." (Authors)] Address: Brugger, Magdalena, SHNA-OFAB. Email: magdalena.brugger@shna.fr

25292. Cartron, C. (2024): Entre terre et rivière: analyse d'un suivi sur le long terme des odonates Onychogomphus forcipatus, Ophiogomphus cecilia et Stylurus flavipes et mise en place d'un suivi du lézard Lacerta agilis. Rapport de stage de fin d'étude - Master 2 Biodiversité Écologie. Évolution parcours Écologie Évolutive et Comportementale: 52 pp. (in French, with English summary) ["Biodiversity's collapse coupled with insufficient knowledge on many species requires more systematic population monitoring. On the one hand, as part of the monitoring program "Suivi des Odonates Gomphidés et Anisoptères Prioritaires" (Monitoring of Gomphidae Odonata and Priority Anisoptera) also known as SOGAP, I analysed the population trends in the Loire region of O. cecilia, S. flavipes and O. forcipatus. I also studied the influence of water levels on their population dynamics. Between 2015 and 2023, the populations of O. cecilia and S. flavipes declined by more than 90 % while O. forcipatus remained stable. The collapse of O. cecilia and S. flavipes may be partly linked to decreasing water levels during low-water periods...." (Author)] Address: https://libellules.pnaopie.fr/wp-content/uploads/2025/-02/Rapport_M2_Chloe_CARTRON.pdf

25293. Cerný, L.; Hesoun, P. (2024): Nové nálezy vážky beloústé v jižních Cechách - New records of the Dark whiteface dragonfly in South Bohemia. Sborník Jihoceského muzea v Ceských Budejovicích, Prírodní vedy 64: 126-130. (in Czech, with English summary) ["The Dark whiteface (Leucorrhinia albifrons) is a widespread species of dragonfly found from western and northern Europe to central Siberia. Despite its expansive range it is one of the rarest species in Europe. So far, only three records from southern Bohemia have been documented, of which only one population survives,

and the other two have become extinct. Two more new and recent records of the species from the region are presented in this work." (Authors)] Address: Cerný, L., Jihoceské muzeum v Ceských Budejovicích, Dukelská 242/1, CZ – 370 01 Ceské Budejovice, Czech Republic. Email: cerny@muzeumcb.cz

25294. Cheng, M.; Zhao, Y.; Yang, D. (2024): Aerodynamic performance analysis of tandem-winged configuration during dragonfly flight. Proceedings, Eleventh International Symposium on Precision Mechanical Measurements; 131780Z (2024) https://doi.org/10.1117/12.3032523: (in English) ["The dragonfly possesses flight skills unparalleled by other flying creatures. It is a typical representative of insects with a distinctive serial flapping flight. The wing configuration of dragonflies exhibits excellent aerodynamic characteristics. This research field holds promising applications in various sectors, including military and civilian domains. To further investigate the influence of a dragonfly's single wing versus a tandem double-wing on aerodynamic performance, this study constructed biomimetic wing models for both single and tandem configurations. MATLAB was employed for simulating aerodynamic lift, and computational fluid dynamics (CFD) methods were applied using Fluent CFD analysis software to numerically simulate the wing models. This study investigates the aerodynamic characteristics and mechanisms of single and tandem wings at a flapping frequency of 30Hz. The results indicated that, at an angle of attack of 10° and an incoming flow velocity of 5m/s, the maximum lift of the tandem wing is three times higher than that of the single wing. The tandem wing configuration demonstrates improved aerodynamic performance compared to the two single wing configurations. This further unveils the flight mechanism of dragonflies, providing a theoretical foundation for Flapping- Wing Micro Air Vehicles (FMAVs). The findings have practical implications for the design and development of FMAVs, offering valuable insights into flight principles." (Authors)] Address: Cheng, M., Henan Polytechnic Univ., China

25295. da Silva, E.C.; Guerrero-Moreno, M.A.; Oliveira, F.A.; Juen, J.; de Carvalho, F.G.; Barbosa Oliveira-Junior, J.M. (2024): The importance of traditional communities in biodiversity conservation. Biodiversity and Conservation 34: 685-714. (in English) ["More than one-third of the world's high-biodiversity areas are inhabited by traditional communities, which possess deep knowledge and a unique relationship with the environment, resulting in sustainable management of natural resources. However, the importance of these communities is not always highlighted; therefore, this study conducts a mapping of scientific literature on the importance of these communities in biodiversity conservation, identifying trends, gaps, and areas of focus. A total of 519 articles from the Scopus and Web of Science databases were analyzed. The highest scientific productivity was recorded in 2022 (n = 59; 11.36%), and the Journal of Ethnobiology and Ethnomedicine was the most prolific on the subject. Brazil (n = 128; 24.66%) and India (n = 94; 18.11%) were the countries with the highest scientific output, while India (n = 80; 15.41%) and Brazil (n = 58; 11.17%) were the most studied. However, the USA leads in scientific collaboration networks. The main contributions of traditional communities to biodiversity conservation included management and sustainable use of natural resources (71.29%) and cultural and traditional practices (46.43%). The results reflect the growing recognition of the importance of traditional communities in nature conservation. Conservation policies and strategies should recognize and incorporate the knowledge and practices of these communities to strengthen environmental preservation and promote social justice and equity. Only by acknowledging the value of these communities' actions will it be possible to combat neocolonialism, where they are viewed or considered merely as subjects of study or as labor to be exploited for data generation, without due recognition of their importance." (Authors)] Address: Cruz da Silva, E., Programa de Pós-Graduação em Ecologia (PPGECO), Universidade Federal do Pará (UFPA), Belém, Pará, Brazil. Email: evertonsilva856@gmail.com

25296. Farhadian, O.; Bagheri, J.; Soofiani, N.M.; Heidari, S.; Ebrahimi, E. (2024): Determining nutritional indices of Dori bleak (Alburnus doriae) and Brond Snout (Chondrostoma regium) in Zayandehroud River. Aquatic Animals Nutrition 10(3): 49-64. (in Arabian, with English summary) ["In this study, nutritional indices of Dori bleak (Alburnus doriae) and Brond Snout (Chondrostoma regium) were investigated by collecting 200 samples of each species (male, female, juvenile) seasonally from the Zayndehroud river located in Chaharmahal and Bakhtiari province. The results showed that the Vacuity index was 11.5% and 24% in A. doriae and C. regium, respectively, and this index have a significant difference during the year. The highest amount for both species was in autumn and the lowest amount was for A. doriae in winter and C. regium in summer. The calculated average Relative length of the gut for A. doriae and C. regium was 0.73 and 1.36, respectively, which was not significantly different in different age groups. According to the results of the selection index, A. doriae, in order of preference, has a greater tendency to feed on the orders of Odonata (0.94), Plecoptera (0.77), Coleoptera (0.74), Hemiptera (0.42), Arachnida (0.15) and Hirudinea (0.02) and C. regium have a greater tendency to feed from Plecoptera (0.73), Odonata (0.49), Ephemeroptera (0.49) and Hirudinea (0.37). In general, the findings of this research showed that A. doriae could be considered as a carnivorous species and C. regium as an omnivorous species in the food chain of Zayandehroud River." (Authors) "Gomphidae" contributed with 0.19% to the diet of the two fish species, and differed species-wise to. esfahani: 5.05% and C. regium: 0,56%.] Address: Farhadian, O., Department of Natural Resources Isfahan University of Technology, Isfahan 84156-83111, Iran

25297. Hadfield, R.K. (2024): Diversification and evolution of Hawaiian Megalagrion damselflies (Pinapinao, Odonata: Coenagrionidae). MSc thesis, Department of Biology, Brigham Young University: VII + 48 pp. (in English) ["The Megalagrion damselflies of Hawai'i present a valuable study system for understanding the impacts of geology on evolutionary processes. Despite their significance, our understanding of the temporal, geographic, and phylogenetic origins of these damselflies remains incomplete. Prior phylogenetic studies have proposed adaptive ecological and morphological progressions, but evaluating these hypotheses relies on a sound understanding of phylogenetic relationships within the genus. Previous phylogenetic analyses have produced conflicting topologies. To resolve these uncertainties, we performed phylogenetic analyses including divergence time estimation with 90 nuclear loci (>50 kbp) and 2 mitochondrial loci (>1000 bp), sampling representatives from each genus within core Coenagrionidae and 90% of Megalagrion species, including multiple island populations. Our methods included ancestral range estimation, paleodiversity analyses, agent-based simulation modeling, and ancestral state reconstruction to test biogeographic and diversification hypotheses. Our findings indicate that the ancestor of Megalagrion diverged from core Coenagrionidae in the early Eocene (~ 50 MA) with extinction likely playing a significant role in the early evolution of Megalagrion. The most recent common ancestor of Megalagrion predates the emergence of Kaua'i by 7-15 MY. The extant diversity of Megalagrion is largely explained by ecological diversification into at least five distinct clades that likely occurred on now-

sunken Northwestern Hawaiian Islands, then dispersal to the current Hawaiian Islands as they emerged." (Author)] Address: https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=12027&context=etd

25298. Houard, X.; Kotwica, G. (2024): Le PNA Libellules: une approche «parapluie», «facilitatrice» et «intégratrice» pour agir en faveur des enjeux liées à la biodiversité aquatique. Zones humides infos 106: 10. (in French) [https://www.snpn.com/wp-content/uploads/2025/01/ZHI-106.pdf] Address: Houard, X., CREN de Haute-Normandie, rue Pierre de Coubertin, BP424 76850 S'-Etienne-du-Rouvray Cedex, France. Email: x.houard-@cren-haute-normandie.com

25299. Kaltsas, D.; Xanthakis, M.; Maroulis, C.; Voulgaris, J.; Minetos, P. (2024): The Odonata of Kefalonia island, Greece – distributional data and conservation implications. Libellula 43(3/4): 177-192. (in English, with German summary) ["The Odonate species on Kefalonia island were studied based on field surveys during 2022 and 2023, literature data and previously unpublished records. In total, we gathered 361 Odonata records from 52 localities on the island. 29 species are certainly present on Kefalonia, Aeshna mixta and Sympecma fusca are firstly recorded. Most species are found at Avythos lake and the two reservoirs near Tzanata, three of the less disturbed wetlands of Kefalonia. There is strong evidence that Lindenia tetraphylla and Selysiothemis nigra arrived at the island quite recently, and established populations at the two recently constructed reservoirs on Kefalonia. The vast majority of Odonata records are located near the 20 wetlands on the island, since about half of Kefalonia's landscape is mountainous with dry and rocky soil, unsuitable for Odonata. Such strong dependence on habitat suitability highlights the importance of wetland protection for the conservation of Odonata. Though many wetlands on the island are degraded due to habitat destruction, water pollution and/or eutrophication, the recent legislation prohibiting housing, new roads, drainage, embankments, waste disposal, and expansion of cultivation at eight wetlands of Kefalonia is a big step towards that goal." (Authors)] Address: Kaltsas, D., Don Daleziou 45, 38221 Volos, Greece. Email: dimitris.kaltsas@gmail.com

25300. Krishnan, N.; Harikuttan, N.; Vijay, N.; Syamala, V. (2024): An ecological inquiry into the taxonomic diversity and spatial distribution patterns of Odonata within the Meenachil and Pampa River basins in Kerala, India. International Journal of Creative Research Thoughts 12(9): 798-808. (in English) ["This study endeavoured to conduct a comparative analysis of Odonate species, within discrete regions along the Meenachil and Pampa rivers, specifically in the Malarikkal and Parumala areas, throughout the period from March 1st to April 30th, 2023. The inquiry encompassed weekly visits to the designated study sites, where meticulous documentation of observations was conducted. A comprehensive analysis unveiled a total of 25 Odonate species in both regions. The Malarikkal region demonstrated heightened diversity with 18 dragonfly and 7 damselfly species, while the Parumala region exhibited comparatively diminished diversity, encompassing 7 dragonfly and 4 damselfly species. Regarding species diversity indices, Malarikkal exhibited values of 0.2022 for dragonflies and 0.25 for damselflies, indicating a moderately diverse Odonate community. Conversely, the Parumala region displayed lower diversity indices, with values of 0.0875 for dragonflies and 0.2857 for damselflies. These observations suggest discernible variations in Odonate species composition and diversity between the two regions." (Authors)] Address: Syamala, Vani, Dept of Zoology, D. B. Pampa College, Parumala, Kerala, India-689626

25301. Krishnanunni, T.A.; Neha, N.; Arya, R.; Nameer, P.O. (2024): A preliminary study of odonate fauna in the high ranges of Munnar, southern Western Ghats, India. Journal of Threatened Taxa 16(12): 26240-26250. (in English) ["A study was conducted at Munnar Forest Division Idukki District, Kerala, the southern Western Ghats, to assess the diversity of odonates. Around 44 species of odonates, which include 29 species of Anisoptera and 15 species of Zygoptera. The odonate diversity of Munnar Forest Division accounted for 24.72 % of the odonates in Kerala and 22.45 % of the odonates of the Western Ghats. The study highlights the importance of biodiversity documentation at high altitudes in the Western Ghats." (Authors)] Address: Krishnanunni, T.A., College of Forestry, Kerala Agricultural Univ., Thrissur, Kerala 680656, India.

25302. Lee, S.-H.; Han, H.-W.; Yoon, C.-S.; Hong, S.-J.; Cheong, S.-W. (2024): Community characteristics and stability of benthic macroinvertebrates in Wondong wetland. Korean Journal of Environmental Science 33(12): 993-1008. (in Korea, with English summary) ["This study analyzed the ecological changes in the community structure of benthic macroinvertebrates in the Wondong Wetland, South Korea, to provide baseline data for its conservation and management. Between 2022 and 2023, four classes, six orders, 20 families, 43 genera, 75 species, and 2,404 individuals were identified, with insects, particularly Odonata, being predominant. Pollution-tolerant species, such as Cipangopaludina chinensis malleata and chironomids, were dominant. Environmental disturbances caused fluctuations in species and individual numbers, with notable increases in species from Diptera, Systellommatophora, and Isopoda in 2023. Although the species richness remained stable, the diversity index decreased from 3.307 in 2022 to 3.223 in 2023. Site 1 had low diversity and evenness owing to the dominance of pollution-tolerant species. Biological water quality assessments showed that the biological monitoring working party and average score per taxon were more sensitive and suitable for monitoring of Wondong Wetland. Functional feeding groups were mainly predators and gathering collectors, with changes in their proportions depending on habitat and pollution level. Notably, Site 1 had more gathering collector species, whereas Site 2 was rich in predatory species. The species composition of the habitual dwelling group was dominated by climbers, whereas the abundance composition was dominated by sprawlers. Changes in habitual dwelling groups were minimal during the study period, although the abundances of burrowers and skaters increased in 2023. The community loss index showed greater instability in 2023, especially during summer, with increased community loss in autumn compared to that in 2011. Relative resistance and resilience were higher at Site 1, indicating ecosystem stability, whereas Sites 2 and 3 exhibited high resistance but low resilience. This study highlights the Won." (Authors)] Address: Cheong, S.-W., Dept of Biology & Chemistry, Changwon National University, Changwon 51140, Korea. E-mail:swcheong@changwon.ac.kr

25303. Mackenzie Dodds, R.; de Koenigswarter, K. (2025): An Emergence study of Uropetala carovei carovei (Odonata: Petaluridae) over five seasons at one site near Wellington, New Zealand. The Weta 59: 38-46. (in English) ["We examined the nocturnal activity and emergence of larvae of the New Zealand Bush Giant dragonfly, Uropetala carovei, by using continuously-running cameras to obtain a record of all aspects of their night activity over five successive flight seasons." (Authors)] Address: Mackenzie Dodds, R., The National Dragonfly Museum, Ashton Mill, near Oundle, Peterborough PE8 5LZ, UK. Email: ruarymackenziedodds@gmail.com

25304. Martins, R.T.; Firmino, V.C.; Hamada, N. (2024): Amazonian aquatic insects in a changing landscape. In: de Souza, S.S., Braz-Mota, S., Val, A.L. (eds) The Future of Amazonian Aquatic Biota. Springer, Cham. https://doi.org/10.1007/978-3-031-66822-75: 111-136. (in English) ["Multiple local anthropogenic pressures and climate changes threaten the biodiversity of aquatic insects in the Amazon. In this chapter, we review the impacts of various land use ractices (e.g., urbanization, pasture, agriculture, mining, and dams) and climate change on aquatic insect assemblages in the Amazon region. We explore how these factors might influence the composition, richness, abundance, diversity, and ecosystem processes (e.g., leaf decomposition) of these insect communities. Finally, we outline future perspectives for studies of insects and aquatic environments in the Amazon." (Authors) The publication includes many references to Odonata.] Address: Hamada, Neusa, Coordenaqao de Pesquisas em Entomologia, Institute Nacional de Pesquisas da Amazonia, Caixa Postal 478, CEP 69011-970 Manaus, AM, Brazil. E-mail: nhamada@inpa.gov.br.

25305. Muhammad, A.-I.; Muhammad, I.I.; Amirrudin, B.A.; Norashikin, F.; Chee, Y.C. (2024): Odonata from the Tok Bali Wetland, Kelantan, Peninsular Malaysia. Conference: Proceedings Books Scientific Expedition Tok Bali Wetland 2024 At: Kelantan, Malaysia. 23-29. (in Engllish) ["The Odonata fauna of Tok Bali Wetland was studied during the Ekspedisi Saintifik Tok Bali Wetland Pasir Puteh 2024 on 5–9 May 2024. A total of 27 species consisting of six families were recorded. The family Libellulidae had the highest number of species, with 16 species, followed by the family Coenagrionidae, with seven species. The other four families (Argiolestidae, Aeshnidae, Gomphidae and Macromiidae) had only one species each. Of these, eight species were damselflies, and 19 species were dragonflies, representing 11% of the species known to Peninsular Malaysia. It is interesting to note that five species recorded from Tok Bali Wetland are new records for the state of Kelantan – Agriocnemis nana, Epophthalmia vittigera, Gynacantha dohrni, Rhyothemis aterrima and Urothemis signata. The diversity of Odonata in Tok Bali Wetland was moderate. This might be attributed to the arid conditions during the expedition." (Authors)] Address: Chee, Y.C., Faculty of Science & Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. Email: cheeyenchoong@gmail.com

25306. Nalley, S.E.; Moore, M.P. (2024): Aggregate mating behaviour of Sympetrum dragonflies in Colorado and Wyoming wildfire perimeters. The Southwestern Naturalist 69(1): 1-4. (in English, with Spanish summary) ["Aggregations of dragonflies engaging in copulation were observed in Sympetrum internum dragonflies and potentially other Sympetrum species. On four separate occasions in Colorado and Wyoming during the 2023 summer, Sympetrum species were found copulating in groups of three to >10 pairs at ponds located within the perimeters of recent wildfires. While post-copulatory aggregations have been described for Sympetrum species, aggregatory behavior during mating remains less well documented in any dragonfly species. Future research should explore the taxonomic prevalence of aggregate copulation in dragonflies and the ecological or social drivers that might favor or oppose its expression." (Authors)] Address: Nalley, Sarah, Integrative Biology, Univ. of Colorado Denver, USA

25307. Reghu, A.V.; Aravind, N.P. (2024): Odonates of Vembanad Lake, a Ramsar site in Kerala, India. International Journal of Entomology Research 9(11): 148-151. (in English) ["Besides serving as important prey and predators in the food chain's trophic level balance, odonates are important markers of the health of terrestrial and aquatic ecosystems. The current research endeavors to record and examine the odonate diversity found in Kerala's Vembanad Lake, a Ramsar site. Observations were made for a period from November 2022 to May 2024. A total of 41 species — 27 Anisoptera and 14 Zygoptera — were identified, spanning two sub-orders, six families, and 30 genera. The families obtained were Gomphidae, Libellulidae, Aeshnidae, Chlorocyphidae, Coenagrionidae and Platycnemididae. Anisoptera were found to be more diverse and predominant with 27 species under 24 genera belonging to Libellulidae, Gomphidae, and Aeshnidae contributing 65%, followed by the order Zygoptera which was less diverse with 14 species under 8 genera belonging to Chlorocyphidae, Coenagrionidae and Platycnemididae, contributed 34% of total Odonates recorded from the study area. Libellulidae is the most species-rich family with 25 species, followed by Coenagrionidae, Platycnemididae, Chlorocyphidae, Aeshnidae, and Gomphidae with 10 species, 3 species, and 1 species respectively. The study will provide baseline information on the diversity and composition of odonates in the selected study area." (Authors)] Address: Reghu, A.V., Dept of Zoology, CMS College, Kottayam, Kerala, India

25308. Sandeep, V.; Chinmayi, S.; Sujith, K.M.; Maheshwar, N.; Amogh, C.N.; Tejashree, G.N.; Varalaxmi, K (2024): Dragonfly: A master of migration. International Journal of Environment and Climate Change 14(11): 197-207. (in English) ["Insect migration is vital for ecosystems, with trillions of individuals redistributing biomass and nutrients annually. Dragonflies, particularly Pantala flavescens are notable migratory insects capable of traveling over 6,000 kilometres across generations. Their migrations are influenced by resource availability, breeding needs, environmental conditions, and competition avoidance. This behaviour includes both seasonal movements and sporadic flights triggered by temperature and wind cues. Despite their well-known life cycle from aquatic nymphs to aerial adults, many aspects of their migration remain under-researched. Dragonflies exhibit diverse flight mechanisms, employing four distinct modes: counter-stroking for hovering, phased-stroking for cruising synchronized stroking for acceleration, and gliding for energy conservation. Migratory species show specific wing adaptations for improved endurance, such as elongated forewings and larger hindwings, along with sensory enhancements like enlarged thoracic setae. Specialized flight muscles allow for independent wing control, essential for complex movements. Additionally, physiological adaptations like fat accumulation and rapid development support their migratory behaviour. Recent studies also highlight nocturnal migrations, revealing unique flight patterns and adaptations. Together, these traits underscore the evolutionary success of dragonflies in diverse ecosystems." (Authors)] Address: Sandeep, V., Dept Entomology, Keladi Shivappa Nayaka Univ. of Agricultural & Horticultural Sciences, Shivamogga, India

25309. Schwesig, K.; Zizka, V.; Scherber, C.; Hölzel, N. (2024): Comparing eDNA and transect methods for aquatic biodiversity assessment in lakes and ponds. Molecular Ecology Resources 25:e14060: 12 pp. (in English) ["Biodiversity monitoring increasingly relies on molecular methods such as eDNA metabarcoding. However, sound applications have so far been only established for a limited number of taxonomic groups. More information on the strengths and weaknesses of eDNA methods, especially for poorly covered groups, is essential for practical applications to achieve the highest possible reliability. We compared amphibian and Odonata data from eDNA metabarcoding and traditional transect walks on N = 56 plots in 38 water bodies distributed

over six extraction sites for building materials in Northwest Germany. The traditional amphibian assessment included visual encounters, dip netting and acoustic detection, while Odonata were assessed through exuviae. In total, both methods detected 8 out of 11 amphibian species, while the remaining three species were detected by eDNA only. We did not find differences in amphibian species numbers per plot, but mean detection probabilities were higher with metabarcoding. In contrast, both methods detected 10 out of 29 Odonata species, while the remaining 19 species were detected by exuviae only. Species numbers per plot were higher for exuviae and only 30% of species were detected with metabarcoding. The species identified by eDNA were those with high abundance, and their detection probabilities were similar to transect walks. The results for amphibians show equal suitability and high complementarity of the compared methods. Metabarcoding detected species more efficiently and therefore offers a suitable protocol for biodiversity monitoring. For Odonata, eDNA metabarcoding showed considerable gaps, implying the need for protocol evaluation and improvement in assessment of ecological communities based on eDNA." (Authors)] Address: Schwesig, Katharina, Biodiversity and Ecosystem Research Group, Institute of Landscape Ecology, University of Münster, Münster, Germany. Email: katharina.schwesig@uni-muenster.de

25310. Souret, L. (2024): Bilan des observations de 2018 à 2023 d'un nouvel odonate en France continentale: Selysiothemis nigra (Odonata: Libellulidae). Faune-PACA 124: 29 pp + annexes. (in French, with English summary) ["On July 24, 2020, Mathias Lohr made the first documented observation of S. nigra in continental France (Lohr, 2021). In the commune of Vinon-sur-Verdon, in the north of the Var department, he collected two exuviae at the edge of an old gravel pit and discovered a male imago individual, near there, in the major bed of the Durance. The autochthony of the species was thus proven. Internet research allowed us to discover that the first observation of S. nigra in mainland France took place in 2018 (Lavigne, 2018) on the same site in Vinon-sur-Verdon, two years before Mathias Lohr's discovery. On the national territory, it was in Haute Corse, in 2015, that S. nigra was seen for the first time (Sannier, 2015). This publication retraces the field research undertaken from June 2021 and the chronology of observations of S. nigra in mainland France based on data from the Faune PACA naturalist database over the period 2018 – 2023. These allow to confirm that the species has settled in Vinon-sur-Verdon and even that it is expanding its range in the PACA region in the Durance valley but also on the coast in the Crau plain (Bouches-du- Rhône). We tried to answer several questions about the species: - What are the favorable areas for looking for S. nigra in order to facilitate the discovery of the species in the coming years? - With the closest populations in Corsica, Italy, Sardinia and Spain, what is the origin of the first imagos to arrive on the banks of the Durance? - Will S. nigra expand into mainland France as recently: Trithemis kirbyi arrived in 2017 or others more anciently like Trithemis annulata in 1989 and Crocothemis erythraea since the 1980s, pioneers in the colonization of the old continent. What will be the next species likely to arrive in the PACA region? The aim of this publication is to help observers increase the number of observations of S. nigra in the coming years in order to better understand its distribution and monitor the colonization of the species in mainland France. ... 7. Conclusion Climate change is the most frequently cited reason for the northward expansion of African Odonata species, and thus their spread into the western Palearctic ecozone. Summers with heat waves and the proliferation of former gravel pits are expected to continue, in the coming decades, to favor the arrival of other dragonfly and damselfly species currently found in the Mediterranean islands and North Africa. Unlike T. annulata, which, after about thirty years since its arrival in mainland France, is now present in a large part of the southern half of the country, S. nigra does not appear to have the same dynamics. Despite its good dispersal capabilities, in neighboring countries, Spain and Italy, the species can be very abundant in certain areas that remain quite scattered along the coast or inland. In Spain, S. nigra is even disappearing from some areas due to changes in agriculture and water management. Nevertheless, in Occitanie and the Rhône Valley, where suitable habitats exist, the species should find favorable conditions for expanding its range. Targeted surveys of *S. nigra* near former gravel pits, in the beds of inland Mediterranean rivers and along the coast, in irrigated agricultural plains, and in steppe areas should allow us to monitor its expansion in mainland France." (Author)] Address: https://cdnfiles1.biolovision.net/www.faune-paca.org/userfiles/FPPubli/FPP124-Selysiothemisnigra.pdf

25311. Ul Hayat, A.; Ud Din, N.; Sana, K.; Farooq, M.T.; Khan, D.; Khan, A.S.; Perveen, K.; Zainab, A.; Khan, A.U. (2024): Exploring the fauna of dragonflies in District Dera islamil khan KPK, Pakistan. The Research of Medical Science Review 2(3): 1712-1718. (in English) ["…District Dera islamil khan Khyber Pakhtunkhwa Pakistan. Duration of this study is 9 months i.e. February 2021 to November 2021. A total of 915 specimens were collected from the sampling site, Paharpur, Daraban, Kulachi, Prova and main Dikhan city of the district Dikhan. The identified specimens belong to order Odonata 2 families Libellulidae and Aeshnidae, 8 genera and 14 species respectively. Libellulidae was the largest family consisting 13 species Palpopleura sexmaculata, Pantala flavescens, Orthetrum chrysis, Orthetrum cancellatum cancellatum, Orthetrum sabina, Orthetrum glaucum luzonicum, Bradinopyga geminata and Trithemis festiva. Family Aeshnidae comprising only one specie Anax immaculifrons it can be concluded that this region has a diverse dragonfly fauna. Similarly survey on large scale is recommended to fully evaluate the dragonfly fauna of District Dera Ismail khan kpk Pakistan." (Authors)] Address: Ul Hayat, A., Institute of Biological Sciences, Gomal Univ., D.I Khan, Pakistan. Email: aqeemulhayatkhan @gmail.com

25312. Walia, G.K.; Chahal, S.; Singh, H. (2024): Origin of the large X chromosomes and their behavior during meiosis in Nychogomphus duaricus and Scalmogomphus bistrigatus of family Gomphidae (Odonata: Anisoptera) from India. North-Western Journal of Zoology 20(2): 189-191. (in English) ["Cytogenetically, 80 species of the family Gomphidae have been studied worldwide (Chahal 2019, Kuznetsova & Golub 2020, Walia et al. 2021, Mola et al. 2022). Out of 85 Indian gomphid species, only 13 species have been described cytogenetically. Most data pertain to chromosome numbers, sex-determining mechanisms, and metrical data on chromosomes (Kuznetsova & Golub 2020). The most common sex-determining mechanism in gomphids is XX (?)/X0 (?) types, and the X chromosome is the largest element in the complement of the family Gomphidae (Kuznetsova & Golub 2020). Neo-XY sex-determining mechanism is reported only in six gomphid species: Gomphus graslinii, Onychogomphus forcipatus, Nychogomphus duaricus, Progomphus intricatus, Scalmogomphus schmidti and Stylurus townesi. During the present study, N. duaricus and S. bistrigatus … have been described cytogenetically, and the origin of large X chromosomes and their behavior during meiosis have been explained" (Authors)] Address: Walia, Gurinder, Dept of Zoology & Environmental Sciences, Punjabi Univ., Patiala-147002, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

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25313. Abdelhamid, E.-h.; Karima, E.B.; Mohamed, S.; Abdelilah, F.; Zaina, Z.; Samah, A.B. (2025): Application of biotic indices to determine the ecological status of Oued El Abid Basin, Azilal, Morocco. Egyptian Journal of Aquatic Research 51(4): 443-452. (in HQI; IBGN; RQI; Water quality; Oued El Abid watershed) ["Morocco is one of the countries the most affected by water shortages, and the Beni Mellal-Khenifra region is not an exception, specifically The Oued El Abid basin. The study was carried out over an annual cycle at 7 stations. Biotic indices including the Normalized Global Biological Index (IBGN), the River Habitat Quality Index (HQI), and the Riparian Quality Index (RQI) were used for the ecological diagnosis. The surface water quality was assessed by analyzing 15 physicochemical parameters (temperature, pH, DO, EC, COD, NO^{3-}, Cl^{-}, SO_4^{2-}, PO_4^{3-}, TH, Fe^{2+}, Cu^{2+}, Pb, Cr, Cd). Current results indicate a notable degradation in water quality downstream of Oued El Abid, at S7, with high values for COD (42.01 mg L^{-1}), EC (1538 µS cm^{-1}), and Cl^{-} reaching 205.9 mg L^{-1}, and upstream of Oued Ahansal (S2) with DO (3.02 mg L^{-1}) and COD (36 mg L^{-1}) values, which classify this stream as poor to average, linked to domestic and agricultural pollution. Metals analyzed reveal a total or partial absence in places. The values of the three biotic indices classify the water at the various stations studied as being of critical quality for stations S2 and S7, of average quality for S3, S4, and S6, and of average to good quality for S1 and S5. PCA revealed that the three biotic indices show a high negative correlation with EC and a strong positive correlation with DO. This suggests that less conductive and better-oxygenated waters are associated with better biological quality. Distance-based linear models (DistLM) show that several environmental variables significantly influence the variation of biological or ecological parameters of Oued El Abid aquatic ecosystem." (Authors) The study includes data on "Odonata" and "Gomphidae".] Address: Karima, El Bouqdaoui, Lab. of Care, Health & Sustainable Development, Higher Institute of Nursing Professions & Health Techniques, Casablanca, Morocco. Email: elbouqdaouik@gmail.com

25314. Abdellatif, M.A.; Abdellah, A.G.M.; Abdalla, I.H.; Safi, A.I.A.; Eltayeb, R.E. (2025): Monitoring of insect species richness and abundance in Sudan semi-arid ecosystem (Case study: Khartoum State/Sudan). International Journal of Entomology 1(3): 11-32. (in English) ["Sudan's ecological landscape is characterized by various zones, including deserts, semi-deserts, and savannas, which host a diverse array of forests, rangelands, and numerous plant and animal species. However, the sustainable management of these resources is becoming increasingly challenging due to human activities and the impacts of climate change. This article presents the results of a research project focused on monitoring and documenting biodiversity in Sudan's semi-arid regions, particularly emphasizing insect diversity. Insects are vital for maintaining ecosystem health through processes such as nutrient cycling, decomposition, pollination, and acting as natural predators to pests. Field surveys were conducted across three Sudanese states—North Kordofan, Gezira, and Khartoum—to assess the diversity of flora and fauna. Specifically, El Rawakeeb semi-arid land in Khartoum state was investigated, which comprised three sites with varying soil elevations: a hilly site at 420 meters above sea level, a flat site at 416 meters, and a valley site at 411 meters. Researchers utilized direct collection methods and butterfly nets to gather insect specimens, which were subsequently preserved and identified for further analysis. Diversity indices, including Simpson's Diversity Index, Shannon-Wiener Index, and Margalef Richness Index, were computed to compare the biodiversity of these sites, along with metrics for evenness and species richness. Permanova analysis was carried out for insect variation between the study sites. A total of 1541 insect specimens were gathered from El Rawakeeb, encompassing 34 species distributed across 21 families and 9 orders. The order Lepidoptera exhibited the greatest number of species (35.29%), followed by Coleoptera (20.59%). The orders Neuroptera, Orthoptera and Thysanoptera recorded the fewest species (2.94% each). From the hilly site, 514 insect specimens were collected, representing 9 orders, among which Hymenoptera included 4 species, while Lepidoptera had 3 species, and Odonata, Orthoptera, and Thysanoptera each had 1 species. The highest individual counts were recorded for Coprini klobe (dung beetle), Dacus longistylus (fruit fly), Camponotus sp. (carpenter ant), and Anax ephippiger. In a flat site, 484 insect specimens were collected, classified into 15 species, 12 families, and 7 orders. The highest individual counts were noted in four species: Onthophagus nuba (dung beetle), D. longistylus, Camponotus sp., and Anax ephippiger. In a valley site, 543 insect specimens were collected, categorized into 17 species, 16 families, and 9 orders. Insect Diversity in three research sites. Simpson's Diversity Index revealed varying levels of insect diversity across the three sites. The valley site exhibited the highest diversity level with an index score of 0.857, followed by the flat site at 0.826, and the hilly site at 0.819. The Shannon diversity index of 2.22 indicated the highest diversity among the three sites, suggesting a relatively diverse insect community. The relative abundance of insects was greatest in the valley site at 35.24%, followed by the hilly site at 33.35%, and the flat site at 31.41%. The Margalef Richness Index indicated a moderate level of richness in the insects collected from the three locations. Certain insect species were found in some sites but were absent in others. The PERMANOVA revealed notable variations among the three study sites ($F = 2.24$, p-value = 0.035)." (authors) The study includes record of A. ephippiger and Pantala flavescens.] Address: Abdellatif, M.A., Environment & Natural Resources & Desertification Res. Inst., National Center for Research/Khartoum/Sudan

25315. Adak, R.; Mandal, A.; Saha, S. (2025): Direct numerical simulations of dragonfly-inspired corrugated tandem airfoils at low Reynolds Number. Bioinspiration & Biomimetics 20(4), 046013: (in English) ["A corrugated wing is known to significantly enhance aerodynamic efficiency in the low Reynolds number regime. Although the result may be relatable directly to two-winged insects, larger insects flying at similar Reynolds numbers, like dragonflies, have four wings, and the role of the gap between the fore and hindwing in flight has rarely been analyzed. In particular, we perform direct numerical simulations of the flow past a tandem corrugated airfoil configuration at a chord Reynolds number of 104 that is of relevance to the micro-aerial vehicle (MAV) community. We assessed the tandem wing configuration for different horizontal and vertical offsets. In general, the aerodynamic efficiency for tandem configurations is quite high (~10). Furthermore, we find that vertical offsets have a greater impact on aerodynamic forces than horizontal offsets. Positioning the hindwing below the forewing improves aerodynamic efficiency compared to placing the hindwing above because of the generation of a favorable pressure gradient on the forewing. The vortex shedding and correlations evaluate the hindwing/forewing interaction and the fluctuation of the forces. The horizontal offset results demonstrate improved aerodynamic efficiency and reduced flow unsteadiness as the gap between the two wings is minimized, primarily because the interaction between the forewing's wake and the hindwing is suppressed. A study

with NACA 0008 is done to corroborate the range of optimal configurations and assess performance benefits of corrugated profile. The comparative study reveals that the tandem wing configuration maintains efficiency comparable to that of a single wing while allowing us to utilize its advantages for MAV applications." (Authors)] Address: Adak, R., Indian Inst. Technology Kharagpur, Dept of Aeropsace Engineering, IIT Kharagpur, District: Midnapur West, Kharagpur, WB, 721302, India

25316. Álvarez-Álvarez, K.L.; Vásquez-Ramos, J.M.; Bota-Sierra, C.A. (2025): Contrasting responses of Odonata diversity to the rainy season in lentic and lotic habitats in Colombia. Odonatologica 54(3/4): 165-180. (in English) ["The diversity of adult odonates in two artificial aquatic ecosystems in the Colombian Orinoquía region, a drainage canal and artificial ponds, was assessed in 2020 during both rainy and dry seasons. A total of 66 odonate species were recorded, 15 in the drainage canal and 51 in the artificial ponds. Overall, the assemblage was predominantly composed of common species; however, rare and threatened species (Acanthagrion fluviatile, Agriogomphus jessei) were also documented. Variation in rainfall between the two seasons influenced both species richness and community composition in each aquatic system. Although the ponds maintained higher overall richness, the drainage canal showed a significant increase during the rainy season compared to the dry season, reflecting a positive response to greater water availability and habitat heterogeneity and with a predominance of Zygoptera. In contrast, Anisoptera predominated in the ponds, which exhibited similar richness values between seasons, suggesting greater environmental stability. Despite their artificial origin and humaninduced modifications, these water bodies serve as important habitats for various odonate species throughout the year, functioning as temporary refuges that buffer the ecological impacts of seasonal climatic fluctuations." (Authors)] Address: Álvarez-Álvarez, Karen Lineke, Instituto de Biodiversidad Neotropical, CONICET-Universidad Nacional de Tucumán, Facultad de Ciencias Naturales e IML, San Miguel de Tucumán, Argentina. Email: karen.lineke@gmail.com

25317. Amer, N.R.; Golab, M.J.; Stoks, R.; Wos, G.; Sniegula, S. (2025): Time constraints modulate the effects of predator cues and a metal across life stages in a damselfly. Evolutionary Applications 18:e70169: 19 pp. (in English) ["Animals are increasingly exposed to multiple co-occurring stressors. Environmental factors such as seasonal time constraints (TC), predation risk, and pollutants strongly influence fitness-related traits in aquatic organisms. Yet, the interactive effects of such stressors, especially across life stages, remain unclear. We examined immediate and delayed effects of predator cue exposure during the post-overwintering egg stage and the larval stage, both subjected to early-or late-season photoperiods, and how these factors interacted with subsequent larval exposure to predator cues and copper in Lestes sponsa. Copper was used due to its known effects as a pesticide on aquatic invertebrates. We measured immediate effects of egg predator cue on egg hatching (development time), carry-over effects on larval survival and growth rate, and behavioural (activity, resting, freezing, feeding) and physiological (oxidative damage, cellular energy allocation) traits after larval exposure to metal and predator cues. Several pairwise stressor interactions occurred, but none were modified by a third stressor. Predator cues during the egg stage delayed hatching under strong TC and led to sex-specific carry-over effects: males had reduced growth under strong TC. Copper increased oxidative damage only under weak TC, suggesting that strong TC can induce a hormetic antioxidant response. Short-term copper exposure did not affect survival, behaviour, or net energy budget. However, predator exposure during the egg stage modified energy allocation, increasing it under weak TC and reducing it under strong TC, indicating context-dependent trade-offs. Behavioural responses were shaped by predator cues and TC; fast-growing larvae under strong TC increased activity and feeding, while predator-exposed individuals reduced these behaviours. These findings show how environmental stressors interact across life stages and traits, shaping plastic, sex-specific responses. By integrating natural and anthropogenic stressors with life-history timing, our study advances understanding of how ecological and evolutionary processes shape stress responses.] Address: Sniegula, S., Inst. Nature Conserv., Polish Acad. Sciences, Krakow, Poland. Email: szymon.sniegula@gmail.com

25318. Angelidou, I.; Hadjikyriakou, T.; Kirschel, A.N.G.; Martinou, A.F.; Roy, H.E.; Saratsis, A.; Karris, G. (2025): Eleonora's falcon trophic interactions with insects within its breeding range: A systematic review. Open Life Sciences 2025; 20: 20251187: 15 pp. (in English) [Eleonora's falcon (Falco eleonorae) has a unique ecology that makes it ideal for studying predator–prey dynamics. Its diet shifts seasonally, with insects dominating the non-breeding and pre-laying periods, and birds becoming the main prey during chick-rearing. This systematic review explores the falcon's foraging behavior during the prebreeding and breeding phases within its global breeding range, emphasizing insect prey. Following PRISMA guidelines, the review includes studies from ten Mediterranean countries and the Canary Islands. Literature was sourced from Web of Science, Google Scholar, PubMed, and Scopus, covering both peer-reviewed and grey literature up to 2024. From 18 scientific publications and personal observations, 120 insect species and morphospecies from 47 families were recorded as prey. Coleoptera, Hymenoptera, and Hemiptera were the most frequent insect orders. Migratory species such as Acherontia atropos, Anax parthenope, and Anax ephippiger were also documented. This review contributes valuable knowledge for future studies on the dietary ecology of Eleonora's falcon and similar raptors." (Authors)] Address: Angelidou, Ioanna, Dept of Environment, School of Environment, Ionian University, Zakynthos, GR29100, Greece. Email: joanna_angelidou@hotmail.com

25319. Anggraini, E.; Sabrina, M.; Putra, A.M.; Aisyah, A.; Khorunnisa, A.; Sandi, A. (2025): Diversity of Odonata species in oil palm plantations (Elaeis guineensis Jacq.) PT.Kasih Agro Mandiri II at Banyuasin, South Sumatra. In: Herlinda S et al. (Eds.), Prosiding Seminar Nasional Lahan Suboptimal ke-13 Tahun 2025, Palembang 20 Oktober 2025, Palembang: Penerbit & Percetakan Universitas Sriwijaya (UNSRI): 111-124. (in Indonesian, with English summary) ["Oil palm … vegetable oil used for cooking and industrial applications. Odonata, as predatory insects, consume various arthropods that can reduce oil palm productivity, thus potentially serving as natural pest controllers. This study identified dragonfly diversity in an oil palm plantation and evaluated their role as biological control agents. Research was conducted at the oil palm plantation of PT.Kasih Agro Mandiri II, Banyuasin Regency. The sampling method combined purposive selection of representative plots with random sampling within plots to capture spatial variation. Collected specimens were identified to species level and analyzed using three ecological indices: Shannon diversity index, Pielou's evenness index, and species richness estimates. Results recorded eight Odonata species: six Anisoptera and two Zygoptera. The highest recorded Shannon diversity index was 2.04, while Pielou's evenness reached 0.98; the dominance index peaked during the third week of observation. The most

abundant species was Orthetrum sabina with 117 individuals, whereas Neurothemis fluctuans was least abundant with 36 individuals. Observed abundance and diversity patterns suggest a stable predator assemblage within the plantation ecosystem. The presence of a relatively diverse Odonata community indicates that the plantation environment still supports natural predator populations capable of contributing to biological pest suppression. These findings underscore the potential value of conserving habitat features that favor dragonfly populations as part of integrated pest management strategies in oil palm landscapes. Further studies should assess prey preferences, seasonal dynamics, and habitat management practices that enhance Odonata-mediated pest control." (Authors) Brachythemis contaminata, Crocothemis servilia, Neurothemis fluctuans, N. tullia, Orthetrum sabina, Rhyothemis phyllis, Aciagrion hisopa, Ischnura senegalensis.] Address: Anggraini, Erise, Program Studi Proteksi Tanaman, Fakultas Pertanian, Univ. Sriwijaya, Indralaya 30662 Ogan Ilir, Sumatera Selatan, Indonesia. Email: erise.anggraini@unsri.ac.id

25320. Aziizah, F.N. (2025): Pengembangan Buku Referensi Jenis Jenis Capung (Odonata) di Kampus II Universitas Islam Negeri Antasari Banjarmasin. Skripsi, Tarbiyah dan Keguruan [Development of a reference book on dragonfly species (Odonata) at Campus II of Antasari State Islamic University, Banjarmasin]. Pembimbing Skripsi: Nurul Himmah, S.Pd., M.Pd., pada Program Studi Tadris Biologi Fakultas Tarbiyah dan Keguruan UIN Antasari Banjarmasin. 2025: 305 pp. (in Indonesian) ["Campus II of Antasari State Islamic University, Banjarmasin, has many dragonfly species, so this research has been developed into a reference book. The purpose of this study is to describe the validity of the reference book on dragonfly species at Campus II of Antasari State Islamic University, Banjarmasin. The type of research is Educational Design Research (EDR), consisting of preliminary research, a development or prototyping phase, and an assessment phase limited to the development or prototyping phase (Plomp et al., 2013). During the development or prototyping phase, the developed Reference Book was evaluated using Tessmer's (1993) formative evaluation, which includes self-evaluation, expert review, one-to-one evaluation, small group evaluation, and field testing limited to the expert review stage. The Reference Book was developed based on data from field studies on dragonfly species. The research approach was qualitative and quantitative. The sampling techniques used were purposive sampling and field research. Data collection techniques included observation, questionnaires, and documentation. Data analysis techniques included qualitative and quantitative data analysis. The study identified 15 species: Brachydiplax chalybea, Orthetrum sabina, Pantala flavescens, Rhyothemis phyllis, Neurothemis fluctuans, Brachythemis contaminata, Agriocnemis femina, Ischnura verticalis [sic!], Agriocnemis pygmaea, Ceriagrion cerinorubellum, Ischnura senegalensis, Telebasis carmesina, Ischnura ramburii [sic!], Pseudagrion microcephalum, and Ischnura heterosticta [sic!]. The validity test for the reference book yielded an average percentage of 86%, categorized as very valid and can be used with revision." (Author) This is one of those tragic dissertations where a scientist enthusiastically dedicated herself to dragonflies, and it contains countless stamps and signatures of validators, all of whom were either poorly qualified or completely unqualified to supervise such work. Because: they didn't even notice the blatant misidentifications. Simply because one should assume that dragonfly species from North America or Australia are not found in Indonesia.] Address: https://idr.uin-antasari.ac.id/30251/

25321. Babalean, A.F.; Stefanescu, D.M. (2025): Contribution to Odonata from Fântânele Lake (Dolj, Romania). Annals of the University of Crajova 30(66): 52-57. (in English) [During 2023 and 2025, 5 species of Zygoptera and 4 species of Anisoptera" were recorded: Calopteryx splendens, Platycnemis pennipes, Enallagma cyathigerum, Ischnura elegans, I. pumilio, Cordulegaster sp., Orthetrum albistylum, O. brunneum, Sympetrum sp. (fonscolombii?] Address: Babalean, A.F., University of Craiova, Faculty of Horticulture, Craiova, Romania. Email: anda.babalean@ucv.ro

25322. Bai, C.; Yang, X.; Wu, J.; Wang, Y.; Hu, D.; Ji, Z.; Liu, D.; Jiang, P.; Wang, X. (2025): Low-entropy-penalty elastomers with synergistic resilience and strength via resilin-inspired microphase separation. Advanced Functional Materials 2025, e10053, https://doi.org/10.1002/adfm.202510053: 12 pp. (in English) ["The inherent trade-off between elasticity and strength in elastomers continues to present a significant challenge due to the difficult-to-reconcile soft and hard networks. In this study, inspired by the heterogeneous structure of resilin in dragonfly cuticle, a nano/micro engineering is introduced to regulate microphase separation by constructing dynamic hard domains with well-defined sizes, optimal spacing, and uniform aggregation. During deformation, the dynamic hard domains progressively disintegrate, while strain-induced crystallization (SIC) occurs in the soft segments. This process is governed by an entropy-enthalpy compensation mechanism to minimizes the net Gibbs free energy barrier ($\Delta G = \Delta H - T\Delta S$), which therefore establishes a synergistic balance between entropy gain ($\Delta S\uparrow$) due to domain disassembly and enthalpy release ($\Delta H\downarrow$) resulting from SIC-induced lattice ordering. Upon recovery, the reversible SIC interfaces release stored interfacial Gibbs energy (ΔGs) to compensate the conformational entropy loss ($-T\Delta S$), thereby facilitating molecular rearrangement. Consequently, the proposed elastomers exhibit minimal entropy penalties and achieve recovery efficiency over 88% along with a record tensile strength exceeding 80 MPa. Additionally, the elastomers show outstanding toughness, tear strength, and puncture resistance. This low-entropy-penalty strategy paves the way toward resolving the elasticity and strength conflict in elastomers, advancing the functional elastomer machines for engineering applications.] (Authors)] Address: Liu, D., State Key Lab. of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, 730000 China. Email: liudesheng@licp.cas.cn

25323. Barnes, L.A.; Wenban-Smith, E.; Skinner, G.; Dicks, L.V.; Millard, J.; Bladon, A.J. (2025): Differing impacts of livestock farming and ranching on aquatic insect biodiversity: A global meta-analysis. Global Change Biology, 2025; 31:e70513: 15 pp. (in English) ["Recent studies examining global insect biodiversity trends have shown declines for many terrestrial species but increases in some aquatic species, albeit with limited spatial coverage. However, the impact of a wide range of threats on insect biodiversity remains uncertain at a global scale. Livestock farming and ranching constitute approximately 30% of global land use and represent a major and growing threat to biodiversity. Although we know livestock farming and ranching affect aquatic macroinvertebrates via degradation of water quality and habitat, there are no global syntheses of the impacts of livestock on the biodiversity of aquatic insects. Here, we investigate the impact of livestock farming and ranching on the abundance and richness of five major aquatic insect orders: Ephemeroptera, Plecoptera, Trichoptera, Megaloptera, and Odonata. Our meta-analysis shows that livestock farming significantly reduces species richness of Ephemeroptera, Trichoptera, and Plecoptera compared to areas with no livestock present. In contrast, we found no overall

impact of livestock farming on the abundance of aquatic insects or individual orders, even after accounting for moderators such as livestock type, riparian vegetation presence, and stocking density. The apparent stability in insect abundance, combined with declines in richness, suggests there may be shifts in community composition that cannot be captured with a broad-scale analysis. Further research is needed at finer taxonomic resolution, coupled with increased reporting of quantitative stocking density and livestock water access, to better understand the apparently heterogeneous effects of livestock on aquatic insects and predict the impacts of further spread and intensification of livestock farming." (Authors)] Address: Barnes, L.A., Dept Zool., Univ. of Cambridge, Cambridge, UK

25324. Bez, M.; Itrac-Bruneau, R. (2025): Guide d'identification des Odonates protégés en Franche-Comté. Plan régional d'actions en faveur des libellules. Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés: 24 pp. (in French) [https://libellules.pnaopie.fr/-wp-content/uploads/2025/04/071-232AF-Guide-identification-libellules-protegees-FC-2 025-WEB.pdf] Address: Itrac-Bruneau, Raphaëlle, 8F, rue Maurice Deslandres, 21000 Dijon, France. Email: r.itracbruneau@yahoo.fr

25325. Bian, J.; Ma, Y.; Ling, H.; Zhou, X.; Liu, L.; Yuan, X.; Li, W.; Gai, M.; Arianpour, B.; Wang, S.; Zhou, Y.; Zhong, J.; Huang, Y.A. (2025): Scalable manufacturing of multifunctional insect wing membrane via interfacial lase-and-peel strategy. Science Advances 11(50): 15 pp. (in English) ["Insect wings have unique, irregular nanopillars with multifaceted properties. One of the great challenges in broader applications of insect wing–inspired surfaces is to mass-produce insect-wing nanoarchitectures (IWNs) on ultrathin and durable substrates that can be integrated onto any planar/nonplanar surfaces. This study presents a simple method for producing IWNs on ultrathin polyimide (PI) films. An ultraviolet laser irradiates the PI-glass interface, generating gas that induces the nucleation, growth, and coalescence of nanobubbles, leading to the formation of nanopillars at the interface. Mechanical peeling then delaminates the PI film from glass along the middle of these nanopillars, creating IWNs on both PI film and glass. The artificial wing membrane (thickness < 500 nanometers) closely mimics natural dragonfly wings and can be seamlessly integrated onto contact lenses, demonstrating enhanced optical and bactericidal capabilities. This approach offers exceptional dimensional compatibility and high-throughput, potentially addressing scalability limitations that hinder broader applications of insect wing–inspired superfunctional surfaces." (Authors)] Address: Huang, Y.A., State Key Lab. Intelligent Manufacturing Equipment & Technology, Huazhong Univ. of Science & Technology, Wuhan 430074, China. Email: yahuang@hust.edu.cn

25326. Borah, P.; Bora, N.; Das, S. (2025): Insect diversity in mullberry plantations: A study from Assam Agricultural University, Jorhat. Journal of Scientific Research and Reports 31(10): 36-41. (in English) ["A survey was conducted to study the diversity of insect species during February 2024 to February 2025 in the campus of Assam Agricultural University, Jorhat. Geographically, Jorhat is located at 116 Meters (381 ft) above MSL and 26.75°N latitude and 94.22°E longitude. The insect specimens were collected from the mulberry gardens located at different locations within the campus of Assam Agricultural University, Jorhat. From the study a high diversity of insect fauna in the mulberry plantations was recorded. The result of the diversity study revealed that Coleopteran (17 species) dominated the other insect fauna followed by Hymenoptera (12 species), Lepidoptera (10 species), Diptera (6 species), Odonata (4 species) and Hemiptera (4 species). A total of 53 insect species were collected and the species were identified with the help of existing literature. The knowledge compiled here will serve as valuable information for future studies aiming to understand more deeply the processes of speciation and faunal formation of insects in Jorhat. " (Authors) The following odonate species are documented: "Crocothemis tullia" (?, Neurothemis tullia, Crocothemis servilia?), Ictinogomphus rapax, Agriocnemis kalinga, Lestes praemorsus.] Address: Borah, P., College of Sericulture, Assam Agricultural Univ., Jorhat, India. Email: nanitaborah1@gmail.com

25327. Borisov, A.S.; Borisov, S.N. (2025): Distribution, habitat characteristics and northward expansion of Orthetrum albistylum (Selys, 1848) (Odonata, Libellulidae) in southern part of West Siberia, Russia. Euroasian Entomological Journal 24(4): 234-238. (in English, with Russian summary) ["O. albistylum was first recorded in West Siberia in 2020 in the extreme south of Altaiskii Krai. Further studies in 2021–22 and iNaturalist data from 2025 showed that this species is widespread across Altaiskii Krai. Eleven locations were identified, with the northernmost lying at 53°N. The species is confined to flowing water bodies such as canals and small rivers, as well as semi-flowing water bodies such as ponds on small rivers. It is hypothesised that, over the past two decades, the range of O. albistylum in southern part of West Siberia has expanded northwards by three degrees of latitude." (Authors)] Address: Borisov, S.N., Institute of Systematics & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. Email: borisov-s-n@yandex.ru.

25328. Brinesh, R.; Parthive, P.S. (2025): Biodiversity of odonates in the paddy wetland of Pannissery Padam near Sreekrishna College, Guruvayur, Thrissur, Kerala. Journal of Entomology and Zoology Studies 13(4): 306-310. (in English) ["The diversity of Odonate in a paddy field near Sreekrishna College, Guruvayur, was studied during the Kharif season from October to December 2024. A visual count was adopted to record the odonate diversity. Out of the 10 species identified and monitored, 4 species were in ... family Coenagrionidae, and 6 species in the ... family Libellulidae were identified during the study. During the 3-month period, an average of 411 individuals of odonate species was counted. Of these, Pantala flavescens was found in the maximum number, with 320 individuals, followed by Brachythemis contaminata with 40 individuals, Agriocnemis pieris with 25, and A. pygmaea with 22. The Shannon Diversity Index for this region is 2.539 and Margalef Richness Index is 1.828." (Authors)] Address: Brinesh, R., Department of Zoology, Sreekrishna College, Guruvayur, India. Email: brineshr@gmail.com

25329. Brucchieri, A.R. (2025): Characteristics of farm ponds that promote dragonflies as biological control agents in pasture systems. MSc thesis, Entomology, Faculty of the Graduate School of the University of Maryland, College Park: XI + 92 pp. (in English) [Anisoptera "are voracious insects that have dynamic relationships within their ecosystems due to their predatory lifestyle as aquatic nymphs and terrestrial adults. They are well documented bioindicators, as nymphs and adults. However, limited research has been conducted on their role as biological control agents in agricultural systems. Many species are dependent on lentic water systems for reproduction and in an altered landscape such as agricultural systems this could pose a problem. Farm ponds may support dragonfly nymphs that emerge as adults and subsequently provide biological control services in agricultural systems such as pastures. To better understand how

farm ponds can support dragonflies as biological control agents, I investigated farm pond characteristics that promote dragonfly reproduction, identified species of dragonflies that forage within or above agricultural fields and ponds and investigated dragonfly species that overlap the two habitats. I found that farm ponds supported 19 different species across 16 genera despite variation in water quality, vegetation cover, fish presence and macroinvertebrate community structure. There was an overlap of 14 dragonfly species that were able to successfully utilize farm ponds for reproduction and active cattle pastures as foraging sites. The dominant behavior over ponds was territorial displays and mating while the most common behavior over cattle was foraging. The results give a glimpse into how farm ponds of various features and under different management strategies can provide habitat for dragonfly species that act as biological control agents in livestock pastures." (Author)] Address: https://api.drum.lib.umd.edu/-server/api/core/bitstreams/40e26946-1851-49af-8885-162-eeb191964/content

25330. Buczyński, P.; Buczyńska, E. (2025): New records of Odonata (Insecta) from Finland with particular emphasis on Lapland and North Ostrobothnia. Polish Journal of Entomology 94: 145-156. (in English) ["The authors present dragonfly data collected mainly in central and northern Finland during the summer season in 2023-2025. A total of 27 species were recorded at 65 sites, including 16 species north of the Arctic Circle. This is a significant addition to the knowledge of the fauna of some poorly explored regions in Finland. From a zoogeographical perspective, the most significant is the first record of Onychogomphus forcipatus beyond the Arctic Circle and 270 km north of the current northernmost site. Also Lestes sponsa and Cordulia aenea were found outside the previously known range, and the records of Coenagrion armatum, C. pulchellum, Aeshna grandis, A. serrata, and Somatochlora flavomaculata are crucial for refining the boundaries of their distribution areas. The records of 13 threatened or near threatened species in Europe and the European Union are also valuable. … Aeshna caerulea was found at the largest number of sites (81.5%). Considering North Ostrobothnia and Lapland exclusively, this number was as high as 89.8%. A. caerulea also exhibited a very wide habitat range (from springs to peatlands). A. grandis, Somatochlora metallica, Coenagrion hastulatum, and Somatochlora arctica were recorded at many sites as well (at least 20%). Aeshna subarctica, A. juncea, and Leucorrhinia dubia were found at 10 to 20% of the sites. As many as 76.3% of the records (i.e. all data on the occurrence of a given species on a single day at a given site) included only 7 species, with the largest share of A. caerulea (25.1%), A. grandis (13.4%), and S. metallica (10.2%). The abundance of imagines varied significantly (1-218 ind.·100 m^{-1}), with a relatively low average number (26.1). Coenagrion hastulatum represented the largest share in this number, i.e. 40.3%. Moderate shares (6.9-9.0%) were also found for A. caerulea, Enallagma cyathigerum, Erythromma najas, Sympetrum danae, and A. grandis. The other 21 species accounted for only 20.5% of individuals recorded during the observations (Fig. 2B).] Address: Buczyński, P., Dept of Zoology and Nature Protection, Institute of Biological Sciences, Maria Curie-Sklodowska University, Akademicka 19, 20-033 Lublin, Poland. Email: pawel.buczynski@mail.umcs.pl

25331. Byeon, J.S.; Kim, D.G. (2025): Development of a wetland ecosystem health assessment method using benthic macroinvertebrate community. Wetlands 45, 4. (in English) ["Benthic macroinvertebrates are a major ecological group in freshwater ecosystems, exhibiting diverse adaptations depending on their habitat. Based on these characteristics, studies using benthic macroinvertebrate communities for aquatic ecosystem health assessments are currently being conducted worldwide, primarily focusing on lotic ecosystems such as rivers, and estuaries. However, due to the significant environmental changes caused by water flow affecting water quality, food sources, and microhabitats, it is essential to develop indices specialized for lentic ecosystems, which have different flow characteristics, to accurately evaluate their health. Therefore, this study aimed to develop a wetland health assessment index using benthic macroinvertebrates. Preliminary indicators were selected from domestic and international health assessment methods, and final indicators were chosen based on their correlation with water quality status, applicability in Korea, redundancy between indicators, and their reflection of wetland characteristics. The verification of each indicator was performed using benthic macroinvertebrate community data from 37 wetlands, while water quality data were used from wetland assessments conducted from 2018 to 2022. Evaluation scores were calculated based on the cumulative distribution function, reflecting the distribution of data for each indicator. The final indicators included the number of taxa, total individual density, the number and percentage of OCH (Odonata, Coleoptera, Hemiptera) taxa and individual density, non-insect taxa (%), Chironomidae spp. individual density (%), functional feeding groups (FFGs), and habitat-oriented groups (HOGs), with a total of eight indicators selected. We developed an index to effectively assess Korean wetland health, providing a foundational resource for health evaluations in Korea." (Authors)] Address: Kim, D.G., Insti. of Environmental Ecology, Sahmyook Univ., Seoul, Republic of Korea

25332. Cai, Y.; Ng, D.; Davison, G.W.H.; Seng, R.X.N.; Leong, B.P.I.; Tan, Y.H.J. (2025): The dragonflies of the southern Islands of Singapore. The Southern Islands Biodiversity Survey, Singapore. https://www.nparks.gov.sg/resources/southern-islands-biodiversity-survey-e-publication: 7 pp. (in English) ["Of the historically recorded 136 species of Odonata from Singapore, 42 species (31%) were found during recent surveys of the Southern Islands. Most are Libellulidae and there was only a low representation of forest-preferring damselflies. The results give a greatly expanded geographical coverage of the Southern Islands but demonstrate that there is still under-recording, shown by locality gaps in recording some of the common, highly mobile sea-crossing species that must be ubiquitous. Vegetation, habitat diversity and island size are identified as important determinants of community composition." (Authors)] Address: Cai, Y., National Parks Board, 1 Cluny Road, Singapore 259569

25333. Cantasano, N. (2025): Ecological and fluvial corridor of the Verri stream as a connecting step in the Natura 2000 Network along the Calabria Coastal region, Italy. Environments 2025, 12, 426. https://doi.org/10.3390/environments12110-426: 28 pp. (in English) ["In Calabria coastal regions, seaward and landward sides could be connected through the ecological role of fluvial catchments. Calabria Tyrrhenian coast shows a wilderness area, characterized by two terrestrial and marine Special Areas of Conservation (SACs) connected by the fluvial catchment of Verri stream. The bibliographic search was realized according to a Preferred Reporting Items for Systematic Reviews and Meta-Analysis, as a standardized method for screening the most relevant literature. The field survey, conducted in the study area, highlighted high biodiversity levels and a great natural heritage represented by 189 plant species and 130 animal ones. According to the resulting data, the basin represents a classical model of ecological corridor linking terrestrial and marine SACs, as cornerstones of Natura 2000 network, so representing the European assessment for

biodiversity conservation. This paper highlights the high biological richness of a wilderness area showing the tight relationship between the continental and the marine districts of the same coastal region. The main goal of the research is to remark the fundamental role of fluvial corridors within a regional approach where riverine catchments could represent the connecting steps of the network. In Calabria it is hopeful to establish a functional connectivity amongst protected areas supported by fluvial corridors along the regional basins." (Author) Coenagrion puella, Sympetrum flaveolum, S. pedemontanum] Address: Cantasano, N., Rende Research Unit, Institute for Agricultural and Forest Systems in the Mediterranean, National Research Council of Italy, Via Cavour, 4/6, 87036 Rende, CS, Italy. Email: cantasano@tiscali.it;

25334. Carachilo, I.; Starr, C.; Foster, R.; Arienzo, M.M.; Grant, C.J. (2025): Quantifying and classifying microplastics and microparticles across aquatic heterotrophs from headwater streams in central Pennsylvania. Journal of Freshwater Ecology 40(1), 2579096: 23 pp. (in English) [oas 840; "Microplastics (<5 millimeters) are a prominent contaminant globally, negatively affecting terrestrial, freshwater, and saltwater systems. Virtually no research has investigated microplastic contamination in remote, forested headwater streams in Pennsylvania. At five streams in central Pennsylvania, we assessed microparticle/microplastic contamination across three trophic levels: tertiary consumers (Salvelinus fontinalis), secondary consumers (Rhinichthys atratulus), and primary consumers (Trichoptera, Plecoptera, Ephemeroptera, Odonata, and Megaloptera). From 100-meter unblocked reaches, fish (n = 46 total, n = 21 tertiary consumers, n = 25 secondary consumers) and benthic macroinvertebrates (n = 106 total, Trichoptera: n = 40, Plecoptera: n = 39, Ephemeroptera: n = 22, Odonata: n = 4, Megaloptera: n = 1) were collected using standard wadeable stream sampling procedures. Fish gastrointestinal (GI) tracts and macroinvertebrates were digested in 10% potassium hydroxide (KOH) solutions, and microparticles were identified after vacuum filtration and visualization with a dissecting microscope at 45× magnification. Microparticles were categorized as microplastics at two of our five sites using μFTIR spectroscopy on Salvelinus fontinalis, Rhinichthys atratulus, and Plecoptera. Our efforts resulted in the identification of 159 microparticles and 5 microplastics among all heterotrophs across all sites. Microparticle contamination was highest among secondary consumers with no heterotroph or site effect on microparticle count ($p > 0.05$). The distribution of microparticle morphology and color combinations varied significantly across the heterotroph groups, and there were negative correlations between brook trout morphological characteristics and microparticle count (e.g. total length: $r = –0.62$, $p = 0.03$; weight: $r = –0.62$, $p = 0.03$; gastrointestinal tract weight: $r = –0.66$, $p = 0.02$). Negative relationships between size characteristics among all fish and microparticle count were expressed by d15N analysis ($r = –0.37$, $p = 0.03$). We believe that the disparity in microparticle contamination by fish size and between trophic levels is driven by divergences in feeding strategies, ontogenetic shifts in feeding behavior, and contrasts in life histories. Overall, our data highlight the presence of microplastic/-microparticle contamination in remote, forested headwater streams in Pennsylvania without any known upstream point-source pollution." (Authors)] Address: Carachilo, I., Pennsylvania Cooperative Fish & Wildlife Research Unit, Dept of Ecosystem Science & Management, Pennsylvania State Univ., University Park, PA 16802, USA. Email: ikc5068@psu.edu

25335. Castillo-Pérez, E.U.; Rivera-Duarte, J.D.; Abellán, P.; del-Val, E.; González-Tokman, D.; Córdoba-Aguilar, A. (2025): Thriving in the heat: How high temperatures and habitat disturbance shape odonate taxonomic and functional diversity in the tropics. Insect Conservation and Diversity 18(3): 343-356. (in English) ["Because insects are unable to regulate their body temperatures, they are vulnerable to rising temperatures and habitat disturbances that limit access to optimal microhabitats. This study examines how these factors affect the taxonomic and functional diversity of Odonata insects in a tropical dry landscape. We assessed taxonomic diversity using Hill numbers (0D, 1D, 2D) and functional diversity in preserved and disturbed sites within a tropical dry forest. Functional diversity was measured using the standardised effect size (SES) of functional richness, evenness, divergence and community-weighted means (CWMs), focusing on traits related to heat tolerance and resource acquisition (body colouration and size). Taxonomic diversity was positively related to high temperatures and vegetation in Anisoptera, with no relation for Zygoptera. The SES of functional richness for Zygoptera was higher in preserved areas, while anisopterans showed no changes. Only Anisoptera showed a negative correlation between functional evenness and maximum temperatures. Functional divergence in both suborders was higher in disturbed areas. In Anisoptera, the CWM of body colour lightness was higher in disturbed sites, but neither environmental factor affected the CWM of body size in either suborder. While disturbance limited trait variability in zygopterans, it favoured species with extreme traits in both suborders. Reduced trait variability in preserved sites may have affected adaptability to future disturbances. Our study highlights that Odonata communities maintain stable taxonomic diversity despite disturbances, but shifts in functional diversity could compromise their resilience and ecological roles." (Authors)] Address: Córdoba-Aguilar, A.; Instituto de Ecología, Universidad Nacional Autónoma de México, Circuito Exterior, Ciudad Universitaria, Coyoacán, 04510 México City, Mexico. Email: acordoba@iecologia.unam.mx

25336. Cawood, R.A.; Samways, M.J.; Pryke, J.S. (2025): Viable conservation of pondscapes includes the ecotones with dryland. Biological Conservation 302 (2025) 110944: 9 pp. (in English) ["Marshlands are ecotones between standing water and terrestrial environments, where aquatic and terrestrial species overlap. However, little is known about the assembly rules of organisms inhabiting this ecotone, which is inherently dynamic according to the amount of available water. We separated the waterbody/dryland ecotone of 22 standing waterbodies into five zones according to plant composition, structure, and water depth. Here, the waterbodies had limited inflows and outflows, and were highly responsive to seasonal precipitation events. We then determined the extent to which insect species assemblages change across the five zones and identify environmental factors driving these changes. Each zone had a characteristic suite of plant species, which differed greatly among the standing waterbodies. Dragonflies were present across the entire ecotone, although turnover peaked at the ecotone centre, while butterflies peaked in the grassland zone, along with some marsh-associated species. Grasshoppers preferred grassland associated with the smaller waterbodies. Dragonfly, grasshopper, butterfly, and plant species compositions each responded to their own sets of both aquatic and terrestrial variables. Overall, pond ecotones had high species turnover and high conservation value for both aquatic and terrestrial species, indicating that ponds have a much larger footprint than just the extent of wet areas. The terrestrial buffer zones are required for protection of the local biota. In turn, wet areas provide increased opportunities for dryland species. Buffer zones should be determined not so much in linear metres, but rather should also include dryland, which varies among waterbodies according to micro-

topography. Pondscape (all the standing waterbodies) conservation must include all the transition zones, so that the full habitat heterogeneity around such waterbodies is built into the set of functionally connected waterbodies." (Authors)] Address: Cawood, Rebecca, Dept of Conservation Ecology & Entomology, Faculty of AgriSciences, Stellenbosch Univ., Private Bag X1, 7602 Matieland, South Africa. Email: rcawood@sun.ac.za

25337. Chatterjee, T.; Chakrabarty, S.; Mitra, B.; Chaudhuri, P. (2025): Unveiling the association of mangrove flowering phenology on the dynamics of insect abundance. Acta Oecologica 126, 104052: 10 pp. (in English) ["Mangroves are ecologically unique ecosystems supporting large biodiversity. Climate change and anthropogenic interferences led to continuous decline of mangroves worldwide. Simultaneously, continuous decline in pollinators, have put these primarily insect-pollinated ecosystems under threat. Therefore, to understand seasonal and interannual variation in floral-visitor population, study of insect-visitor abundance in relation to flowering phenology is critical. In this context, present study (2022–2023) was conducted in the mangrove belt of Purba Medinipur, West Bengal, India. We observed quantitative floral availability as flowering phenology of four dominant mangrove species: Avicennia marina, Avicennia officinalis, Aegiceras corniculatum, and Acanthus ilicifolius. We also examined the seasonal and interannual variation in insect abundance within the mangrove community via pan traps. To identify potential pollinator groups among insects from the pan traps, we studied foraging behaviour of these insect visitors separately. Finally, we investigated the relationship between floral availability and insect-visitor abundance. In this study, a total 35 insect species of eight orders were collected across all pan traps, among which, 19 species were classified as potential pollinators. Hymenoptera was most abundant in pan trap captures, followed by Diptera, Lepidoptera and Coleoptera. Significantly higher insect abundance was observed during the peak flowering at community-level. There was no interannual variation in insect abundance between two years. This is the first comprehensive quantitative study identifying potential mangrove pollinators and demonstrating their positive relationship with floral availability, which affecting pollinator abundance. This also indicates that, steady supply of floral availability is required for maintaining the pollinator abundance in the community. ... Additionally, the traps collected small numbers of unidentified Hemiptera, Odonata, spiders (Araneae), and Collembola, none of which exhibited pollinator-like foraging behavior." (Authors)] Address: Chaudhuri, P., Dept Environ. Science, Univ. of Calcutta, 35, Ballygunge Circular Rd., Kolkata, 700019, West Bengal, India. Email: punarbasu_c@yahoo.com

25338. Chovanec, A.; Hilfert-Rüppell, D.; Wegl, P. (2025): Libellen (Insecta: Odonata) in der Umweltbildung. Acta ZooBot Austria 161: 133-155. (in German, with English summary) [Dragonflies are charismatic insects and widely regarded as flagships for conservation and connecting people with nature. This makes them ideal for increasing awareness for biodiversity issues. The present article aims to motivate those working in school and extracurricular environmental education, as well as in adult education, to engage with dragonflies. In this context, selected behaviours, which are generally easy to observe at standing and running waters, are shown and explained through photographs. Particular focus is laid on the behaviour of Calopteryx splendens and C. virgo. Additionally, opportunities are highlighted for implementing nature education through dragonfly-related information in the form of excursions, lectures, and workshops. Alongside selected dragonfly-related projects, the excursions at the garden exhibition 'Die Garten Tulln' are also presented.] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

25339. Christie, M. (2025): Ode to Odonata: Erythiagrion alidae and other damselflies. Bulletin of the Amateur Entomologists Society 83(558): 163. ["The article focuses on Maximilian Christie, an amateur entomologist and recipient of the Michael Majerus Grant from the Amateur Entomologists' Society, and his experiences studying damselflies, particularly the discovery and description of E. alidae, a new coenagrionid damselfly species from Peru's Amazon. Topics include field expeditions and specimen collection, behaviors and habitats of damselflies, and the process of describing a new species." (Author)] Address: Christie, M., Crossways, Mill Lane, Exeter, Devon, EX3 0PJ, UK. Email: m.c.f.christie@gmail.com

25340. Combey, R.; Adu, K.W.; LaDage, L.D.; Badu, I.; Ware, J.L. (2025): The secrets of the extreme durability of Odonata wings. Annals of the Entomological Society of America 118(6): 481-494. (in English) ["Essential properties considered in the design, fabrication, and application of contemporary bio/nanomaterials have been modeled on adaptations of biological systems, one of which is the robustness of insect wings. Proto-odonate wing development in Meganeuridae began during the Carboniferous period; over 350 million years of wing evolution has selected for agility and long-distance flight capacity in Odonata, making them suitable model taxa for bio-inspired design related to flight. Dragonfly species vary in flight behavior, reflected by variation in wing stiffness and flexibility due to differential venation patterns, wing biochemistry, and wing shape and size. We analyzed 8 distinct characteristics of dragonfly wings that are related to wing durability and could serve as bio-designs for novel technical innovations: venation, nano-architectural surface, pterostigma, antiwetting properties, antimicrobial properties, antifatigue features, antiaging features, and sensory structures. Specifically, we examined a tropical African species of Libellulidae, Aethriamanta rezia, using scanning electron microscopy and cuticular profiling, which revealed the presence of hydrocarbons responsible for these functions. Furthermore, we investigated the optical response of the wings within the UV-vis-NIR region. We discuss these wing features in the context of durability and environmental stresses." (Authors)] Address: Adu, K.W., Dept Physics, Pennsylvania State Univ. Altoona College, 3000 Ivyside Park, Altoona, PA 16601, USA. Email: cxa269@psu.edu

25341. Csutoros, A. (2025): Premières observations de Trithemis annulata (Palisot de Beauvois, 1807) en Pays de la Loire (Odonata: Libellulidae). Le Naturaliste Vendéen 15: 47-51. (in French) [22 juin 2025 l'étang nord, Saint-Valérien, Vendée, France] Address: Csutoros, Antoine, 48 Mail Gaston Bardet, 35190 Le Rheu, France. Email: antoinecsutoros@gmail.com

25342. Csutoros, A. (2025): Étude de la reproduction d'Oxygastra curtisii (Odonata: Incertae sedis) sur deux étangs en Mayenne (France). Martinia 38(4): 31-45. (in French, with English summary) ["Study of the reproduction of Oxygastra 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 (Louverné), and 151 at the Roche pond (Saint-Martin-du-Limet). 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 imagos 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." (Author)] Address: Csutoros, Antoine, 6 rue du Bois Jardin, 35190 Québriac, France. Email: antoinecsutoros@gmail.comntoine

25343. Cusmano, A.; Corso, A.; Surdo, S. (2025): Diplacodes lefebvrii (Rambur 1842) in Sicily with first evidence of reproduction (Odonata: Libellulidae). Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano 12(2): 87-90. (in English) [The recent discovery of D. lefebvrii on the island of Sicily (Italy) is reported, with a description of the habitat of two breeding populations and some morphological remarks on the imagoes. A total of six localities with records of of D. lefebvrii between 2022 and 2024 in Sicily is mapped.] Address: Surdo, S., Dept of Agricultural, Food, and Forestry Sciences, University of Palermo, Italy. Email: salvatore.surdo@unipa.it

25344. Dalu, T.; Zantsi, B.P.; Wu, N.; Cuthbert, R.N. (2025): Effects of water and sediment chemistry variables on aquatic macroinvertebrate community structuring in a subtropical Austral river system. Environmental Science and Pollution 32(4): 1830-1845. (in English) ["Riverine physical and chemical characteristics are influencing ecosystem integrity while shaping and impacting species richness and diversity. Changes in these factors could potentially influence community structuring through competition, predation and localised species extinctions. In this study, eight sampling sites over multiple seasons were assessed along the streams draining the City of Nelspruit, South Africa, to examine river health based on water and sediment quality, while using macroinvertebrates as bioindicators for pollution. All water variables with the exception for salinity were found to be significantly different among seasons, with sites having significant differences among all water variables. All sediment chemistry variables were also found to be significantly different among sites and seasons, with the exception of K for sites and Zn and Ca for seasons. The PCA factor loadings and two-cluster analysis identified two groupings, i.e. group 1 that consisted of all metals apart from K and Na and group 2 with K and Na metals. A total of 4470 macroinvertebrate taxa were identified, with Crustacea Caridina nilotica and Diptera Chironominae being dominant across seasons, with macroinvertebrate communities being found to be significantly different among sites and seasons. The most common functional feeding groups across sites were the collector–gatherers (52.2%), followed by collector–filters (26.8%), predators (16.4%), scrapers (4.4%) and shredders (0.1%). Boosted regression trees indicated that high variation in species richness occurred with change in resistivity, P, water pH, ORP, conductivity and S concentrations. These results evidence a strong linkage among the sediment, water quality, substratum embeddedness and habitat structure and community structure. It is important to protect the integrity of aquatic ecosystems through effective monitoring due to the increasing water and sediment quality pressures that arise from various anthropogenic activities." (Authors) Chalcostephia flavifrons] Address: Dalu, Tatenda, School of Biology & Environmental Sciences, Univ. of Mpumalanga, Nelspruit, 1200, South Africa

25345. Dantas, C.; Simas, R. (2025): Predation of Dione juno juno (Lepidoptera: Nymphalidae) by Erythemis vesiculosa (Odonata: Libellulidae) in a Caatinga–Atlantic Forest ecotone, with a review of butterfly predation by dragonflies. Food Webs 45, December 2025, e00425: 4 pp. (in English) ["Predation events linking aquatic predators to terrestrial prey can shape energy flow in ecotonal landscapes but remain poorly documented. Here we report the first record of predation on the heliconiine butterfly Dione juno juno by Erythemis vesiculosa in a Caatinga–Atlantic Forest ecotone in Bahia, Brazil. On 6 October 2024, at the campus of the State University of Feira de Santana (northeastern Brazil), we photo-documented an adult Erythemis (~38mm) perched on shrubby vegetation handling an adult D. j. juno (~32mm). The dragonfly grasped the butterfly with its forelegs and consumed the head and anterior thorax—prey-handling behavior typical for libellulids. The event occurred within an anthropized mosaic of shrub–herb vegetation and forest fragments. This observation expands current knowledge of the opportunistic diet of Erythemis, reinforces its role as a generalist predator of flying insects, and underscores the value of ecotones as natural laboratories to study insect predator–prey interactions. Given ongoing habitat fragmentation and climate change in these transition zones, opportunistic, photo-vouchered records such as this can complement systematic surveys and help quantify cross-habitat predation pressure on Lepidoptera. In addition, we provide a brief review of published cases of butterfly predation by dragonflies across different biogeographical contexts, which places our record into a broader comparative framework and highlights the underreporting of this phenomenon." (Authors)] Address: Dantas, C., Universidade Estadual de Feira de Santana, Programa de Pós-Graduação em Ecologia e Evolução, Feira de Santana, Bahia, Brazil. Email: caidanvas@gmail.com

25346. Datta Mudi, S.; Saha, G.K.; Aditya, G. (2025): Mosquito egg raft predation by dragonfly larva: prospects for biological control. Zoology and Ecology 35(2): 115-117. (in English) ["This study documents mosquito (Diptera: Culicidae) egg raft consumption by … Pantala sp., the dragonfly larva consumed about seven egg rafts of the culicine mosquito Culex tritaeniorhynchus in mosquito-rearing trays. The average time taken by the larvae for consumption of an egg raft (egg count 132.333 ± 13.642, length 3.19 ± 0.317 mm, mean ± SE) was 56.57 ± 2.22 seconds (n = 7). While mosquito egg predators are known from different taxonomic groups, the present observation provides evidence for an alternative mode of biological control for mosquitoes, considering that dragonfly and mosquito larvae coexist in similar habitats." (Authors)] Address: Aditya, G., Dept of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata-700019, India. Email: gautamaditya2001@gmail.com

25347. De Haro-Guijarro, S.; Chico-García, M.A. (2025): Los odonatos (Insecta: Odonata) del Parque Periurbano de la Dehesa de Santa Fe, Granada (Sureste de España), y apuntes sobre su conservación. Boletín de la SAE Nº 35: 121-128. (in Spanish) ["15 species were recorded, of which 4 belong to Zygoptera and 11 to Anisoptera. All of them appeared at least once within the administrative limits of the PPDSF, both on the edge and in the pine forest. The most common species was Sympetrum fonscolombii, while Ischnura graellsii, Orthetrum cancellatum, O. chrysostigma, O. coerulescens, Diplacodes lefebvrii and Anax parthenope were only observed once. Sympetrum striolatum was only recorded in the pine forest, and other species recorded in this habitat were Anax imperator, Trithemis annulata, S. fonscolombii and Crocothemis erythraea. Teneral individuals of I. graellsii and O. chrysostigma were observed, territorial flights of A. parthenope, A. imperator, Trithemis kirbyi, T. annulata, C. erythraea and S. fonscolombii, tandem flights of I. graellsii,

Erythromma viridulum, Erythromma lindenii, S. fonscolombii and Enallagma cyathigerum, and females of S. fonscolombii and E. viridulum laying eggs." (Authors/Google translate)] Address: De Haro-Guijarro, S., Agrupación de Voluntariado Ambiental de Santa Fe-AUCA, C/ Rosa de Luxemburgo 30, 18320 Santa Fe (Granada), Spain. Email: amunosporfandangos-@gmail.com

25348. Dolai, S.; Samanta, A.K.; Mallick, Md. A.I. (2025): Diversity and distribution of Odonates in a coastal ecosystem of Namkhana, West Bengal, India. Munis Entomology & Zoology 20(1): 1610-1630. (in English) ["Dragonflies are aquatic insects that are intimately tied to the presence of freshwater ecosystems. The decline of dragonfly populations in rural areas can be attributed to various factors, including habitat destruction, water pollution, and altered ecosystem dynamics. This comprehensive study investigated the diversity and distribution of Odonates in a coastal ecosystem of Namkhana, West Bengal, India. A total of 39 species were recorded, comprising 26 dragonflies and 13 damselflies, across four sites with distinct biodiversity profiles. Statistical analysis revealed significant variations in species composition, abundance, and distribution patterns across the grids, with Grid 4 emerging as the most diverse. Seasonal monitoring showed changes in species distribution and abundance, with some species exhibiting significant increases or decreases during different seasons. Behavioral aspects, including feeding other odonates, egg-laying, mating, territorial defense, and communal roosting, were also explored. Advanced statistical analyses, including species packing curve, abundance, and paired group UPGMA hierarchical cluster analysis were employed to elucidate the ecological patterns. Alpha diversity analysis and individual rarefaction analysis provided further insights into species diversity. The findings highlight the importance of conservation efforts to protect these vulnerable species and their habitats, and provide valuable insights into the ecological significance of Odonates in coastal ecosystems." (Authors)] Address: Mallick, Md. A.I., West Bengal Biodiversity Board, Prani Sampad Bhawan, 5th Floor, Salt Lake, LB-2, Sector-III, Kolkata, West Bengal - 700106, India. Email: imranmallick708@gmail.com

25349. Doucet, G.; Itrac-Bruneau, R.; Mora, F.; Dehondt, F.; Durlet, P. (2025): Chronique d'une disparition: le cas de Nehalennia speciosa (Charpentier, 1840) en Franche-Comté, seule station française contemporaine (Odonata: Coenagrionidae). Martinia 39(11): 79-88. (in French, with English summary) ["Chronicle of a disappearance: the case of Nehalennia speciosa in Franche-Comté, the only contemporary French station – N. speciosa was rediscovered in mainland France in 2009 in a peat bog in Franche-Comté. The collection of exuviae and observation of emergences in 2011 confirmed that the species was well established at the site. The following year, a count of imagos revealed the presence of more than 450 individuals. Subsequent counts showed a drastic decline in numbers to fewer than 20 individuals. The species was also searched for in similar peat bogs on the outskirts of the site within a 15 km radius, but these searches proved unsuccessful. After the last observations in 2018, no individuals were recorded at the site. It can therefore be considered that the species is no longer present in this bog, and by extrapolation in France. The main causes of this disappearance are likely to be drought episodes and heatwaves, the isolation of the population but also the overcrowding of this small site by some naturalists. As for the presence of the species at the site, two hypotheses have been put forward, the most likely of which seems to be colonisation by individuals from the east (Switzerland?), as during the same period, the taxon was discovered or rediscovered at several Swiss and Italian sites." (Authors)] Address: Doucet, G., 2 rue de la Grette, 25 000 Besançon, France. Email: guillaume.doucet-@yahoo.fr

25350. Elme-Tumpay, A.; Meléndez, J.M. (2025): First record of Tigriagrion aurantinigrum (Odonata: Coenagrionidae) from Peru. Notulae odonatologicae 10(6): 215-221. (in English) ["T. aurantinigrum is recorded for the first time in Peru. This finding extends the known distribution of the species 400 km westward to the Amazon department of Madre de Dios." (Authors)] Address: Elme-Tumpay, A., Laboratorio de Biodiversidad y Genética Ambiental (BioGeA), Universidad Nacional de Avellaneda, Mario Bravo 1460, CP1870 Piñeyro, Avellaneda, Buenos Aires, Argentina.

25351. Fahrenholz, A. (2025): Eine aufgegebene Sandgrube in Mittelhessen als Lebensraum für Ischnura pumilio und Lestes sponsa (Odonata: Coenagrionidae, Lestidae). Libellen in Hessen 18: 67-81. (in German) ["During a volunteer survey of a disused sand pit in the Marburg-Biedenkopf district, the dragonfly fauna was recorded. The survey, conducted in the summer of 2024, identified 23 dragonfly species, including rare or endangered species in Hesse such as I. pumilio and L. sponsa. The occurrence of selected species is discussed, as are past, current, and potential future management measures. With appropriate conservation management, mining sites can provide valuable habitats. To ensure these habitats persist even after mining activities cease, conservation management should be maintained." (Author/Google translate)] Address: Fahrenholz, A., Ellernbroek 25, 26817 Rhauderfehn, Gemany. Email: arnefahrenholz@posteo.de

25352. Fédération Aude Claire (2025): Les Odonates patrimoniaux du département de l'Aude. Les documents naturalistes de la Fédération Aude Claire: 39 pp. (in French) [The following species are treated in detail: Coenagrion hastulatum, C. mercuriale, Lestes dryas, L. sponsa, Aeshna juncea, Gomphus graslinii, Stylurus flavipes, Oxygastra curtisii, Macromia splendens, Somatochlora arctica, Leucorrhinia dubia, Sympetrum danae, S. flaveolum] Address: https://libellules.pnaopie.-fr/wp-content/uploads/2025/10/Livret-Odonates-patrimoniaux-Aude-2025VFF3.pdf

25353. Forouzesh, M.A.; Nili-Ahmadabadi, M.; Drafsh, Z.; Ha, M.Y. (2025): Shape optimization of a dragonfly-inspired corrugated airfoil in ultralow Reynolds flow regimes via a genetic algorithm. Journal of Mechanical Science and Technology 39(11): 6465-6478. (in English) ["Recent studies have claimed that bioinspired corrugated airfoils outperform conventional airfoils in terms of aerodynamic performance at ultralow Reynolds flow regimes. This study focused on optimizing the shape of a corrugated airfoil inspired by the cross-section of a dragonfly wing under different flight conditions at Reynolds numbers (Re) of 1000 and 10000. The first objective was to maximize the lift-to-drag ratio, which is critical for gliding as well as flapping during the downstroke of dragonfly wings. The second objective was to minimize drag at minimum lift, which is crucial during the upstroke phase of flapping flight. The optimization process was performed using a genetic algorithm via MATLAB's "ga" function, which was integrated with the Fluent software to solve two-dimensional, laminar, incompressible Navier–Stokes equations. The upper surface points of the corrugated airfoil were used as the initial 17 geometrical variables with constraints imposed to maintain the plate thickness and to fix the leading and trailing edges. The results of the first optimization demonstrated that the zigzag pattern of the corrugated airfoil was eliminated, and

the shape converged to a cambered plate. As a result, the optimized cambered plate achieved lift-to-drag ratios of 5.65 at Re = 1000 and 12.23 at Re = 10000, representing 50 % and 96 % improvements over the original corrugated airfoil, respectively. This significant performance improvement rejected the superior aerodynamic performance of the bio-inspired corrugated airfoil for steady-state flight conditions at ultralow-Re flow regimes. The optimization process increased the lift coefficient significantly, and the overall drag coefficient only slightly increased. Notably, the pressure drag decreased, while the friction drag increased. The second optimization also eliminated the zigzag pattern, and the geometry converged to a flat plate. Generally, although the zigzag pattern reduced the friction drag due to the negative shear stress in the vortex region within the cavities, it increased the pressure drag. These findings offer a clearer understanding of how optimized geometries outperform traditional corrugated designs, under steady-state flight conditions at ultralow-Re flow regimes." (Authors)] Address: Nili-Ahmadabadi, M., Dept Mechanical Engineering, Isfahan University of Technology, Isfahan, Iran

25354. Garcia Junior, M.D.N.; Damasceno, M.T. dos S. (2025): New records of damselflies (Odonata-Coenagrionidae) for Amapá, Brazil. EntomoBrasilis 18, e1133: 3 pp. (in English) ["The order Odonata has approximately 7,000 species worldwide, of which just over 900 are registered in Brazil. Even with this high diversity, many regions of the country have little data on the order, such as the state of Amapá. Thus, the objective of this work is to present the first records for the state of the species Epipleoneura albuquerquei and Neoneura confundens. The species were collected between February and March 2025 in the area known as the Amcel waterfall, in the municipality of Tartarugalzinho. The number of studies on Odonata in Amapá is still low: only 121 species were previously recorded in the state, a number that rises to 123 with the new occurrences. However, new studies should increase knowledge about the odonatofauna of Amapá." (Author)] Address: Garcia Junior, M., Univ. Estadual do Amapá, Macapá, AP, Brazil.

25355. García-Bravo, C. (2025): Primeros registros de Onychogomphus forcipatus ssp. unguiculatus (Van der Lynden, 1823) [sic] en el tramo bajo del río Manzanares (Getafe, Comunidad de Madrid). Graellsia 81(2): e804. https://graellsia.-revistas.csic.es/index.php/graellsia/article/view/804: 6 pp. (in Spanish, with English summary) ["First records of O. forcipatus unguiculatus in the lower section of the Manzanares River (Getafe, Community of Madrid) - The Community of Madrid, despite its diversity of aquatic habitats, has been little studied in terms of odonates. In this context, the finding of several specimens of O. forcipatus unguiculatus in the lower reach of the Manzanares River... is particularly noteworthy. This subspecies, sensitive to environmental degradation, typically inhabits well-preserved rivers, which contrasts with the expected quality of the riverbed near urban areas. The observations were made during regular sampling as part of ongoing odonate monitoring efforts in Getafe and were thoroughly documented, including reproductive behaviors. This river reach shows signs of ecological alteration due to constant flows from wastewater treatment plants, which have modified the traditional river dynamics. Therefore, these records not only extend the known regional range of the species but also suggest a positive change in the biological quality of the river in this area." (Author)] Address: García-Bravo, C., Asociación para el Seguimiento de la Biodiversidad de Getafe: Getafe, Madrid, Spain. Email: cristiangarciabrav@gmail.com

25356. Ghaliow, M.; Aboshaala, F.; Elsowayeb, A.A.; Samraoui, B. (2025): Breeding ecology of Lindenia tetraphylla in northern Libya (Odonata: Gomphidae). Notulae odonatologicae 10(6): 222-230. (in English) ["Recent evidence indicates that L. tetraphylla is expanding into parts of its former western Mediterranean range by utilizing both natural and artificial wetlands. The species has now established populations across a broad coastal and sub-coastal zone in several Mediterranean Basin countries. We investigated a lake in the Tawergha region of northwestern Libya and confirmed breeding presence of the species. Recurrent sightings, along with observations of flight periods, mating behaviour, and emergence, indicate a resident population and suggest a univoltine life cycle. However, larval studies are required to confirm this." (Authors)] Address: Ghaliow, M., Dept Zoology, Fac. of Sciences, Misurata Univ., Misurata, Libya

25357. Gomes, TC.; Farias, A.B.S.; Santiago, M.M.; Venancio, H., Santos, J.C. (2025): A preliminary view of the odonatofauna from the Poxim-Açú River, São Cristóvão, Sergipe, Brazil. Biota Neotropica 25(4): e20251814: 14 p. (in English, with Portuguese summary) ["n Brazil, there is a growing body of scientific research focused on odonatofauna, however, some areas remain poorly explored, especially in the northeast region, where the aquatic environments of different ecosystems still have largely unknown faunal compositions. To bridge these knowledge gaps, we aimed to produce a preliminary checklist of the Odonata fauna of the Poxim-Açú River, located in the municipality of São Cristóvão, Sergipe, Northeastern Brazil. We recorded 41 species among the 489 individuals collected, including 9 new genus records and 14 new species records for Sergipe. We present a list of species with illustrations, describe community parameters, and emphasize the importance of conserving natural areas and monitoring disturbed habitats within the Atlantic Forest of Sergipe." (Authors)] Address: Gomes T.G., Univ. Federal de Sergipe, Programa de Pós-Graduação em Ecologia e Conservação, São Cristóvão, SE, Brasil. Email: jcsantosbio@gmail.com

25358. González, E.; Duque, G.; Cogua, P. (2025): Macroinvertebrados bentónicos como bioindicadores del impacto acuícola en la calidad del agua del Lago Guamuez, Nariño, Colombia. Revista MVZ Córdoba 30(3):e3758: 11 pp. (in Biotic indices; rainbow trout; bioindicators; water quality; pollution (Sources: MeSH, FAO).) ["Objective. This study aimed to evaluate the composition and diversity of benthic macroinvertebrates as bioindicators of water quality in three trout farms located in the Lake Guamuez basin, Nariño, Colombia. Materials and methods. Sampling was carried out during periods of high and low precipitation in 2021, using a Van Veen grab with a mesh size of 0.5 mm to collect benthic organisms at six sites: three within aquaculture production zones and three control sites. Diversity indices (Shannon-Weaver, Margalef, Berger-Parker, Pielou) and the BMWP-Col index were calculated, and statistical differences between zones and seasons were assessed using ANOVA and Tukey tests. Results. A total of 1,780 individuals belonging to seven families were identified, with Chironomidae being the dominant group in aquaculture zones. Diversity indices showed significantly lower values at the trout farm sites compared to control sites ($p<0.05$), indicating reduced richness and equitability, along with increased dominance of tolerant taxa. No significant seasonal differences were observed. Conclusions. The study demonstrates that intensive aquaculture exerts measurable impacts on the benthic macroinvertebrate community, reducing its diversity and favoring tolerant species such as Chironomidae. These findings underscore the need for implementing environmental monitoring and management strategies to mitigate potential ecological degradation in high-Andean

lakes." (Authors)] Address: González, E., Univ. Nacional de Colombia, Fac. de Ciencias Agropecuarias, Palmira, Valle del Cauca, Colombia. Email: edagonzalezle@unal.edu.co

25359. González-Soriano, E.; Noguera, F.A.; Peredo, C.D.V.S. (2025): Odonata from a Tropical Dry Forest in Huatulco, Oaxaca, Mexico. Odonatologica 54(3/4): 181-198. (in English) ["A total of 587 adult Odonata belonging to six families, 25 genera, and 52 species were collected in 2005 from the tropical dry forests of Huatulco, Oaxaca, Mexico by bimonthly samplings of five days each for one year. Libellulidae with 26 species was the richest family, followed by Coenagrionidae (18), Calopterygidae (3), Aeshnidae and Gomphidae (2), and Lestidae (1). Argia with nine species was the most speciose genus, followed by Erythrodiplax (4), Dythemis, Erythemis, Hetaerina, Micrathyria, and Macrothemis (3). The remainder of the genera were represented by only two or one species. The observed species richness represented approximately 85.9% of the estimated species richness for Huatulco. Maximum values of species richness, abundance, and diversity apparently coincide with the months of greatest rainfall. No relationship between phylogenetic diversity with temperature and precipitation was found." (Authors)] Address: González-Soriano, E., Instituto de Biología, Depto de Zoología, UNAM, Apdo. Postal 70-153, CP 04510, Ciudad de México

25360. Goodman, A.; Rhema Uche-Dike, R.; Gamett, E.; Hulick, C.P.; Ware, J.L. (2025): From swamps to software: a comparison of field and modeled dragonfly richness. International Journal of Odonatology 28: 171-186. (in English) ["Biodiversity monitoring is crucial for detecting species declines and informing conservation efforts; however, traditional field-based surveys are constrained by time, resources, and geographic scale. Ecological Niche Modeling (ENM) provides an alternative using large citizen-science datasets but requires validation against empirical data. Here, we compare field-collected and ENM-derived estimates of species richness for Anisoptera species across southeastern Australia, assessing concordance and strength of each approach. We conducted field surveys at 42 localities across New South Wales and Victoria, collecting 476 individuals representing six families, 18 genera, and 33 species. Using occurrence records from GBIF, we generated a stacked richness map, derived from individual species ENMs. While modeled richness predominantly overestimated richness at field sites, we observed two instances of oversampling in field data, where richness exceeded model predictions. Field-based richness exhibited no significant relationships with elevation, latitude, or longitude, most likely due to limited sampling effort and spatial coverage. In contrast, ENM-based richness declined significantly with elevation and increased with latitude and longitude. However, rank-based correlations found significant associations between field-based and ENM-based richness estimations, suggesting broadscale patterns can still be estimated from field data. Our data highlights the complementary value of field surveys and ENM, in which broadscale richness gradients can be identified, while also capturing local-scale variation and validation of predictions." (Authors)] Address: Goodman, A., Division of Invertebrate Zoology, American Museum of Natural History, New York, NY 10024, USA. Email: agoodman@amnh.org

25361. Gupta, A.; Svensson, E.I.; Frietsch, H.; Tsuboi, M. (2025): Persistence of the ecological niche in pond damselflies underlies a stable adaptive zone despite varying selection. Journal of Evolutionary Biology 38(6): 728-743. (in English) ["Following the development of regression-based methods to estimate natural and sexual selection, evolutionary biologists have quantified the strength, mode and direction of selection in natural populations. Although this approach has been successful, its limitations include the lack of replication across species, which compromises the generality of the inferences beyond microevolutionary time scales. Here, we carried out a comparative study of selection on wing shape and body size across multiple populations of two closely related pond damselflies: Enallagma cyathigerum and Ischnura elegans. We found weak stabilizing selection on wing shape in both sexes, and no evidence that selection on this trait differed between the species. In contrast, selection on body size was curvilinear in males and directional in females, with differences in form (males) and intensity (females) between the species. By analyzing selection in each local pond, we found that selection on male body size was shaped by various population characteristics that reflect local mating systems. Furthermore, the relationship between mating system characteristics and directional selection was remarkably consistent across these species. Finally, we present a graphical model that links contemporary selection with macroevolution. Based on this model, we conclude that the persistence of ecological modes of life in pond damselflies explains why varying selection in nature may still result in a stable adaptive zone lasting millions of years." (Authors)] Address: Tsuboi, M., Department of Biology, Lund University, Sölvegatan 37, 22362 Lund, Sweden. Email: masa.tsuboi@gmail.com

25362. Han, D.; Shi, X.; Zheng, Y. (2025): Ground effect on the aerodynamic characteristics and flow structure of a hovering dragonfly. Physics of Fluids 37(7), 071917 (2025): (in English) ["The ground effect of a hovering dragonfly was investigated through numerical simulations of both two-dimensional and three-dimensional dragonfly wings. An immersed boundary method, enhanced with a prediction-correction multi-direct forcing scheme and a smoothed discrete delta function, was employed. The inverse distance weighting interpolation was introduced to address the interpolation on a refined mesh. For two-dimensional simulation, the ground effect was divided into three regions: force enhancement, force reduction, and force recovery region. Various mechanisms, such as early or delayed vortex shedding, wall extrusion, vortex integration, and reattachment, were observed. Additionally, the vortex remained near the ground, altering the velocity difference between the wing and surrounding fluid through induced velocity. This led to a significant change in pressure on the windward side. A hysteresis phenomenon was discovered: in the force enhancement region, vertical force coefficient peaked at a later time. For three-dimensional simulation, the presence of ground resulted in a decrease in time-average vertical force coefficient. Additionally, the magnitude of this reduction diminished as the distance between the wing and ground increased. The influence of ground was primarily reflected in the more rapid growth of the vertical force coefficient during the initial stage of the downstroke, the magnitudes of its peak and trough values. These changes were attributed to alterations in the strength and state of the vortex near the wing, along with the induced effect of the rebounded vortex. It is more obvious during the downstroke that the downward velocity of the flow was enhanced, which causes the reduction of the relative inflow velocity to the wing." (Authors)] Address: Shi, X., School of Aeronautics and Astronautics, Zhejiang University, Hangzhou, Zhejiang 310027, China. Email: shix@zju.edu.cn

25363. Haneef, K.A.R.M.; Chandran, A.V., Sawant, D.; Beevi, Y.P.M.; Koparde, P.; Kunte, K. (2025): Description of Protosticta sooryaprakashi sp. nov. (Odonata: Zygoptera: Platystictidae) from the Western Ghats, India. Zootaxa 5723(3): 359-383. (in English) ["We erect a new species of damselfly, Protosticta sooryaprakashi sp. nov. from Sampaje, Kodagu District, Karnataka, India (type specimens are deposited in the Biodiversity Lab Research Collections, currently held at the National Centre for Biological Sciences, Bengaluru). Morphologically, this species shows close affinity with the members of the P. sanguinostigma Fraser, 1922 group; however, it is distinguished by unique features in its prothorax, caudal appendages, and accessory genitalia. Additionally, the analyses also revealed a significant genetic distance between the new species and other species of this group. We present an updated identification key to the males of Protosticta Selys, 1885 species in the Western Ghats, incorporating newly available diagnostic information." (Authors)] Address: Haneeff, K.A.R.M., Dept Botany, Government Brennen College, Thalassery, Kannur, Kerala, 670106, India. Email: haneefmangad@gmail.com

25364. Hedges, B.A.; Beasley-Hall, P.G.; Dorey J.B.; Weinstein, P.; Austin, A.D.; Guzik, M.T. (2025): Environmental DNA reveals temporal and spatial variability of invertebrate communities in arid-lands ephemeral water bodies. Marine and Freshwater Research 76, MF24243. doi:10.1071/MF24243: 13 pp. (in English) ["Throughout semi-arid and arid Australia surface freshwater is rare, and where it does occur, it is often ephemeral. This is the case for freshwater granite rock-holes throughout much of southern Australia. Rock-holes support freshwater invertebrate communities, but the ongoing threat of climate change means that this ecosystem is likely to experience hydrological disruptions. Rockholes are also likely to be heavily affected by invasive vertebrates such as feral goats, leading to declining water quality. However, the ecology of this ecosystem is poorly understood despite its relative ecological significance and the extent of its associated threats. Aims. To provide a baseline ecological understanding of this ecosystem, we documented species richness and variability at a series of rock-holes in the Gawler bioregion in South Australia. Methods. We targeted invertebrate taxa present in seven rock-holes, using an environmental DNA approach. Freshwater samples were extracted and sequenced using COI insect–mollusc primers and 16S rRNA crustacean primers. Key results. Metabarcoding recorded invertebrates from 22 orders and 45 families. Community composition varied among rock-holes and throughout the year, with a peak in species richness in winter. Conclusions. Our findings demonstrate the importance of these ecosystems to a range of endemic taxa, and the validity of environmental DNA metabarcoding as an approach for assessing the community composition of rock-hole invertebrates. Implications. We propose establishment of monitoring programs, development of custom barcode reference libraries for the rock-hole ecosystem, and future research into the likely impacts of climate change on the communities associated with them." (Authors) Taxa - including Odonata - are treated at order level.] Address: Hedges, B.A., School of Biological Sciences & the Environment Institute, University of Adelaide, Adelaide, SA 5005, Australia. Email: brock.hedges@adelaide.edu.au

25365. Hezil, W. (2025): Les macroinvertébrés de deux bassins versants du nord-est algérien: wilaya de Khenchela. Doctoral dissertation, Laboratoire de domiciliation: Laboratoire de Conservation des Zones Humides, Département d´Ecologie et Génie de l´Environnement, Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de L'Univers, Université 8 Mai 1945 Guelma: 231 pp. (in French, with English summary) ["Wetlands are vital for human survival and are among the most productive environments on the planet. However, studies show that wetlands are experiencing a continuous decline in quality due to threats from pollution and climate change. Like other countries, Algeria has made significant conservation efforts to curb the erosion of biodiversity caused by climate change, which threatens ecosystem functions and services. Aquatic macroinvertebrates are an important link in the food chain and are known as good bioindicators of the health of aquatic ecosystems due to their varying tolerance to pollution and habitat degradation. Our research question focuses on the influence of environmental pollution on the abundance, spatial distribution, and species diversity of benthic macroinvertebrates. The temporal study covers the period from 2019 to 2021, while the spatial study encompasses watersheds in the Khenchela province, using simple random sampling across 17 sites. The inventory includes 12,030 individuals distributed across 12 orders. The populations are composed of invertebrates (98%) and vertebrates (only 2%). Among the invertebrates, insects are dominant, primarily represented by Ephemeroptera (61%) and Trichoptera (13%), followed by Coleoptera (7%), and Odonata (10%). Diptera and Hemiptera are present in small numbers. During this study, surveys yielded a total of 273 odonate specimens, predominantly from the suborder Anisoptera, representing 71% of the total collected individuals (193 specimens). In comparison, Zygoptera represent 29% of the total, with 80 individuals. These dragonflies belong to a total of four families, comprising four different species, with the Gomphidae family showing a clear dominance, represented by the most abundant species, Onychogomphus uncatus. During the sampling campaigns, 752 individuals were collected, belonging to three distinct families, encompassing seven species. …. The results will constitute a pioneering study on macroinvertebrates, providing valuable data for the assessment, monitoring, and conservation of ecosystems in the Khenchela province." (Author/Google translate)] Address: https://dspace.univ-guelma.dz/xmlui/handle/123456789/18721?show=full

25366. Holmes, A. (2025): Are British Dragonflies building up a "climatic debt"? Range shifts of British Odonata1990 to 2024. Journal of the British Dragonfly Society 41(1): 120-137. (in English) ["Where there is sufficient data to calculate occupancy at a 100 m square resolution, the change in the fifth most northerly and southerly records and the median changes in latitude and longitude have been calculated for populations of British odonates in response to climate change over the period 1990-2024. For zygopteran species, the average median latitude is moving north at 1.85 km/year and, for anisopteran species, at 2.86 km/year. Some species have extended their range much faster than this and faster than the estimated climate change. So, some at least will not face a 'climate debt' if there is receiving habitat availability, but many species are building a climate debt. Species that are cold-adapted or sensitive to drought and specialists that may not be able to extend their ranges, will thus need conservation action to mitigate the effects of climate change to enable their survival. Orthetrum coerulescens has spread east over the period of study and Aeshna grandis has a notably more southerly distribution than would be predicted from its European distribution. (Author)] Address: Holmes, A., 10 Lockyer Cl. Winnersh. RG41 5RR, UK. Email: alansholmes@gmail.com

25367. Huang, A.; Cocconi, L.; Nicholls-Mindlin, B.; Alexandre, C.; Salbreux, G.; Vincent, J.-P. (2025): A genetic circuit that extends the useful range of a BMP morphogen arose

alongside insect wing evolution. Current Biology 35: 5840-5852. (in English) ["The range over which a morphogen gradient provides reliable positional information is limited by intrinsic noise. We identify a regulatory circuit that counteracts this constraint for Dpp, a BMP that organizes the anterior/posterior axis of Drosophila wings. The transcriptional repressor Brinker (Brk), a Dpp target, enhances positional precision by repressing Dad, an inhibitory Smad, thereby extending Dpp's effective range. Thus, Brk mediates a feedback circuit that selectively amplifies low-level Dpp signals as would a logarithmic amplifier. This circuit also achieves temporal integration, mitigating the inevitable noise penalty associated with amplification. Although a core component of BMP signaling in flies, Brk is found exclusively in insects. Phylogenetic and expression analyses in the apterygote insect Thermobia domestica suggest that Brk originated in insects and was incorporated into the BMP network in pterygotes, possibly to permit long-range signaling in wing primordia. Brk exemplifies how gene regulatory network (GRN) evolution can enhance developmental precision, thus opening the door to increased morphological complexity." (Authors) The study includes data on Odonata.] Address: Huang, A., Francis Crick Institute, London NW1 1AT, UK. Email: anqi.huang@crick.ac.uk

25368. Illhamdi, M.L.; Idrus, A.A.; Syazali, M. (2025): Pola Sebaran capung di Kawasan ekowisata air terjun segenter [Dragonfly distribution pattern in the Segenter waterfall ecotourism area]. BIOCHEPHY: Journal of Science Education 5(2): 1095-1102. (in Indonesian, with English summary) ["Odonata diversity is a sensitive biological indicator of environmental change, especially in ecotourism areas that are potentially subject to anthropogenic disturbance. This study aims to analyze the distribution patterns of dragonflies in the Segenter Waterfall Ecotourism Area. The method used was a field survey with the Visual Encounter Survey (VES) technique on three observation lines, namely the edge of the area, the middle, and the water line. Identification was carried out to the species level and the distribution patterns were analyzed using the Morisita Dispersion Index. The results showed variations in distribution patterns in the ten species identified. Pseudagrion pruinosum, Orthetrum sabina, Neurothemis ramburii, Diplacodes trivialis, and Pantala flavescens showed random distribution ($I\delta \approx 1$). Trithemis festiva and Orthetrum glaucum showed uniform distribution ($I\delta < 1$), indicating competition. Orthetrum chrysis, Neurothemis fluctuans, and Anax guttatus showed clustered distribution ($I\delta > 1$), presumably due to habitat heterogeneity and uneven resource availability. It was concluded that the distribution pattern of dragonflies at Segenter Waterfall was dominated by random distribution, reflecting complex interactions between species biological characteristics and local environmental conditions. These findings can serve as basic data for planning sustainable ecotourism management and dragonfly biodiversity conservation strategies." (Authors)] Address: Illhamdi, M.L, Univ. Mataram, Indonesia. Email: liwa_ilhamdi@unram.ac.id

25369. Inam, M.; Shahjeer, K.; Zia, A.; Rehman, G.; Iqbal, T. (2025): First record of Anisogomphus caudalis (Fraser 1926), a data deficient species of Odonata (Anisoptera: Gomphidae) from Pakistan with special reference to species distribution modelling. Oriental Insects 59(4): 671-691. (in English) ["Anisogomphus caudalis, an IUCN declared 'Data Deficient' species of Odonata, is an addition to the Odonata fauna of Pakistan by reporting it from district Buner of Khyber Pakhtunkhwa, Pakistan. This study predicted the current and prospective habitat for A. caudalis based on environmental data and future scenarios accessed from prior researches, while evaluating the impact of environmental factors influencing its distribution. Differential characters for species, habitat detail, and previous records are provided to enhance data availability for the species for future studies and research. Additionally, geographical information system (ArcGIS) and maximum entropy model (Maxent) were employed to determine appropriate areas in Southern Asia under climate change scenarios. This study further assessed 8 incidence records and 19 environmental parameters. Our findings indicate that A. caudalis occupies a suitable environment in the majority of northern areas of the southern Asia. Furthermore, the precipitation of the driest month, mean temperature of driest quarter, and the precipitation of the wettest quarter were recognised as the critical elements influencing habitat availability for A. caudalis. Additionally, the area under the curve (AUC) for the training set was 0.966, presenting the model as '"excellent".'" (Authors)] Address: Inama, M., Dept of Zoology, Abdul Wali Khan University, Mardan, Pakistan. Email: inam8294@gmail.com

25370. Irawan, F.; Muzaki, F.K.; Ardishah, R.; Yuraldo, L.A.; Rahmawati, D.F.P.; Wijaya, A.E.; Ambari, O.; Ariyadi, D.; Basman, S. (2025): Diversity of Odonata in Danau Kemiri Pagardewa and adjacent areas, Lubai Ulu, Muara Enim, South Sumatera. BIO Web of Conferences 202, 02006: 8 pp. (in English) ["The existence and diversity of Odonata can provide information for habitat management planning, particularly regarding their role in the food chain and their potential as bioindicators in both aquatic and terrestrial habitats. Danau Kemiri in Pagardewa, Lubai Ulu District, Muara Enim Regency, South Sumatra, is projected as a nature-based tourism site, however information on its potential as Odonata habitat is not yet available. Therefore, this study aimed to map the diversity of Odonata in the Danau Kemiri and its surroundings areas. Odonata observations were conducted using the Visual Encounter Survey in August 2025 at three adjacent locations: Danau Kemiri (DKM), a small water channel (SAL), and Arboretum of SKG Pagardewa (SKG). In total, 25 species of Anisoptera from 4 families and 6 species of Zygoptera from 3 families were identified. The DKM had the highest species richness and Shannon-Wiener diversity index (H') value (22 species, H' = 2.764), followed by the SKG (13 species, H' = 2.251) and the lowest at the SAL (10 species, H' = 1.823), respectively. The Anisoptera encountered were more concentrated around the DKM, while the Zygoptera tended to be at the SAL, indicating a tendency for each Odonata species to distribute to habitats with specific characteristics. The dominant Anisoptera were Neurothemis fluctuans and Pantala flavescens, while the dominant Zygoptera were Libellago hyalina, Copera vittata, and Prodasineura verticalis. Although the area is not very large, Danau Kemiri and its surroundings serve as an important habitat for Odonata. " (Authors)] Address: Muzaki, F.K., Biology Department, Institut Teknologi Sepuluh Nopember (ITS), 60111 Sukolilo, Surabaya, East Jawa, Indonesia. Email: rm_faridkm@bio.its.ac.id

25371. Itrac-Bruneau, R.; Orliac, N. (2025): Prise en compte des odonates dans les études réglementaires en Bourgogne-Franche-Comté. Doctrine régionale à destination des services instructeurs de dossiers. Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés: 30 pp. + annexes. (in French) ["This document aims to enable the services in charge of processing regulatory study files to assess the quality of the studies provided to them, and in particular the inventories of odonates carried out in the Bourgogne-Franche-Comté region, but also to clarify the order to the project owners in charge of carrying out the latter." (Authors/Google translate) The following species are treated:

Leucorrhinia albifrons, L. caudalis, L. pectoralis, Ophiogomphus cecilia, Oxygastra curtisii, Stylurus flavipes, Sympecma paedisca, Coenagrion mercuriale and C. ornatum.] Address: https://libellules.pnaopie.fr/wp-content/uploads/2025/04/011-252DA-Prise-en-compte-odonates-etudes-reglementaires-2025-WEB.pdf

25372. Itrac-Bruneau, R. (2025): Les demoiselles et libellules des milieux courants de tête de bassin: enjeux de conservation et guide d'orientation de gestion des habitats en Bourgogne-Franche-Comté. Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés: 12 pp. (in French) [https://cbnfc-ori.org/sites/default/files/2025-03/Fiche-technique-Libellules_2024_WEB.pdf; Coenagrion ornatum, Coenagrion mercuriale, Thecagaster bidentata, Sympetrum depressiusculum, Sympetrum pedemontanum] Address: Itrac-Bruneau, Raphaëlle, 8F, rue Maurice Deslandres, 21000 Dijon, France. Email: r.itracbruneau@yahoo.fr

25373. Janssen, S.E.; Hoffman, J.C.; Krabbenhoft, D.P. (2025): New tools for a legacy problem: How isotope tracers inform area of concern actions in the St. Louis River in Lake Superior. Journal of Great Lakes Research 51(1):102494: 9 pp. (in English) ["Numerous mercury (Hg) sources can contribute to biological burdens within the Great Lakes, including atmospheric deposition (e.g., precipitation), non-point source land runoff (e.g., watershed), and legacy contamination. Due to these different environmental entry points, it is often difficult to ascertain if legacy Hg contamination contributes to contemporary fish consumption advisories within Areas of Concern (AOCs), as designated by the United States-Canada Great Lakes Water Quality Agreement. In this study, we aimed to assess the contributions of legacy Hg to sediments in nearshore wetland habitats and co-located prey items (dragonfly larvae and yellow perch) within the St. Louis River AOC using Hg stable isotopes. We observed that nearshore sediments had the same Hg source portfolio as previously examined main channel sites. Furthermore, this data confirmed that two major Hg sources were contributing to sediments within nearshore regions of the St. Louis River AOC: legacy and watershed Hg. The contribution of legacy Hg was estimated in biota and demonstrated that up to 64% of the Hg in fish tissue in the lower estuary (St. Louis Bay) was from legacy sources, but that this percentage declined substantially when examining upstream regions of the AOC. These data indicate the influence of legacy Hg to the food web varies spatially within the St. Louis River. We further found that watershed Hg sources are an important Hg contributor to the St. Louis River, which likely applies to other impacted and unimpacted tributaries across the Great Lakes region." (Authors)] Address: Janssen, Sarah, U.S. Geological Survey Upper Midwest Water Science Center, One Gifford Pinchot Drive, Madison, WI 53726, USA. Email: sjanssen@usgs.gov

25374. Jinguji, H.; Aoki, Y. (2025): Latitudinal variation in the effects of winter temperature on egg hatching and larval development in Sympetrum frequens (Odonata: Libellulidae). Odonatologica 54(3/4): 243-256. (in English) ["S. frequens has recently been classified as an endangered species in 11 (26%) Japanese prefectures, which are mainly located at lower elevations with higher temperatures. This study investigates the impact of warmer winters on the post-diapause development of overwintering eggs in S. frequens, a dragonfly species that depends on rice paddies for reproduction. We conducted two laboratory experiments comparing eggs from cooler northern regions (Fukushima Prefecture) and warmer southern regions (Miyazaki Prefecture). Eggs were exposed to temperature regimes simulating average winter conditions in these regions from 1990 to 2020. Our results revealed significant effects of regional temperature differences on hatching success and synchronization. Both, hatching rate and synchronized hatching coefficient, were significantly lower in eggs derived from Miyazaki province than in those from Fukushima. Eggs from warmer regions exhibited reduced hatching success and synchronization, indicating greater vulnerability to climate change. Elevated water temperatures (27.8°C) significantly reduced larval head width in eggs collected from the warmer southern region, supporting evidence that higher temperatures adversely affect larval development. These findings emphasize the critical role of global warming in reducing the reproductive success of S. frequens and highlight the need for targeted conservation strategies that address the species' climate-related vulnerabilities in rice paddy ecosystems." (Authors)] Address: Jinguji, H., Fukushima Univ., 1 Kanayagawa, Fukushima city, Fukushima 960-1296, Japan. Email: jjinguji@agri.fukushima-u.ac.jp

25375. Joest, R. (2025): Wasserbüffel als Landschaftspfleger – Erhaltung von Libellenlebensräumen in einem beweideten Niedermoor im Zeitraum 2014 bis 2024. Libellula 44(1/2): 41-61. (in German, with English summary) ["Water buffalo as landscape managers – conservation of dragonfly habitats in a grazed fen in the period 2014 to 2024 – The nature reserve Woeste near Bad Sassendorf (North Rhine-Westphalia) is home to a regionally remarkable dragonfly fauna. To prevent scrub encroachment, it has been subject to year-round grazing by water buffaloes in low density since 2005. Since studies of the dragonfly fauna in grazed wetlands are rare, this article describes the dragonfly community of the Woeste in 2014, 2019, and 2024 and analyzes it with regard to grazing by water buffalo. A total of 35 dragonfly species (2014: 29, 2019: 27, 2024: 29) were recorded, of which there was evidence of reproduction in the area for at least 28 (2014: 19, 2019: 21, 2024: 23). These included Lestes dryas (vulnerable) and Ischnura pumilio (near threatened), two species on the national Red List, and 11 species with declining populations nationwide. In addition to ubiquitous species of still waters, species of the genera Lestes and Sympetrum are among the characteristic species of the Woeste due to their abundance and reproductive behavior, the consistency of their occurrence in the three survey years and the completeness of the species spectrum. In particular, L. dryas, which occurred annually in large numbers, and Sympetrum meridionale, which has been recorded since 2014, should be mentioned here. Compared to the years 2014, 2020, and 2022, the cover of willow and alder shrubs on the pond complexes surveyed remained approximately the same or decreased in the pond complexes that had been mechanically cleared of shrubs in 2018. Since then, no renewed scrub encroachment was evident there until the end of the study in the summer of 2024, six years later. On the water bodies cleared of woody plants and grazed by water buffalo, the number of dragonfly species recorded was relatively stable in the three years surveyed. Their overall abundance even increased in most cases. A negative effect of grazing on the dragonfly fauna in the period 2014 to 2024 was not evident from the analysed data. Rather, grazing had evidently helped to keep the intermittently wet shallow waters open and to maintain early successional stages suitable for dragonflies." (Author)] Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz – Biologische Station Soest, Bad Sassendorf-Lohne. Email: r.joest@abu-naturschutz.de

25376. Juen, J.; Silva, F.S.; Barbosa Santos, F.M.; Luz Silva, B.; Rivera Pérez, J.M.; Barbosa Oliveira Junior, J.M.; Andrade, A.L. Calvão Santos, L.B.; Oliveira de Resende, B.; Shimano, Y.; Faria, A.P.J.; Cruz, P.V.; Quinteiro, F.B.; Brasil, L.S.; Monteiro

dos Santos, E.; Veras, D.S.; Pereira de Sousa, J.P.; Cavalcante do Nascimento, J.M.: Ligeiro, R.; Marques Couceiro, S.R.; Moreyra, A.K.; Godoy, B.S.; Acácio de Lima, M.; Hamada, N.; Silva de Azevedo, C.A.; Boldrini, R.; Vieira, L.J.; Dias Silva, K. (2025): Protocolo de coleta para inventário de insetos aquáticos na amazônia no sistema rapeld com ênfase em Ephemeroptera, Plecoptera, Trichoptera, Odonata e Heteroptera. EDUCAmazônia, ISSN-e 1983-3423, Vol. 18, Nº. Extra 0, 2025: 43 pp. (in Portuguese, with English summary) ["Collection protocol for aquatic insect inventory in the Amazon using the rapeld system with emphasis on Ephemeroptera, Plecoptera, Trichoptera, Odonata, and Heteroptera. - Aquatic insects are widely used in environmental assessments of freshwater ecosystems, but the diversity of sampling methods compromises the comparability of results. Standardizing sampling procedures is essential for data integration, the construction of temporal and spatial series, and the assessment of the effects of climate change and anthropogenic activities. In this article, we present a sampling protocol for monitoring aquatic insect biodiversity in the Amazon and other Brazilian biomes, focusing on the key groups Ephemeroptera, Plecoptera, Trichoptera, Odonata, and Heteroptera (EPTOH). The protocol follows guidelines adopted by the Long-Term Ecological Research Program (PELD) and the Biodiversity Research Program in Western and Eastern Amazonia (PPBio), ensuring the application of standardized and replicable methods across different research contexts, aligned with ICMBio's Aquatic Monitoring Program (Programa Monitora Aquático). In addition to describing materials and methods, we discuss the perspectives of standardization, highlighting its importance for conducting large-scale studies and integrating data across different Amazonian regions, and more broadly, across various regions of Brazil. The adoption of a single protocol will facilitate the compilation of robust historical series, which are essential for formulating public policies aimed at biodiversity conservation and the sustainable management of water resources in Brazil. Furthermore, we emphasize the importance of continuous monitoring of aquatic insects as bioindicators of environmental integrity, encouraging scientific collaboration and strengthening research networks in the Amazon and throughout Brazil." (Authors)] Address: Juen, L., Programa de Pós-graduação em Ecologia, Universidade Federal do Pará (UFPA), Av. Perimetral, 1, Belém, Pará 66077-830, Brazil. Email: leandrojuen@ufpa.br

25377. Jugovic, J.; Kostanjšek, P.; Šabeder, N.; Lužnik, M. (2025): Shifts in dragonfly (Odonata) assemblages and morphological traits in response to goldfish (Carassius auratus) presence in sub-Mediterranean ponds. Hydrobiologia 853: 227-246. (in English) ["The introduction of non-native fish species can substantially alter aquatic ecosystems; yet, their impact on invertebrate assemblages remains understudied. We investigated how goldfish presence influences the abundance, species richness and diversity, assemblage composition, species turnover rates, and morphological traits of Odonata nymphs in sub-Mediterranean ponds. Both Odonata species abundance and richness were higher in fishless ponds, Shannon diversity index was greater for Anisoptera, while the Dominance index was higher for Zygoptera. Species turnover rates between fishless and goldfish-occupied ponds were significantly different for Zygoptera and Anisoptera, indicating shifts in Odonata assemblages in response to goldfish presence. Morphological analysis revealed significant differences in body size between nymphs from fishless and goldfish-occupied ponds, especially in Anax imperator, which also displayed well-developed defensive structures in goldfish-occupied ponds, possibly as an adaptation to predation. While certain species exhibited adaptive morphological changes to withstand predation pressure, others showed differences in occurrence between fishless and goldfish-occupied ponds (e.g., Cordulia aenea, Sympetrum sanguineum, and S. striolatum), suggesting species-specific responses to goldfish presence. These findings underscore the ecological consequences of introducing fish species into aquatic habitats and highlight the importance of conservation efforts to protect vulnerable Odonata populations." (Authors)] Address: Lužnik, Martina, Dept of Biodiversity, Faculty of Mathematics, Natural Sciences and Information Technologies, University of Primorska, 6000, Koper, Slovenia Email: martina.luznik@upr.si

25378. Karmakar, D.; Babuji; Shukla, S. (2025): Assessment of odonate diversity as an indicator of water quality, around Golapbag and Tarabag campuses, the University of Burdwan, West Bengal. Journal of Entomology and Zoology Studies 13(3): 94-102. (in English) ["Odonates are among one of the primitive group of insects, that first to have evolved for flight. Their diversity signifies a lot about the health of the environment, as they are often specialists with very narrow ecological niches. Although some species can be found in a wide range of habitats, some species are exclusive depending on certain environmental parameters. Water quality is one such factor. The present study was carried out in four water bodies in and around the Golapbag and Tarabag campuses of the University of Burdwan. The water quality index was calculated using five parameters: pH, total dissolved solid (TDS), Electrolyte Conductivity (EC), and Dissolved Oxygen (DO). The area with the lowest water quality index (good water quality) showed the highest species richness, and the area with the highest water quality index (polluted water) showed the lowest species richness. Brachythemis contaminata and Lestes umbrinus were most abundant in the highly polluted water body while Bradinopyga geminata, Crocothemis servilia, and Trithemis festiva were abundant in areas having good water quality. This difference in abundance shows their indicator efficiency. Although some species are generalists, the species richness was recorded to increase from poor to good water quality." (Authors)] Address: Karmakar, D., Dept of Zoology, Harish Chandra Post Graduate College, Varanasi, Uttar Pradesh, India

25379. Karube, H.; Futahashi, R.; Kawashima, I. (2025): A taxonomic revision of the genus Anotogaster (Anisoptera: Cordulegastridae) from central Ryukyu Islands, with descriptions of a new species amamensis and its subspecies yambarensis. Tombo 68: 1-17. (in English, with Japanese summary) ["Anotogaster amamensis sp. nov. is described from Amami Islands and Okinawa Island in the central Ryukyu Islands (holotype male is from Amami-Oshima Island [Yamato-son, Amami-Oshima, Kagosima Pref., Japan]). This new species is closely related to Anotogaster sieboldii widely distributed from mainland Japan and east of Asian Continent but is highly genetically differentiated and can be distinguished by several characteristics of the external morphology. In addition, because of morphological differences between the Okinawa Island population and the nominate subspecies amamensis from Amami Islands, the former is described as the subspecies yambarensis nov. (holotype male is from Okinawa Island [Kunigami-son, Kunigami-gun, Okinawa Pref., Japan])." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh -kanagawa -museum.jp

25380. Khader, N.K.; Shaaban, A.D.; Al-Hawash, A.B. (2025): Study on the impact of hydrocarbon pollution on water of northern Basra and its effects on the life cycle of dumsefly [sic]

naiads. Journal of Neonatal Surgery 14(4s): 653-662. (in English) ["An environmental study was conducted to some Odonata to examine the relationship between environmental elements and Pollutants in Water of North Basra from October 2020 to May 2024. The study covered six water stations. (1) Sharash Site: (a) First Station: Shat El Arab (Current Stream) and (b) Second Station: Al-Shaheen Ponds (Still Water). (2) Thagher Site: (a) Third Station: Tigris River Coast (Current Stream) and (b) Fourth Station: Al-Neherat Ponds (Still Water). (3) Mdainah Site: (a) Fifth Station: Euphrates River Coast (Current Stream) and (b) Sixth Station: Al-Jallal Ponds (Still Water). The study measured Odonata naiads number density on monthly basis from October 2023 to May 2024. It was found that the highest number density, 4.52 Naiads per 6 draws in Sharash Site and 5.28 Naiads /6 Draws on December. The study indicated that the hydrocarbon concentration rate, 39.59, was in Sharash Site: Al-Shaheen Ponds, and there is Direct Relationship between the total hydrocarbon and the number density of Odonata Naiads. In the sense that the highest Naiads number was in Sharash Site: Shat El Arab, and Thagher Site: Al-Neherat Ponds, Mdainah Ponds: and Al-jallal Ponds, 5.21, 4.88, 4.88 alternatively at total hydrocarbon concentrations rates 35.27, 29.88, and 13.44 alternatively at correlation factor 0.855/0.510/0.791 alternatively. The Impact of total hydrocarbon concentrations upon the age levels and number of moulting of Odonata showed that the longest age period is 98.66 with 4.33 moulting that occurred to laboratory grown Odonata Naiads when the total hydrocarbon concentrations were 29.88 as a medium rate. The study also showed a very weak Inverse Relationship between the Odonata naiads age duration and the total hydrocarbon concentrations rate where the coefficient factor reached 0.463." (Authors)] Address: Khader, N.K., Dept Biol., College Education, Qurna Univ. of Basrah, Iraq. Email: pgs.nawras.khalaf@uobasrah.edu.iq

25381. Khan, F.; Fatima, K.; Sabeeka Zaffar, S.; Manzoor, F.; Ali, F.; Khan, A.B.; Nawaz, K.; Yasmin, S. (2025): Biodiversity and ecological distribution of Anisoptera (dragonflies) and Zygoptera (damselflies) in Dir Lower. Insights-Journal of Lifel and Social Sciences 3(2): 40-48. (in English) ["Background: Odonates play a crucial role in freshwater ecosystems, serving as bioindicators of environmental health and natural pest control agents. Their diversity and distribution are influenced by habitat availability, climatic conditions, and water quality. Despite their ecological importance, limited studies have been conducted on the biodiversity of Anisoptera in Dir Lower, Khyber Pakhtunkhwa. This study aims to document the species richness, evenness, and abundance of dragonflies in the region, providing essential baseline data for future ecological and conservation research. Objective: To assess the species richness, relative abundance, and ecological distribution of Anisoptera in Dir Lower during the summer season of 2022. Methods: Field surveys were conducted from June to August 2022 across diverse freshwater habitats, including streams, riverbanks, rice paddies, marshes, irrigation channels, and stagnant water bodies. Specimens were collected weekly and bi-weekly between 9:00 am and 4:00 pm using aerial nets with a standardized 1.5 mm mesh size. Identification was performed using stereomicroscopes and taxonomic keys. Data analysis included species richness, evenness, and relative abundance calculations. Results: A total of 169 specimens were collected, comprising 146 males (86.39%) and 23 females (13.61%), with a male-to-female ratio of 6.35:1. The specimens were classified into 15 species under 10 genera and 3 families. The family Libellulidae was the most dominant, contributing 96.57% of the total specimens, followed by Aeshnidae (2.05%) and Gomphidae (1.36%). Orthetrum pruinosum neglectum was the most abundant species (20.54%), followed by Orthetrum triangulare triangulare (19.17%), while Anax immaculifrons and Onychogomphus bistrigatus were the least abundant (1.36% each). Conclusion: The findings highlight the ecological significance of dragonflies in Dir Lower, emphasizing the need for habitat conservation. The dominance of Libellulidae suggests its adaptability to diverse freshwater environments. Future studies focusing on seasonal variations, larval stages, and environmental factors are recommended for a comprehensive understanding of Odonata biodiversity." (Authors) Orthetrum pruinosum neglectum, Orthetrum triangulare, Trithemis festiva, Pantala flavescens, Acisoma panorpoides panorpoides, Orthetrum sabina, Palpopleura sexmaculata sexmaculata, Rhyothemis variegata variegate, Orthetrum chrysostigma luzonicum, Orthetrum anceps, Brachythemis contaminata, Crocothemis erythraea, Anax immaculifrons, Onychogomphus bistrigatus, Crocothemis servilia] Address: Khan, F., Medical Entomologist, Health Dept Kp. / Entomology Deot, Abdul Wali Khan University Mardan, Pakistan. Email: medicalentomologist94@gmail.com

25382. Kirk, D.A.; Martínez-Lanfranco, J.A.; Forsyth, D.J.; Martin, A.E. (2025): Invertebrate diversity is shaped by farm management, edge effects and landscape context in the Prairie Pothole Region of Canada. Agriculture, Ecosystems & Environment 377, 109194: 18 pp. (in English) ["Terrestrial invertebrates provide essential ecosystem services, and there is concern that their contribution could be compromised by population declines due to agricultural intensification, including pesticide use. Identifying alternative and beneficial agricultural land management measures could stem or reverse biodiversity loss. Here we examine morphospecies composition and abundance of terrestrial invertebrates sampled with pitfall traps and sweep nets in fields and field margins in the Prairie Pothole Region, Canada, close to focal wetlands on 43 sites representing four land management types. These were: conventional, minimum tillage, organic, and perennial cover. We estimate diversity at local and regional scales (alpha, beta, gamma) and examine the impacts of land management in interaction with landscape context on these descriptors of local and landscape biodiversity. We found that: 1) alpha morphospecies richness (hereafter 'alpha richness') was greater at conventionally-managed sites when they were surrounded by more grassland; 2) alpha richness differed among land management types for field locations, but not field margin locations (and also tended to be lower in fields than field margins, especially for sweep net samples); 3) species composition differed somewhat between sites managed for perennial cover versus the remaining three land management types; and 4) conventional sites had the lowest gamma evenness. Our results suggest that increasing the amount of grassland in landscapes could lessen the impact of conventional agriculture and that field margins in intensively managed farming systems are important for invertebrate diversity in this region. Maintaining natural and seminatural cover in agroecosystems, in addition to low-intensity farming practices, could sustain invertebrate biodiversity and facilitate important ecosystem services." (Authors) The study includes references to "Odonata".] Address: Kirk, D.A., Aquila Conservation & Environment Consulting, Suite 300, 240 Bank Street, Ottawa, Ontario, K2P 1X4, Canada

25383. Kopetz, A.; Krebs, D.; Mühlfeit, M.; Weigel, A. (2025): Gemeinschaftsexkursion des Thüringer Entomologenvebandes e.V. (TEV) in das NSG "Stein-Rachelsberg" (Landkreis Eichsfeld). Mitteilungen des Thüringer Entomologenverbandes 32(2): 112-245. (in German) [On page 172, ten odonate species are listed.] Address: Kopetz, A., Im Semmichbache 14, 99334 Amt Wachsenburg, Germany. Email:

andreas.kopetz@t-online.de

25384. Krodkiewska, M.; Spyra, A.; Koczorowska, A.; Lozowski, B.; Czerniawski, R.; Slugocki, L.; Libera, M.; Woznica, A.; Absalon, D.; Matysik, M.; Bak, M.; Sierka, E.; Halabowski, D.; Cieplok, A. (2025): Exploring a large European river: Unraveling the spatial distribution and diversity of benthic invertebrates along the Vistula River (Poland). Ecohydrology & Hydrobiology 25(4), 100681: 12 pp. (in English) ["Along with ongoing climate change, large rivers have experienced dramatic changes in conditions over time, subjected to multiple pressures and disturbances. A study on aquatic invertebrate linear diversity was conducted along the entire course of the large European Vistula River in Poland. The study aimed to evaluate which environmental variables are most important in determining diversity and variation in benthic communities from the upper to the lower parts of the river. A total of 39 macroinvertebrate taxa were recorded. Macroinvertebrate densities varied greatly, ranging from 93 to 19,200 individuals/m². Fourteen alien invertebrate species were identified, including … The proportion of alien species ranged from 0 % to over 99 %. Canonical Correspondence Analysis (CCA) revealed that conductivity, turbidity, pH, dissolved organic matter (DOM), and water oxygen content best explained the variation in the distribution of macroinvertebrate taxa in the Vistula River. Nereidae, Tatetidae, and Gammaridae were associated with high conductivity. In contrast, Gomphidae, Cyrenidae, Caenidae, and Ceratopogonidae were more abundant in well-oxygenated waters with higher turbidity. Some mollusk taxa (Viviparidae, Sphaeriidae, Dreissenidae, and Bithyniidae) were linked to higher levels of DOM. Our results support the conclusion that changing patterns in invertebrate composition along the course of large rivers reflect longitudinal changes in environmental pressures and conditions, providing valuable insight for evaluating changing climate and development." (Authors)] Address: Cieplok, Anna, Institute of Biology, Biotechnology & Environmental Protection, Faculty of Natural Sciences, University of Silesia in Katowice, 40-007 Katowice, Poland. Email: anna.cieplok@us.edu.pl

25385. Krüger, H.T.; Wildermuth, R. (2025): Mauer-Zebraspringspinne Salticus scenicus erbeutet Chalcolestes viridis (Araneae: Salticidae; Odonata: Lestidae). Libellula 44(3/4): 239-244. (in German, with English summary) ["Zebra spider Salticus scenicus preys on Chalcolestes viridis – On a house wall in North Rhine-Westphalia a zebra spider Salticus scenicus was observed with a female of Chalcolestes viridis, which was captured after its maiden flight. The photographically documented find is remarkable for two reasons: It is the first observation of a dragonfly as prey of S. scenicus. Moreover, the prey was six times as long as the spider; consequently, the size ratio of hunter to prey is much more extreme than previously reported in the literature." (Authors)] Address: Krüger, H.T., Finkenweg 5, 53894 Mechernich, Germany. Email: htkvey@gmail.com

25386. Laakso, L.; Ilvonen, J.J.; Suhonen, J. (2025): Can thermoregulation explain differences in habitat selection and distribution range in Calopteryx damselflies? Journal of Thermal Biology 132, August 2025, 104255: 9 pp. (in English) ["Body temperature is important for the behavioural and ecological performance of winged insects whose body temperature must exceed ambient temperature to fly. Although thermoregulation may affect geographical distribution and habitat selection of closely related species. The few studies that have been done on this subject have shown mixed results. Our aim was to study whether thermoregulation affects the coexistence of Calopteryx damselflies. We studied the body temperature of C. virgo and C. splendens under both field and laboratory conditions using an insect thermometer. These damselflies are ideal for studying thermoregulation, because they are closely related, but vary in colouration and size - factors that heavily influence insect thermoregulation. Results from our field and laboratory studies were consistent. Individual temperatures followed ambient temperatures linearly on a level ~3 °C above it. C. virgo could maintain higher body temperatures than C. splendens. Individual body temperature at the activation, or the time before activation was not affected by species, sex or wing size. However, C. virgo warmed up faster than C. splendens in laboratory conditions. Thermoregulation may be a key factor explaining differences in geographical distribution, habitat preferences and behavioral differences between these species. The more melanized species C. virgo has a northern distribution range than less melanized C. splendens. Additionally, C. virgo inhabits shadier brooks and rivers whereas C. splendens prefers open and sunny habitats. C. virgo also wakes up earlier and is a more effective territorial contestant than C. splendens. These differences may partly be explained by their thermoecological differences." (Authors)] Address: Laakso, Linda, Section of Ecology, Dept Biology, Univ. Turku, FI-20014, Turku, Finland. Email: lklaak@utu.fi

25387. Lajoie, C.M.E.; Kidd, K.A.; Mitchell, C.P.J.; Mackereth, R.W.; Emilson, E.J.S. (2025): Temporal and regional effects of forest harvesting on mercury bioaccumulation and biomagnification in boreal stream food webs. Environmental Research 287, 15 December 2025, 123041: 14 pp. (in English) ["Forest harvesting can affect mercury (Hg) dynamics in boreal stream food webs by changing the availability and methylation of Hg and dietary exposure to methylmercury (MeHg) through basal resources. The objectives of this study were to quantify the 1) temporal and 2) regional effects of forest harvest on Hg bioaccumulation and biomagnification in streams. From 2019 to 2021, 5 headwater streams were sampled (n = 2 harvested, n = 3 reference) pre-(2019), during (2020), and post-(2021) harvest for basal food sources, macroinvertebrates and fish. In 2021, 7 streams (n = 4 harvested, n = 3 reference) were also sampled to assess the regional effects of forest harvest. All samples were analyzed for total Hg ([THg]) or MeHg ([MeHg]), and stable isotopes of nitrogen ($\delta^{15}N$). Temporally, we observed increases in [MeHg] in water and some predatory macroinvertebrates and [THg] in fish post-harvest at the most impacted stream (i.e., 78 % of watershed harvested, a stream crossing, and narrow buffer zones), but few differences at the stream where more rigorous best management practices were used (i.e, wider buffer zones and machinery avoidance of wet soils). Regionally, we found significantly higher [MeHg] in food sources and macroinvertebrates in harvested compared to non-harvested landscapes, but no difference in [THg] of fish or Hg biomagnification (log Hg vs. $\delta^{15}N$). Overall, results showed that harvesting increased [Hg] in some food web components, and the magnitude of these effects varied with management practices used and proportion of the watershed harvested." (Authors) Odonata are treated at genus level.] Address: Kidd, Karen, McMaster University, Hamilton, ON, Canada. Email: karenkidd@mcmaster.ca

25388. Lamouille-Hébert, M.; Arthaud, F.; Besnard, A.; Logez, M.; Datry, T. (2025): Increased drying threatens alpine pond biodiversity more than temperature increase in a changing climate. Aquatic Sciences 87:25: 19 pp. (in English) ["Climate change is one of the main drivers of biodiversity decline. Rapidly changing climate in the form of warming, drying, and habitat isolation causes freshwater species to change their spatial extent, as most species have little capacity for in situ responses. However, the relative contribution of these three

effects to freshwater species' changing spatial distributions is actively debated. To shed light on this debate, we explored temperature, hydroperiod, and habitat connectivity effects on alpine pond species occupancy probabilities in the northern French Alps. We studied alpine ponds as ideal test systems because they face climate change effects more rapidly, and in more concentrated areas, than any other freshwater ecosystem. We used multispecies occupancy models with three biological groups (amphibians, macrophytes, and Odonata) to examine contrasting responses to climate change. Contrary to expectations, temperature was not the main driver of species occupancy probabilities. Instead, hydroperiod and connectivity were stronger predictors of species occupancy probabilities. Furthermore, temperature increases had the same effect on occupancy probabilities of non-alpine specialist and alpine specialist species. Nonetheless, temperature disproportionately affected a greater number of specialist species compared with non-alpine specialists. We conclude that climate change mitigation will primarily benefit a greater number of alpine specialist species than non-alpine specialists. Finally, we suggest that enhancing our understanding of freshwater hydroperiods will improve our predictions of climate change effects on freshwater species distributions." (Authors)] Address: Datry, T., Inst. national de Recherche en Sciences & Technologies pour l'Environnement et l'Agriculture, CS 70077 Lyon, France. E-mail: thibault.datry@irstea.fr

25389. Limbu, R.; Thapa, M.K.; Achint, R.; Saroa, R. (2025): First record of Bayadera hyalina (Odonata: Euphaeidae) from Arunachal Pradesh, India. Notulae odonatologicae 10(6): 211-314. (in English) ["In 2023, during a dragonfly survey conducted in and around Vijaynagar, Arunachal Pradesh state, India, two male individuals of B. hyalina were observed and one of them was photographed. Within India, the species was previously known only from the Meghalaya, West Bengal, Nagaland and Manipur states. The current study represents the first record of B. hyalina from Arunachal Pradesh." (Authors)] Address: Thapa, M.K., Dept of Zoology, Assam Royal Global University, Betkuchi, Guwahati, Assam- 781035, India. Email: monish.awrro@gmail.com

25390. Lin, S.; Wen, C.; Li, Y.; Liang, W.; Feeney, W.E. (2025): Urban sports fields as a potential evolutionary trap for polarotactic dragonflies. Journal of Environmental Management 396, 128097: 7 pp. (in English) ["The rapid development of artificial, man-made environments may unintentionally produce evolutionary traps, where the cues that organisms rely on to indicate high-fitness resources are mismatched with novel resources that deliver low fitness outcomes. In this study, we identify urban sports fields as a new source of ecological trap surfaces, which Pantala flavascens lay their eggs on. We found that dragonflies preferred to lay eggs on green and blue sports field surfaces, but rarely did so on red surfaces. In this attraction both colour and polarization can play an important role, because dragonflies are colour- and polarization-sensitive. Reflectance spectrum analysis showed that red was most distinct from the other colors, highlighting the importance of sensory preferences for determining where eggs were laid. Given that we did not measure the polarized reflection of the field, our conclusions were derived in the context of a presumed polarized background. Future research is needed to investigate the interaction between dragonfly polarization vision and color vision. These results identify sports fields as an evolutionary trap enticing dragonflies to oviposit on unsuitable substrates. There is an urgent need to further evaluate the potential impact of this phenomenon on dragonfly populations in urban environments. By optimizing the substrate and color design of sports fields, it might mitigate threats to dragonfly populations and provide support for the conservation of insect biodiversity in urban ecosystems." (Authors).] Address: Feeney, W.E., Doñana Biological Station (CSIC), Seville, 41092, Spain

25391. Liu, X.; Liu, X.; Li, Z.; Xie, Z.; Wu, R. (2025): Energy drives multi-faceted diversity patterns of benthic macroinvertebrates in China with important conservation implications. Global Ecology and Conservation 64, December 2025, e03951: 18 pp. (in English) ["Biodiversity patterns at large scales and their driving mechanisms are central topics in macroecology and biogeography. China is a global biodiversity hotspot and is one of the countries with the richest macroinvertebrate assemblages on Earth. However, national-scale studies on macroinvertebrates diversity and their driving mechanisms are still lacking. Here, we aimed to analyze the spatial patterns of species, functional and phylogenetic a and ß diversity by assembling a comprehensive dataset on the distribution of Chinese macroinvertebrates. We also evaluated the explanatory power of three hypotheses, i.e., 'environmental heterogeneity', 'energy', and 'dispersal', in explaining macroinvertebrates diversity patterns. The spatial patterns in China revealed lower species, functional and phylogenetic a diversity of macroinvertebrates in the northwest regions and higher diversity in the southeast, with major biodiversity hotspots concentrated in the Heilongjiang River, middle and lower reaches of Yangtze River, and Pearl River basins. Species, functional and phylogenetic ß diversity were higher in the Northwest Inland River, Yellow River, and upper reaches of Yangtze River basins compared to other basins. All diversity facets were best explained by the energy factors with strong unique effects (explaining 84% of the total variation), and the influence of environmental heterogeneity and dispersal-related factor was weak. The Yalong River, upper reach of Min River and headwaters of Yellow River basins were identified as priority protected areas for macroinvertebrates diversity, while threats to biodiversity in the middle and lower reaches of Huai River, Tai Lake, and Qiantang River basins require greater attention. This study provides important information for the conservation and management of biodiversity and freshwater ecosystems both in China and globally." (Authors) The study includes references to Odonata.] Address: Wu, R., School of Life Science, Shanxi Normal Univ., Taiyuan 030031, China. Email: wurw@sxnu.edu.cn

25392. Löwenberg-Neto, P.; Coelho, P.E. (2025): Biogeographic regionalization of Odonata (Insecta) in the Neotropics: contrasting Anisoptera and Zygoptera spatial patterns. Frontiers of Biogeography 18, e175261. 16 pp. (In English) ["The Neotropical region stands as a significant hotspot for Odonata diversity, yet comprehensive spatial patterns have remained less elucidated. This study aimed to provide a comprehensive biogeographical regionalization of the order Odonata across the region, specifically investigating whether its extant suborders exhibit congruent or divergent spatial patterns. Geographic distribution data for 1,533 Neotropical Odonata species (666 Anisoptera, 867 Zygoptera) were sourced from the IUCN and analyzed using the Infomap Bioregion application to delineate distinct bioregions. Spatial associations between Odonata, Anisoptera, and Zygoptera bioregions, and nine thematic regionalizations, including ecoregions, biomes, climate types, and hydrobasins, were quantified using the V-measure (global association) and relative inhomogeneity (local association). The analyses successfully delineated 13 distinct bioregions for the entire order Odonata, 14 for Anisoptera, and 19 for Zygoptera, all supported by high levels of endemism. A moderate yet differentiated spatial association was observed between Odonata bioregions and those of its suborders, with Anisoptera showing a stronger congruence

than Zygoptera, indicating Zygoptera's more fragmented and less overarching biogeographical structure. Hydrological units, particularly watersheds at levels 2 and 3, consistently emerged as the most strongly correlated of odonate bioregions, reinforcing the paramount importance of aquatic habitats for these obligate aquatic organisms. In contrast, climate-based regionalizations showed the weakest spatial association. Local inhomogeneity maps further highlighted regional convergences, with areas like the Amazon basin showing strong Anisoptera congruence, while Zygoptera displayed more fragmented patterns tied to hydrological features across Central and northern South America. These findings strongly suggest that distinct dispersal capabilities of Anisoptera and Zygoptera influenced macro-scale biogeographical patterns, with riverine systems acting as fundamental structuring elements." (Authors)] Address: Löwenberg-Neto, P., Lab. Biogeografia, Univ. Federal da Integração Latino-Americana, UNILA, Foz do Iguaçu, Brazil. Email: peter.lowenberg@unila.edu.br

25393. Madanat, H.M. (2025): First report of migration of Anax ephippiger (Odonata: Aeshnidae) in southern Jordan. Notulae odonatologicae 10(6): 231-235. (in English) ["A swarm of hundreds of individuals of Anax ephippiger was observed in Karak governorate in the southern part of Jordan on 18.iii.2025. The swarm was flying around an orchard and later settled on the olive trees. By the following day, the swarm had disappeared. This is the first documented record of swarm migration of this species in Jordan." (Author)] Address: Madanat, H.M., Rabba Agricultural Research Center, Rabba-Karak (61110), (NARC) Jordan

25394. Makbun, N.; Phan, Q.T.; Ignatius, K.; Keetapithchayakul, T. (2025): Coeliccia sirindhornae sp. nov., a new damselfly (Odonata: Platycnemididae) from Northwest Thailand. Tropical Natural History 25: 415-425. (in English) ["… Coeliccia sirindhornae sp. nov., is described based on specimens of both sexes collected from Kanchanaburi Province, Thailand. This species can be differentiated from its congeners by its unique combination of morphological characters, including the shape of antehumeral stripe, the structure and pattern of prothorax, and the shape of anal appendages in both sexes, and the markings on the terminal abdominal segments in female." (Authors)] Address: Keetapithchayakul, T., The Center for Entomology & Parasitology Res., College of Medicine & Pharmacy, Duy Tan Univ., 120 Hoang Minh Thao, Lien Chieu, Da Nang, Vietnam. Email: Keetapithchayakul.TS@gmail.com

25395. Makkinje, W.P.D. (2025): Insect evo-devo: exploring developmental transcriptomes and evolutionary conservation across insect phylogeny. PhD thesis, Wageningen University: 154 pp. (in English) ["This thesis advances insect evolutionary developmental biology by integrating high-resolution transcriptomic and morphological data across four phylogenetically diverse insect species: Thermobia domestica (Zygentoma), Ephemera vulgata (Ephemeroptera), Ischnura elegans, and Nasonia vitripennis (Hymenoptera). These taxa span key evolutionary transitions and developmental modes, thereby capturing stages of insect evolution and development underrespresented through traditional model systems. Using DAPI staining and RNA-seq across multiple embryonic stages, I generated temporal gene expression atlases along with morphological documentation, enabling detailed comparisons of embryogenesis. Individual transcriptomic analyses of T. domestica (Chapter 2) and E. vulgata (Chapter 3) identified major transcriptional turning points, particularly the maternal-to-zygotic transition and katatrepsis, and revealed conserved temporal activation of developmental processes. Expression of Hox genes in E. vulgata supports ancestral sequential segmentation. The results of the transcriptome assembly of I. elegans and N. vitripennis are reported on as well (Chapter 4). By comparing orthologous gene expression across species, including Drosophila melanogaster, I aligned their developmental timepoints (Chapter 5). Using correlation strength as a proxy for evolutionary conservation, I revealed evolutionary heterochrony and refined the hourglass model previously reported in Diptera. Conservation peaked earlier in development among distant taxa, consistent with a nested hourglass pattern. Additionally, larval and pupal stages of holometabolous insects reflected a distributed recapitulation of mid- to late embryogenesis in ametabolous and hemimetabolous insects, rather than aligning with a single stage. These findings emphasize the evolutionary value of non-model insects and expand available resources for comparative evo-devo research." (Author)] Address: https://edepot.wur.nl/681295

25396. Márquez-Rodríguez, J.; Ferreras-Romero, M. (2025): Investigations on the life cycle of Orthetrum nitidinerve in southern Spain (Odonata: Libellulidae). Odonatologica 54(3/4): 199-216. (in English) ["Understanding life cycle patterns of Odonata is critical to identifying the factors that influence their voltinism. Few studies of this type have focused on the Mediterranean Libellulidae. A study on larval development and voltinism of O. nitidinerve, a threatened West Mediterranean endemic, was carried out in a stream in the Guadalquivir Valley of southern Spain. Final-instar larvae were found throughout the year. Larvae with signs of advanced metamorphosis or emergence were found in spring (April–May) and late summer (August). Head width of final-instar larvae differed significantly between those collected in spring and in late summer. Larvae contributing to an assumed first wave of emergence were larger than those contributing to the second wave. The appearance of small larvae (F-4 and smaller) in mid-summer (July and August) can be attributed to the hatching of eggs laid early in the same year. On the other hand, the appearance of medium size larvae (F-2, F-3) in late winter (March) can be attributed to the hatching of eggs laid in the previous year, followed by overwintering in interstitial habitats. This supports bivoltinism at the study site." (Authors)] Address: Márquez-Rodríguez, M., Laboratorio de Zoología, Facultad de Ciencias Experimentales, Univ. Pablo de Olavide, A-376 km 1, 41013 Sevilla, Spain. Email: jmarrod1@admon.upo.es

25397. Mbungu, E.S.; Tshijik, J.-C.K.; Mutambel'hity, S.N.D.; Djonga, J.L.; Mayala, N.D.P.; Gikug, J.M. (2025): Étude de l'influence de la qualité des zones riveraines sur la diversité des odonates dans le bassin versant de la rivière N'saya à Kinshasa RDC. Afrique Science 27(4): 101-117. (in French, with English summary) ["This study assessed the influence of riparian zone quality on Odonata diversity in the N'saya River watershed in Kinshasa, Democratic Republic of Congo. A total of 50 odonate species were recorded, belonging to six families, with a marked dominance of the Libellulidae family. The riparian zone quality index (RBQI) revealed ecological quality ranging from average to low across sites. Sites N'sa2 and N'sa3 exhibited average vegetative and structural integrity, while N'sa1 and N'sa5 were severely degraded by agricultural and urban pressures. Diversity indices (Shannon, Simpson, and Piélou) showed higher diversity and evenness in sites with well-preserved riparian vegetation (N'sa2–N'sa3) compared to disturbed areas. Canonical correspondence analysis (CCA) indicated that species such as Ceriagrion glabrum, Phyllomacromia melania, and Pseudagrion kibalense were associated with natural and vegetated banks, while tolerant taxa such as Palpopleura lucia and Brachythemis leucosticta dominated in open or human-modified areas. Overall, the results demonstrated that the quality of riparian vegetation

significantly influences the composition, diversity, and distribution of Odonata populations. These insects were thus confirmed as excellent bioindicators of the ecological integrity of riparian zones, supporting their use in monitoring and restoration programs for urbanized tropical aquatic habitats." (Authors).] Address: Mbungu, E.S., Université Nationale Pédagogique (UPN), Faculté des Sciences et technologies, Dépt de Biologie, Laboratoire d'Hydrobiologie et écologie, BP8815 Kinshasa I, RD Congo. Email: edwrdsisam@gmail.com

25398. Mendonça, G. R. Q., & Vieira, L. J. S. (2025): O uso de inimigos naturais nativos do Brasil para o controle biológico de Aedes aegypti: uma revisão sistemática. Revista Delos 18(74), e7413: 19 pp. (in Portuguese, with English and Spanish summaries) ["The use of native natural enemies from Brazil for the biological control of Aedes aegypti: a systematic review - The population control of disease vectors in humans is crucial for reducing the incidence of these diseases. In many cases, vector control is the only method available to prevent disease epidemics. The control of Aedes aegypti in Brazil is based on integrated vector management, which involves mechanical, chemical, and biological control methods. The aim of this study was to compile research conducted in Brazil on the biological control of Aedes aegypti using pathogens, predators, and parasites. The theoretical framework was obtained from the following databases: Google Scholar, Science Direct, and SciELO. For article selection, the following descriptors were used: Aedes aegypti; Biological control OR Controle biológico; Predators OR Predadores; Parasites OR Parasitas; Pathogens OR Patógenos; Brazil OR Brasil. The key inclusion criterion was original research articles addressing the selection of native natural enemies from Brazil for the biological control of Aedes aegypti, published in the last ten years (2014–2023). Thirty-three articles met the pre-established inclusion criteria, with 67% addressing the use of pathogens for Aedes aegypti control, 24% addressing predators, and 9% addressing parasites. Species of the genus Metarhizium, Beauveria bassiana, and Bacillus thuringiensis stood out as the main pathogens used for Aedes aegypti control, while Anisoptera and shrimp species were the most common predators. The nematodes Heterorhabditis indica and Steinernema sp. were prominent among the parasites. This study highlights the urgent need to diversify research approaches among Brazilian scientists so that future efforts can bring forth new potential predator and parasite organisms to promote greater balance in Aedes aegypti Integrated Vector Management programs." (Authors)] Address: Queiroz Mendonça, G.R., Mestre em Ciência, Inovação e Tecnologia para a Amazônia Inst.: Univ. Federal do Acre Endereço: Rio Branco – Acre, Brasil. Email: gleisonrafael13@gmail.com

25399. Meng, S.; Mow, S.; Welman, A. (2025): Impact of shoreline broadleaf cattail presence on macroinvertebrate communities. California Ecology and Conservation Research 9(1): 12 pp. (in English) ["While lake recreation can have positive economic and social value, it often comes with negative impacts on the environment. Specifically, shoreline vegetation, which provides shelter and resources for macroinvertebrates, is heavily impacted by human disturbances. Understanding the effects of shoreline vegetation on macroinvertebrate communities can provide valuable insights into effective management of freshwater habitats that benefit both the ecosystem and humans. Macroinvertebrates differ in their habitat preferences according to factors like food and shelter availability. One notable shoreline habitat feature is the broadleaf cattail (Typha latifolia), a native Californian emergent macrophyte that may have both positive and negative outcomes for landowners and macroinvertebrates. We surveyed plots along the shoreline of Lake Fulmor, observing broadleaf cattail presence, percent cover, and macroinvertebrate presence. We found that water striders (Gerridae), Zygoptera, and Anisoptera were more frequently found in sites with broadleaf cattails, while Ephemeroptera were more frequently found in sites without broadleaf cattails. Honeybees (Apis) had no preference for broadleaf cattail presence or absence. We also found that broadleaf cattail percent cover did not have an impact on total macroinvertebrate abundance or the presence of different taxonomic groups. Our findings suggest that maintaining sections of shoreline habitat with and without broadleaf cattails can help support a diverse macroinvertebrate community, providing guidelines for effective shoreline management." (Authors)] Address: Meng, S., Univ. California, Los Angeles, USA

25400. Metcalfe, A.; Ford, M.; Stevens, L.E.; Kennedy, T. (2025): Assessment of dragonfly and damselfly (Odonata) occupancy and habitat suitability at -12 Mile Slough, Glen Canyon National Recreation Area, Arizona. National Park Service, Bureau of Reclamation, Springs Stewardship Institute, Open-File Report 2025-1042: 26 pp. (in English) ["Management practices that enhance habitat complexity in dam tailwaters often aim to increase biodiversity and improve ecosystem health. However, in other instances, management practices may simplify habitat features to help minimize the establishment of invasive species. These tradeoffs are complex, particularly in the face of drought and warming water temperatures. In Glen Canyon National Recreation Area, a backwater known as -12 Mile Slough (henceforth the Slough), located 5-kilometers downstream from Glen Canyon Dam, is being considered for removal to reduce breeding habitat for warmwater nonnative fishes…. In this report, the habitat suitability for and occupancy of Odonata at the Slough are assessed. U.S. Geological Survey staff conducted three site visits to the Colorado River in Glen Canyon, the Slough, and another backwater ("Frogwater") on September 11–13, and 26, 2024. The physical habitat of the sampling sites was characterized by recording water temperatures, specific conductance, dissolved oxygen, turbidity, flow, depth, and benthic substratum size distribution. We sampled aquatic macroinvertebrates and riparian macroinvertebrates using benthic and aerial collection methods, respectively. We describe three distinct benthic aquatic invertebrate communities in and around the Slough, two of which contained Odonata. We found no Odonata larvae in the mainstem, at Frogwater, or in the Lower Slough. Using historic specimen data from the Museum of Northern Arizona, we report 8 species of Coenagrionidae and 8 species of Aeshnidae, Gomphidae, and Libellulidae in Glen Canyon between 1985 and 2024. We discuss the habitat requirements of Odonata larvae known to occur in the Slough, as well as their cultural and recreational values. We conclude that channelization of the Slough to cool water temperatures may reduce larval Odonata habitat locally but is unlikely to affect their diversity and abundance on a regional scale. ... Figure 4. Photographic plate showing Odonata species collected in Glen Canyon National Recreation Area between 1985 and 2024. Species are: Anax junius, Rhionaeschna multicolor, Progomphus borealis, Libellula pulchella, Libellula saturata, Pantala hymenaea, Sympetrum corruptum, Sympetrum pallipes, Argia plana, Argia vivida, Enallagma boreale, Enallagma carunculatum, Enallagma civile, E. praevarum, Ischnura damula, Ischnura demorsa." (Authors)] Address: https://pubs.usgs.gov/of/2025/1042/ofr20251042.pdf

25401. Michalski, J.; White, H.B. (2025): In memoriam Thomas W. "Nick" Donnelly (23rd December 1932 – 7th May 2025). Odonatologica 54(3/4): 143-158. (in English) ["A biography of Dr. Thomas W. "Nick" Donnelly, geologist and influential

leader of American odonatology is provided. A list of odonate taxa described by Nick and a list of odonate taxa named after him are appended." (Authors)] Address: Michalski, J., 1 Retired Public School Biology Teacher, 223 Mount Kemble Ave., Morristown, New Jersey, 07960, USA; huonia@-aol.com

25402. Mishra, D.K. (2025): Study of larval stages of Brachythemis contaminata. Annual Research & Review in Biology 40(12): 153-160. (in English) ["The current work attempts to provide an identification key to aquatic larvae of B. contaminata with colour illustrations. The specimens were collected from different parts on Indore (Madhya Pradesh). Larval stages of B. contaminate takes only 10 instar stages.... Conclusion: B. contaminate takes only 10 instar stages. Sometimes females of this species, in winters, can be found at the walls of buildings of remote areas. They were observed to migrate from their source place to another place to breed and food availability (Kumar, 1971). By end of the winters, in mid of February, these individuals were again available in nearby their source places. Oviposition takes place in March to April month. B. contaminate completes its larval development in 5 months and their adult forms can be seen around again in July to August months. After emergence, these individuals breed and oviposit in rest of 7 months. The adults of B. contaminate are very common and can easily be seen around their breeding grounds. The life cycle was studied thoroughly, in which most of the larval forms could not survive in laboratory conditions. A previous study by Kumar (1973) has also been done on B. contaminate and the details were found quite similar to his notes. The general life history of various other Odonates was also described by Gain et al. (2024), Leggott & Pritchard (1985). They suggested the extensive methods for captive rearing of Odonata from egg to adults. Seasonal monsoon plays significant role in the development and life history patterns in various species. If pond starts getting dry in scarcity of rainfall than larval development cannot take place. In Indore city while studying Odonates, it is observed that Odonata migrate from their initially suitable habitat which degenerates with time towards an alternative or favorable habitat for present conditions (Mishra et al., 2019). Their migrating behavior is mainly dependent on the reduction in responses to stimuli which usually promotes localization for some food resources and favorable sites for reproduction (Dingle, 1996; 2006). Storm water ponds and natural ponds have different water quality as they were found similar in temperatures while higher pH, D.O. and conductivity found in storm water pond water. Higher oxygen and higher pH there would result in higher rate of photosynthesis. The algal and plant biomass traps higher nutrients from photosynthesis." (Author) [Address: Mishra, D.K., Dept of Zoology, Govt. Holkar (Model, Autonomous) Science College, Indore (M.P.), India. Email: devendra2490@gmail.com

25403. Mitchell, R.M.; Herlihy, A.T.; Hughes, R.M. (2025): Striving for consistency in a national lake assessment: Defining reference status and littoral macroinvertebrate condition in lakes across the conterminous United States. Ecological Indicators 170, 112992: 11 pp. (in English) ["Benthic macroinvertebrates are widely used for assessing lotic ecosystems, however, their use in assessing lake condition has been more limited—especially at large, continental extents. We used data collected during the U.S. EPA's National Lake Assessment between 2007–2022 to develop and validate a national macroinvertebrate multi-metric index (MMI) of lake condition across the conterminous U.S. As part of that process, we identified least-disturbed ecoregional reference lakes by filtering all sampled lakes by using specific physical, chemical, and disturbance variables to remove disturbed lakes. To account for natural variability, different criteria values were used for each of the nine national ecoregions. This allowed for a regionally explicit and reproducible definitions of lake reference condition for current and future analyses. Because of insufficient reference lake numbers in some of the nine ecoregions, macroinvertebrate MMI development was done independently for each of five aggregate national ecoregions. All 126 candidate macroinvertebrate metrics were screened for reproducibility, responsiveness, and redundancy to identify the best metric in each of six group types: composition, diversity, feeding group, habit, richness, and pollution tolerance for each ecoregion. The six chosen metrics were summed to calculate the MMI. Condition benchmarks (good/fair/poor) for assessing biological condition were defined for each ecoregion based on reference lake MMI percentiles. Using these five MMIs with the 2022 survey data, an estimated 44% of the lakes were in good condition, whereas 27% were in poor condition. Our MMIs offer managers valuable tools for assessing lakes at large ecoregional and continental extents." (Authors) "Odonata" are included into the "biological ecoregion benthic MMI metrics".] Address: Mitchell, R.M., United States Environmental Protection Agency, Office of Water, 1200 Pennsylvania Ave., NW, MC 4502T, Washington, DC 20460, USA. Email: mitchell.richard@-epa.gov

25404. Mohamad Bukhori, M. F., Daud, R., Gintoron, C. S., Idris, M. I., Tawie Tingga, R. C., Abd Rahman, M. R., & Achmadi, A. S. (2025): Brief documentation of land and water ecosystem in Kubah and Santubong National Parks, Sarawak by UNIMAS Centre for Pre-University Studies Students. Journal of Science and Mathematics Letters 13(1): 10-22. (in English) ["In order to impose effective learning of biodiversity and ecology in pre-university students, they have been introduced and led to experience biodiversity and ecology and impart to differentiate different components of ecosystem. Therefore, a field work was conducted to experience biodiversity and ecology of discerned organisms in various ecosystems in Kubah and Santubong National Park. The input was analysed and described selected ecosystem, plants, and animals and referred to previous scientific reports from various resources. Experiences of biodiversity and ecology at pre-university level seemed to be important for the future development of their understanding during the degree level. It is important, both to give the students early experiences of biodiversity and ecology in nature and to take students' early ideas into consideration in academic, research, and development for lifelong learning and for a sustainable future." (Authors) Odonata are outlined but without any relevant details.] Address: Mohamad Bukhori, M. F. Biology Division, Centre for Pre-University Studies, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: mbmfhaizal@unimas.my

25405. Molineri, C.; Álvarez Álvarez, K.L.; Márquez, J.; Rodríguez, J.; Albanesi, S. (2025): New insights into Odonata diversity of the Chaco ecoregion (Northern Argentina): A survey update. International Dragonfly Fund - Report 194: 1-20. (in English) ["This study addresses significant knowledge gaps in the diversity and distribution of Odonata in Northern Argentina, particularly within the Chaco ecoregion. We conducted surveys across 38 sites in the Yungas-Chaco ecotone and Chaco ecoregion, spanning the provinces of Jujuy, Salta, and Tucumán. A total of 923 specimens from 62 species were collected, including adults, larvae, and 62 reared specimens (used to associate life stages). Key results include the successful rearing of 15 species from larva to adult, three of which yielded previously unknown larval descriptions: Orthemis discolor,

Nephepeltia leonardina, and Phyllocycla basidenta. The survey also established five new provincial records for Jujuy and Tucumán. Most significantly, eight new species additions to the Argentinean Chaco ecoregion were recorded — including Gynacantha bifida and four Telebasis species — increasing the known Odonata fauna of this ecoregion from 112 to 120 species." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical, (CONICET-UNT), Tucumán, Argentina. Email: carlosmolineri@gmail.com

25406. Monnerat, C.; Müller, W. (2025): First record of Tramea limbata in Saudi Arabia and additional records (Odonata: Libellulidae). Notulae odonatologicae 10(6): 205-210. (in English) ["A total of twelve species of dragonflies were recorded during a short trip in May 2024 to south-western Saudi Arabia. Tramea limbata is an addition to the country's checklist and the number of species known in the country is now 43. Trithemis furva has been observed for the first time since 1990, while Anax speratus, Brachythemis impartita, and Crocothemis sanguinolenta have only recently been rediscovered in the country and remain localised." (Authors)] Address: Monnerat, C., Info fauna, Bellevaux 51, 2000 Neuchâtel, Switzerland

25407. Monteiro do Amaral, P.H.; de Castro, D.M.P.; Linares, M.S.; Hughes, R.M.; van den Berg, E.; Callisto, M. (2025): Small hydropower dam alters the functional structure of macroinvertebrate assemblages in a Neotropical savanna river. Hydrobiologia 852: 3137-3154. (in English) ["Hydropower dams and their reservoirs are major disturbances affecting riverine ecosystems worldwide. However, most existing knowledge comes from large hydropower systems. We evaluated the upstream and downstream effects of a small run-of-river hydropower dam on the functional structure of benthic macroinvertebrate assemblages in a Neotropical savanna river. We found that functional originality and divergence were significantly higher near the dam site. In contrast, functional dispersion was higher at free-flowing sites upstream and downstream of the dam. Sites near the dam had greater proportions of univoltine organisms with spherical and low-flexibility bodies. On the other hand, free-flowing sites had increased proportions of multivoltine organisms with flattened bodies and flexible. The macroinvertebrate assemblages at all sites were mainly homogeneous and composed functionally generalist taxa. This study enhances our understanding of the environmental effects of small run-of-river dams on benthic macroinvertebrates, emphasizing the usefulness of functional characteristics for those assessments." (Authors)] Address: Monteiro do Amaral, P.H., Depto de Ecologia Aplicada, Univ. Federal de Lavras, Insti. de Ciências Naturais, Avenida Doutor Sylvio Menicucci, 3037, Lavras, MG, CEP 37200-900, Brazil

25408. Mota de Almeida, J.A.; Chaves Júnior, L.E.; Magalhães de Souza, M. (2025): Occasional record of Orthemis SP. (Libellulidae) in the diet of Falco sparverius L. 1758 (Falconiformis) in the State of Paraná, Southern Brazil. Revista Sociedad Científica del Paraguay 30(2): 132-135. (in Spanish, with English summary) ["The American kestrel (Falco sparverius), one of the smallest birds of prey in the world, has a varied diet that mainly consists of insects, such as dragonflies. However, specific records of these insects in the diet of this species are still scarce. This paper reports an occasional record of a F. sparverius predating on a dragonfly, which was observed on March 22, 2025, on a rural road in the municipality of Umuarama, state of Paraná, southern Brazil. The bird was photographed holding a dragonfly (Orthemis sp., Libellulidae) while perched on a power line wire approximately 5 meters above ground. These data contribute to the knowledge of the diet of F. sparverius in Brazil and highlight the need for further studies on the ecological role of dragonflies as prey for birds in both natural and human-altered environments in the country." (Authors)] Address: Mota de Almeida, J.A., Federal Institute of Paraná, Paraná, Brazil. Email: jose.almeida@ifpr.edu.br

25409. Nafisah, N.A.; Hashifah, F.N.; Wahyudi, C.I. (2025): Monitoring and conservation education of Javan endemic dragonfly genus Drepanosticta in Petungkriyono Forest. Proceeding International Collaborative Conference on Multidisciplinary Science 2(2): 59-68. (in English) ["Endemic dragonflies of the genus Drepanosticta in Java play a crucial role as bioindicators of aquatic environmental quality in tropical rainforest ecosystems. However, increasing land-use change in Petungkriyono Forest poses a significant threat to their survival. This study aimed to disseminate scientific information on the abundance and distribution of Drepanosticta species and to implement conservation education programs targeting elementary school students and local communities. Abundance and distribution data were collected from four sites using line transect surveys and direct count methods. The survey recorded three species, namely Drepanosticta gazella, D. spatulifera, and D. sundana, with D. spatulifera being the most dominant across all sites. Conservation education activities involved 27 students from SD Negeri 02 Tlogopakis through interactive lectures, educational animated videos, and direct field observations to enhance their understanding of dragonfly ecology and conservation. Furthermore, public outreach was conducted on 7 June 2021 through the distribution of infographic posters containing information on Javan endemic dragonflies and their ecological importance to local residents. This integrated approach of scientific dissemination and community-based conservation education is expected to increase environmental awareness and foster active participation in biodiversity conservation efforts in Petungkriyono Forest." (Authors)] Address: Nur Apriatun Nafisah, Fakultas Biologi Univ. Jenderal Soedirman, Indonesia. Email: nur.nafisah@unsoed.ac.id

25410. Nagasaka, K. (2025): Study on the water repellency of the wings of Japanese Paleoptera and the structure and chemical substances of protrusions on the surfaces: A comparative study of the dragonflies and mayflies. Graduation Final Thesis. Kobe University Secondary School, 11th Year 6th Year, Class 3, Number 21: 66-94. (in Japanese, with English summary) ["This paper explores the water repellency and chemical composition of the wing surfaces of Japanese dragonflies and mayflies (Atrocalopteryx atrata, Rhithrogena japonica). Previous research has shown that dragonflies' wings possess nanostructures, specifically nanopillars, contributing to their effective water repellency. This study aims to examine the water repellency and surface characteristics of mayfly wings while delving into the evolutionary correlation between dragonflies and mayflies. The sliding and contact angles of both insects' wings were measured, and significant hydrophobicity in mayflies' wings was revealed. However, unlike dragonflies' wings, the hydrophobicity of mayflies' wings decreased upon exposure to chloroform. Furthermore, an analysis using Electrospray Ionization Mass Spectrometry (ESI-MS) detected the presence of palmitic acid and stearic acid on the surface of the wings of the mayflies. These empirical insights prompt the author to postulate that the wings of the common ancestor of dragonflies and mayflies harbored saturated fatty acids. Subsequent to the speciation event between Odonata and Ephemeroptera, dragonflies underwent a unique evolutionary adaptation, developing nanopillars on their wings." (Author)] Address: https://da.lib.kobe-u.ac.jp/da/kernel/0100492580/0100492580.pdf

25411. Nakanishi, K.; Akanuma, H.; Kobayashi, R.; Yokomizo,

H.; Hayashi, T.I.; Robson, B.; Usio, N. (2025): Experimental test of the effects of prolonged flooding practices on animal communities in rice paddy fields. Agriculture, Ecosystems & Environment 379, 28 February 2025, 109369: (in English) ["Although environmentally friendly rice farming is expected to contribute to biodiversity conservation in paddy fields, scientific testing of the impact of individual management practices in rice cultivation is still in its early stages. This study used field experiments to quantify the effects of winter flooding and summer, mid-season drainage (a short-term soil drying in the middle of the rice growing season) on animal communities in paddy fields. We used a 2×2 factorial design with the factors winter flooding (±) and mid-season drainage treatment (±), crossed, and three replicate paddy fields in each combination (total n = 12). Our field experiments showed that winter flooding had little effect on the taxonomic richness and abundance of freshwater insects and spiders, but it increased the number of egg masses in amphibians such as the montane brown frog Rana ornativentris and the Japanese black salamander Hynobius nigrescens. In contrast, mid-season drainage negatively affected the taxonomic richness and abundance of freshwater insects, and the abundance of spiders. In particular, mortality usually occurred in species whose larval stage overlapped the period of mid-season drainage. Winter flooding promotes the biodiversity of animal communities in paddy fields. For amphibians that breed in the early spring, winter flooding provides breeding habitat. Mid-season drying had negative effects on animal biodiversity. Delaying or ceasing mid-season drainage would improve reproductive opportunities for freshwater insects and maintain species diversity. Diversification of winter flooding and winter drying across a rice paddy landscape and prolonged summer flooding practice may improve conservation outcomes." (Authors) The abundance of Odonata was significantly lower with the WF treatment than without the treatment in the pre-MD period (coefficient of WF = -2.09, P = 0.012, Table 2). Sympetrum dragonflies were absent from the WF treatment, although our samples contained many Libellulidae that could not be identified at the species level (Tables S1, S2).] Address: Nakanishi, K., Biodiversity Division, National Institute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. Email: nakanishi.kosuke@nies.go.jp

25412. Nel, A.; Jouault, C.; Azar, D. (2025): The sixth representative of the endemic Cretaceous Burmese amber family Burmaeshnidae (Odonata: Aeshnoptera). Mesozoic 2(4): 287-292. (in English) ["A new species of the aeshnopteran family Burmaeshnidae is described and illustrated based on a pair of well-preserved fore- and hind wings in mid-Cretaceous amber from Kachin, northern Myanmar. Burmaeshna bechlyi sp. nov. displays all the diagnostic characters of the family and differs from the type species Burmaeshna azari Huang, Cai, Nel & Bechly, 2017 in several key features. These include a hind wing with a discoidal triangle crossed by a single vein (vs. two in B. azari), an anal loop with four cells (vs. five), and the base of the Mspl is located three cells distal to the discoidal triangle (vs. two). The discovery of Burmaeshna bechlyi sp. nov., alongside the recent descriptions of other odonatan species from mid-Cretaceous Kachin amber, highlights the remarkable diversity of true dragonflies in the Burmese amber biota." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. E-mail: anel@mnhn.fr

25413. Nicolai, B. (2025): Libellen als Beute von Neuntöter Lanius collurio und Feldsperling Passer montanus. Apus 30: 90-93. (in German, with English summary) ["Dragonflies as prey of Red-backed Shrike Lanius collurio and Tree Sparrow Passer montanus. - It is reported and discussed how (1.) a female Red-backed Shrike Lanius collurio preys on and transports an Anax imperator and (2.) Tree Sparrows Passer montanus prey on and eat numerous Sympecma fusca after hatching during their maiden flight." (Author)] Address: Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. Email: nicolaibea@gmx.de

25414. Nicolai, B.; Martens, A. (2025): Männchen von Orthetrum coerulescens mit deutlich pigmentierten Flügelspitzen (Odonata: Libellulidae). Libellula 44(3/4): 183-188. (in German, with English summary) ["Male Orthetrum coerulescens with distinctly pigmented wing tips – The observation of a male O. coerulescens with clearly brownish-yellow pigmented wing tips in the Jävenitzer Moor near Gardelegen, Germany, on 7. August 2025 is reported. In addition to other records of similar wing pigmentation, this phenomenon is attributed to increased water temperatures during the last larval stage." (Authors)] Address: Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. Email: nicolaibea@gmx.de

25415. Nikolic, M.L.; Samardžic, A.; Durdevic, A. (2025): A survey of Odonata diversity in continental saltmarshes of Serbia. International Dragonfly Fund - Report 195: 1-16. (in English, with Serbian summary) ["This study provides the first comprehensive survey of Odonata species in the continental saltmarshes of Serbia, focusing on three key locations: Lalinacka Saltmarsh Area, Aleksandrovacka Saltmarsh, and Bresnicicka Saltmarsh. Over a single season from May to October 2023, 31 Odonata species were documented across these sites, representing 44.26% of the Odonata fauna recorded in Serbia. The research highlights the ecological significance of these areas, which are characterized by their unique halomorphic soils in both terrestrial and aquatic environments. Unfortunately, these areas are exposed to significant anthropogenic pressures, including agricultural expansion, waste disposal, and habitat fragmentation. Of particular note is the presence of Coenagrion ornatum, a species listed as Near Threatened in Europe and included in Annex I I of the EU Habitat Directive and the Bern Convention. Despite existing protections, such as their designation as Natural Monuments and Protected Habitats, ongoing threats underscore the need for continued and expanded research efforts." (Authors)] Address: Nikolic, M.L., Biol. Soci. „Dr. Sava Petrovic“, Višegradska 33, 18000 Niš, Serbia. Email: marko@bddsp.org.rs

25416. Novelo-Gutierrez, R.; Gomez-Anaya, J.A. (2025): Description of the F-0 larvae of Brechmorhoga latialata González-Soriano, 1999 and B. tepeaca Calvert, 1908 (Odonata: Libellulidae). Zootaxa 5719(3): 387-400. (in English, with Spanish summary) ["The last instar larvae of B. latialata and B. tepeaca are described and illustrated in detail based on reared larvae. Both are diagnosed and compared with the larvae of other species of Brechmorhoga Kirby described to date. The main structural features that distinguish the larva of B. latialata from that of B. tepeaca are the number of setae on palp and prementum, the shape of the ligula, the palp crenations, the ventral margin of propleura, the size of abdominal dorsal protuberances, and the length of posterolateral spines on S8–9 and caudal appendages." (Authors)] Address: Novelo-Gutierrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. Email: rodolfo.novelo@inecol.mx

25417. Olah, G.; Torres, P.J.; Pomerantz, A.F.; Kirby, R.; Baxter, S.; Grados, J.; Reeves, L.E. (2025): Cyclosa Menge, 1866 (Araneidae) orb-weavers build stabilimenta that resemble larger spiders. Ecology and Evolution, 2025; 15:e72371: 8 pp. (in English) ["Orb-weaving spiders are known to create stabilimenta—silk situated at particular locations of the web.

While anecdotal reports and popular media have long suggested that some spiders arrange debris in their webs to resemble a larger spider, this behavior has not been formally documented in the scientific literature. Here, we provide the first scientific record of this unique behavior in two orb-weaving spiders (Cyclosa spp., Araneidae) from the tropical forests of Peru and the Philippines. We report that these spiders construct stabilimenta composed of detritus and silk, arranging the debris in the web into a shape that visually resembles the silhouette of a larger spider. This structure may serve as a "decoy" that serves an anti-predator function of misdirecting or repelling the attacks of some predators. Video abstract: https://youtu.be/GDySHFRXbCE. "Helicopter damselflies (Odonata: Pseudostigmatidae) are specialist predators of web-building spiders, and they occur extensively throughout the Neotropics, including the region where the Peruvian C. longicauda are found. At the TRC, we confirmed the presence of the pseudostigmatid species Mecistogaster linearis (Fabricius, 1777) and Microstigma rotundatum Selys, 1860 in the same habitat as C. longicauda. Fincke (1992) described pseudostigmatids as visual predators that will methodically search vegetation for spider webs. When a web is located, the damselfly hovers in front of the web searching for the spider. Pseudostigmatids have been reported to target araneid spiders, including Cyclosa, that are 3–6 mm in body length, while actively avoiding larger species (Fincke 1992). Perhaps C. longicauda evolved to construct these putative decoys in response to predation pressure by pseudostigmatid damselflies. Based on the measurements we collected on the Peruvian C. longicauda, this spider is within the preferred size range of damselflies, while the spider-like stabilimentum that it constructs is within the size range of a spider that would be avoided. On the other hand, this form of deception might be even more effective against vertebrate predators, such as birds or lizards, which, unlike insects, are known to respond strongly to macroscopic patterns and may be confused by the large, spider-like decoy, as reported about Argiope spiders (Schoener & Spiller 1992). Thus, the decoy could serve as a general defense against a suite of visually hunting predators." (Authors)] Address: Olah, G., Fenner School of Environment & Society, The Australian National Univ., Canberra, ACT, Australia. Email: george.olah@anu.edu.au

25418. Olive, E.L.; Martins, R.T.; Dias-Silva, K.; Neiss, U.G.; Hamada, N. (2025): Effects of geographic distance and abiotic variables on larval Odonata assemblages in western Amazon savannah lakes. An. Acad. Bras. Ciênc. 97 (Suppl. 2). 15 pp. (in English) ["Odonata, comprising the suborders Anisoptera and Zygoptera, are important bioindicators of aquatic ecosystem health due to their sensitivity to environmental changes. We assessed the effects of environmental variables and geographic distance on larval Odonata assemblages in 25 natural lakes of the Brazilian savannah, in northern Roraima. We focused on Anisoptera, characterized by strong flight abilities and greater dispersal capacity, and Zygoptera, which are more sensitive to local environmental variation due to their limited dispersal capacity. We collected 9,578 larvae of 12 Anisoptera species and 2,884 larvae of eight Zygoptera species. Larval Odonata assemblages are influenced by abiotic variables rather than geographic distance, and richness was positively associated pH. Assemblage composition and abundance were affected by key abiotic conditions. Odonata abundance was positively correlated with oxygen and temperature, but negatively correlated with phosphate. Anisoptera abundance increased with dissolved oxygen and geographic distance, but decreased with phosphate and electrical conductivity. Meanwhile, Zygoptera abundance showed a positive correlation with conductivity and temperature but a negative relationship with geographic distance, pH, and phosphate. Additionally, pH influenced assemblage composition, positively affecting Anisoptera but negatively Zygoptera. Our results provide valuable insights into conservation planning and environmental policies aimed at preserving aquatic biodiversity in the region." (Authors)] Address: Martin, R.T., Fundação Oswaldo Cruz (Fiocruz), Instituto Oswaldo Cruz (IOC), Laboratório de Entomologia (LABE), Av. Brasil, 4365, Manguinhos, 21040-900 Rio de Janeiro, RJ, Brazil. Email: martinsrt@gmail.com

25419. Orliac, N. (2025): Les espèces de papillons de jour et de libellules disparues de Franche-Comté. État 2024. Version non confidentielle. Conservatoire botanique national de Franche-Comté – Observatoire régional des Invertébrés: 26 pp. (in French) ["This document aims to provide an overview of the species of butterflies and dragonflies that are currently considered extinct or potentially extinct in the region, while also exploring the causes of these disappearances and discussing possibilities for the possible future reappearance of some of these species." (Author/Google translate) Nehalennia speciosa, Somatochlora alpestris, Sympecma paedisca, Sympetrum depressiusculum, Sympetrum pedemontanum] Address: https://libellules.pnaopie.fr/wp-content/uploads/2025/06/0-71-232AD-Les-especes-de-papillons-de-jour-et-de-libellules-disparues-de-FV-version-non-conf-2025-WEB.pdf

25420. Ott, J. (2025): Außergewöhnlich früher Beginn der Schlupfperiode der Gemeinen Winterlibelle – Sympecma fusca (Vander Linden, 1820) – in der Pfalz (Odonata: Lestidae). Fauna Flora Rheinland-Pfalz 15(3): 1049-1058. (in German, with English summary) [Germany; "Exceptionally early start of the emergence period of the Common Winter Damselfly – Sympecma fusca – in the Palatinate. - The exceptionally early start of the emergence period of S. fusca is reported, which in the Palatinate region in early summer 2025 already began in the last decade of June. This represents the earliest emergence period of the species to date." (Author)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

25421. Ott, J. (2025): Moorlibellen in der Pfalz – in stetem Rückgang. Mitteilungen der Pollichia 103: 147-170. (in German, with English summary) ["This article introduces the moor dragonfly species present in the Palatinate, mentioning their ecology, distribution, and threats. Due to various changes in the water balance, moor dragonflies are increasingly endangered, and the effects of climate change are on top showing their negative impacts and exacerbating this situation. Moorland dragonflies are regarded as looser in time of climatic changes. No improvement in this situation is in sight in the near future, as no specific conservation programs and measurements exist in the federal state of Rhineland-Palatinate. Regular and standardized monitoring studies are important for the documentation of all the effects." (Author)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. Email: ott@lupogmbh.de

25422. Palacino-Rodríguez, F.; Ríos-Olaya, K.J.; Juen, L.; Palacino-Penagos, D.A. 2025): A bibliometric study of odonate–spider predator–prey dynamics. International Journal of Odonatology 28: 112-122. (in English) ["Predation interactions between spiders and odonates are understudied. We compiled information on spiders that prey on Odonata and Odonata that prey on spiders. A systematic search was conducted in Web of Science™, Google Scholar™, and Google™ to address the following questions: What was the objective or focus of each study, and what taxonomic resolution was used? What were the habitats and vegetation types examined? What were the leading countries where the articles were developed, and in

what time period? Finally, which journals are they being published in? Information on the manuscripts was examined to extract the year of publication, publishing journal, country, research focus, taxonomic resolution, and keywords. Data were grouped over 30 years, and information on taxonomic resolution was classified from species to order. The findings revealed 136 spider species preying on 199 Odonata species and 35 odonate species preying on 10 spider species. Most studies focused on natural history, behavior, and ecology, reaching the species taxonomic level. The publications were primarily authored by scientists from the USA and India, although the studies themselves were from 30 countries. They were published between 1903 and 2024 in 72 journals, with an increase in the number of publications over time. The journals with the highest number of published articles were the International Journal of Odonatology and Odonatologica. We close by suggesting topics to guide future research on odonate and spider predator–prey interactions." (Authors) Address: Juen, L., Programa de Pós-graduação em Ecologia, Univ. Federal do Pará (UFPA), Av. Perimetral, 1, Belém, Pará 66077-830, Brazil. Email: leandrojuen@ufpa.br

25423. Palm, M. (2025): Sex ratio, species composition, and mating frequency in damselfly populations across lakes in Värmland. BSc. thesis, Fakulteten för hälsa, natur- och teknikvetenskap, Karlstad University: 12 pp. (in English, with Swedish summary) ["Zygoptera are ecologically important insects whose population dynamics and reproductive behavior reflect environmental and demographic conditions. This study investigated ecological and reproductive variation among damselfly populations across five lakes in Värmland, Sweden. Specifically, it examined (1) whether sex ratios and species composition differed among lakes, and (2) whether mating frequency varied between species and sexes. A total of 576 individuals from three species — Coenagrion pulchellum, C. hastulatum, and C. lunulatum — were analyzed. Chi-square tests were used to compare sex ratios, species composition, and mating frequencies. C. pulchellum dominated most lakes, representing 84–100% of individuals in four of the five sites, while C. hastulatum and C. lunulatum occurred almost exclusively in Pond 96. Sex ratios did not differ significantly among lakes, and mating frequency showed no significant variation between species or sexes. These results indicate that while ecological context influences species composition, reproductive patterns remain relatively stable across populations. The dominance of C. pulchellum suggests that this species is particularly well adapted to the environmental conditions of these lakes, whereas the limited occurrence of C. hastulatum and C. lunulatum may reflect habitat specialization or small sample sizes. " (Author)] Address: https://www.diva-portal.org-/smash/get/diva2:2018891/FULLTEXT01.pdf

25424. Pandey, C.; Bhatia, G.S.; Ali, M.; Rawate, K.; Dewangan, R. (2025): Diversity and distribution of dragonflies and damselflies (Odonata) in India: A comprehensive review. International Journal of Entomology Research 10(12): 6-12. (in English) ["Odonata constitute one of the most ancient and ecologically significant groups of insects, acting as vital indicators of freshwater ecosystem integrity. This comprehensive review synthesizes existing literature on the diversity, distribution, and ecological roles of Indian Odonata, integrating data from regional surveys across the Western Ghats, Eastern Himalayas, northeastern India, central plains, and coastal ecosystems. India harbors approximately 498 species across 18 families and 154 genera, reflecting exceptional biogeographical heterogeneity and high levels of endemism, particularly within the families Libellulidae and Coenagrionidae. Regional assessments reveal that odonate diversity is closely governed by habitat heterogeneity, vegetation structure, water quality, and climatic gradients. Studies from biodiversity hotspots such as the Western Ghats and the Eastern Himalayas highlight the persistence of both endemic and threatened taxa, whereas surveys in semi-urban and agricultural landscapes demonstrate the adaptability of generalist species to moderate anthropogenic pressures. Despite progress in taxonomic revisions and faunistic inventories, significant ecological and geographical data gaps remain, particularly in the north eastern and trans-Himalayan regions. Major threats to odonate diversity include habitat degradation, pollution, deforestation, and climate change, all of which have led to localized declines in sensitive taxa. The review emphasizes the need for integrative conservation approaches combining habitat restoration, ecological monitoring, molecular taxonomy, and citizen science initiatives. Ultimately, sustaining the diversity of India's Odonata is essential for maintaining freshwater ecosystem health and ensuring the long-term resilience of the country's aquatic biodiversity." (Authors)] Address: Pandey, C., Dept Zool., Government Govt. Digvijay Autonomous Postgraduate College, Rajnandgaon, Chhattisgarh, India

25425. Parkhomenko, V.V. (2025): Materials on the fauna of the "Mykhaylivska Tsilina" Reserve (Based on researcj in 2003-2008). Conservation Biology in Ukraine 44: 251-256. (in Ukrainian) [Sympecma paedisca, 2003-09-28, 50.74580 34.19658] Address: Parkhomenko, V.V., Ukrainian Nature Conservation Group. Email: fullmetalekolog@gmail.com

25426. Pascal, A.; Srinivasulu, C. (2025): A preliminary investigation on wing morphology, flight patterns, and flight heights of selected odonates. Journal of Threatened Taxa 17(11): 27854-27862. (in English) ["Wing shape and its individual structural components are a major contributor to the flight performance of odonates. Two essential components of wing structure are the nodus and the pterostigma. Our study showed that the position of the nodus (expressed as the nodal index) in the forewings and hindwings of dragonflies show subtle, but functionally important differences, whereas on a broader scale, Odonata show characteristic differences in accordance with their specific flight requirements. The position of the pterostigma expressed as the pterostigmatal index was observed to be optimized close to the wing tip across all odonates and unlike the nodus, there were no characteristic differences between dragonflies and damselflies in this regard. In addition to describing wing shape using aspect ratio, our study presents a geometric morphometric analysis of wing shape across flying and perching behaviour and across flight heights of odonates. It was found that wing shape does not significantly differ between fliers and perchers. However, certain species namely Crocothemis servilia, Tholymis tillarga, and Gynacantha bayadera showed notable deviations in wing shape. These deviations indicate that the dichotomous classification of odonates into perchers and fliers is too broad, possibly overlooking the nuanced flight patterns adopted by these insects. On the other hand, a significant association was found between wing shape and flight heights of odonates. These results suggest that behavioural factors may influence odonate wing shape, while also highlighting the importance of wing shape in flight efficiency. Consequently, the flight performance of biomimetic devices modelled after odonate flight, may be enhanced by optimizing wing shape in accordance with the heights above ground at which these devices are intended to operate." (Authors)] Address: Anandtha Pascal, Wildlife Biology and Taxonomy Lab, Department of Zoology, University College of Science, Osmania University, Telangana 500007, India.

25427. Paul, S.; Herberstein, M.E,M.; Khan, M.K. (2025): Patterns of water mite and gregarine parasitism in Ischnura

heterosticta (Odonata: Zygoptera) damselfly populations and their impact on body condition. Austral Entomology 64(4), e70034: 14 pp. (in English) ["Parasitism is a strong selective agent that affects host fitness, and parasitism may be variable across often broad landscapes and ecological gradients. However, variation may also occur within small geographic areas due to local differences in habitat and climate. Here, we quantified the prevalence and intensity of ectoparasitic water mites (Arrenurus sp.) and endoparasitic gregarines (Apicomplexa: Protozoa) in Australian Ischnura heterosticta, between sexes and across three populations in Cairns, Australia. We found that more than 42% of the damselflies were coinfected with water mites and gregarines. The prevalence of both parasite taxa differed between sexes, being higher in females, and also varied among the three populations. Furthermore, we investigated whether parasitism was correlated with damselfly body size, mass and lipid content. Water mite parasitism was negatively correlated with host body mass and lipid content; however, gregarine-infected males and females had better body condition, as estimated by body length, mass and lipid content. In conclusion, our study suggests that damselflies with a larger body size have a higher prevalence of gregarine infection; however, the impact on body mass and lipid content may vary with parasite type." (Authors)] Address: Khan, M.K., School of Natural Sciences, Macquarie University, Sydney, NSW 2109, Australia. Email: kawsar.khan@mq.edu.au

25428. Paulson, D.R. (2025): Thomas W. Donnelly Odonata of Note. Argia 37(3): 33-34. (in English) [List of Odonata described by and named after Thomas W. Donnelly.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. Email: dennispaulson@comcast.net

25429. Pham, A.V.; Pham, C.T.; Nguyen, T.Q.; Nguyen, H.T.T.; Hoang, T.T., Le, M.D.; Ziegler, T. (2025): New record and diet of a poorly known frog, Amolops daorum (Amphibia, Anura) from Vietnam. ZooKeys 1262: 203-219. (in English) [As a result of our field surveys, a new population of the Dao Frog, Amolops daorum (Bain, Lathrop, Murphy, Orlov & Ho, 2003), was found in Son La Province, northern Vietnam, and its identification was based on molecular and morphological analyses. To date, knowledge about the natural history of this species is scarce, including data on its dietary ecology. Using the stomach-flushing method, we analyzed stomach contents of 132 individuals (81 males and 51 females) of A. daorum. We found 501 prey items (458 invertebrates, one vertebrate, and 15 unidentified items), belonging to 11 insect orders (Blattodea, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, Odonata, Orthoptera, Plecoptera), insect larvae, Araneae, Opiliones, Mollusca, Polydesmida, Scolopendromorpha, and a frog. The dominant prey items of the species were Coleoptera (19.16%), Hymenoptera (17.76%), insect larvae (16.57%), Hemiptera (9.98%), Araneae (7.98%), Diptera (6.99), and Orthoptera (5.79%). The importance index for these categories ranged from 5.61% to 18.45%. Hymenoptera and Coleoptera were the categories with the highest frequency of prey items, found in 55 and 54 stomachs, respectively. There was an overlap of 82.83% in the diet between males and females. Coleoptera, insect larvae, Hymenoptera, Araneae, and Orthoptera represented the most important prey categories for both sexes." (Authors)] Address: Pham, A.V.. Fac. Environmental Sciences, Univ. of Science, Vietnam National Univ., Hanoi, 334 Nguyen Trai Road, Hanoi 11416, Vietnam. Email: phamanh@hus.edu.vn

25430. Poncet, R.; Lacoeuilhe, A.; Lervy-Mayere, V.; Lévêque, A.; Touroult, J.; Wroza, S.; Delzons, O.; Robin-Havret, V.; Léonard, L.; Rome, Q.; Gargominy, O.; Amiard, P.; Lepareur, F.; Plaëtevoët, K.; Padilla, B.; Fournier, C. (2025): Inventaires naturalistes du Domaine national de Chambord incluant un test de recensement des Odonates par ADNe - Sortie de service 2024. PatriNat (OFB-MNHN-CNRS-IRD): 28 pp. (in French) ["On the occasion of its end of service in September 2024, PatriNat teams carried out naturalist inventories at the Domaine national de Chambord (Loir-et-Cher), an emblematic territory of the Centre-Val de Loire region, rich in its ecological, landscape and heritage diversity. The inventories carried out combine: • multi-site and multi-taxon field surveys by the agents and experts mobilized (flora, fauna, fungi); • an educational protocol for environmental DNA inventory on the odonates of the Étang de la Faisanderie; In addition, an analysis of existing data in the SINP on the Municipality of Chambord was carried out. In total, 1,456 taxa were recorded at the municipal level, including 147 new taxa identified on the occasion of the end of service. The most enriched groups are lichens, insects, gastropods and arachnids. The density of observations varies greatly in space, with a high concentration along the Cosson and around the central buildings of the estate. The analysis made it possible to map: • taxonomic diversity per 250 x 250 m grid, • threat status according to the IUCN Red Lists at different scales (global, European, national, regional), • the distribution of protected species, listed in European directives, and ZNIEFF determinants. A cumulative threat score was calculated, revealing several biodiversity hotspots with high stakes, particularly in the wet meadows of the southwest, the central forest edges, and the La Gabillière sector to the north. The meadows sector bordering the Cosson was the subject of a specific inventory effort. It is distinguished by: • a significant contribution to the knowledge of local biodiversity (258 taxa), • the presence of numerous threatened species, some of which are classified as CR or EN at the regional level, • the co-occurrence of high conservation statuses (national protection, European directives, ZNIEFF determinance). The data collected by eDNA made it possible to identify 7 taxa of odonates, none of which had been observed during visual surveys (6 taxa). These results suggest a complementarity of approaches and significant variations in the detectability of species." (Authors/Google translate) The following odonate species are listed: Lestes dryas, Coenagrion mercuriale, Pyrrhosoma nymphula, Isoaeschna isoceles, Sympetrum fonscolombii, Somatochlora flavomaculata, Somatochlora metallica, Orthetrum coerulescens, Leucorrhinia pectoralis. In addition, in Chapter 3.2 Odonata are treated: "3.2. Odonata Inventories by Environmental DNA Sampling revealed the presence of seven different taxa, four of which could be assigned to species rank. The molecular sequences indicating the presence of the three species identified at the genus level were either too degraded or associated with species for which the available molecular data do not yet allow for certain differentiation of taxa within genetically similar complexes. It is worth noting that, with the exception of Epitheca bimaculata, all taxa were detected during several phases of environmental DNA sampling (max = 6 for Ischnura sp., min = 3 for Anax sp. and Libellula depressa). On average, taxa were detected 4.3 times out of 6. The time slots with the highest detection rates were 11:30–13:00 and 16:00–17:30 (n = 6), while the time slots with the lowest detection rates were 17:30–18:30 (n = 2) and 14:30–16:00 (n = 3). On average, 3.7 taxa were detected per environmental DNA collection time slot. To provide context for the data obtained by eDNA, a further extraction to that described in section 2.3 was carried out, concerning the odonates recorded in the municipality of Chambord since January 1, 2000 (https://openobs-.mnhn.fr/openobs-download/d03c2f6c-ac93-3c43-bef0-57-43af638e42/1747897773813/records-20 25-05-22.zip). The data available in OpenObs cover 49 taxa (47 species and two subspecies, one of which is a nominate subspecies), for

a total of 765 observations. Before the inventories carried out during the outing, only one record was available at the Pheasantry Pond: Orthetrum cancellatum, observed on June 25, 2017 (data collected by the INPN Species application, taxonomic assignment by Olivier Delzons). The naturalist surveys (outside the eDNA protocol) carried out visually on the pond during the outing allowed for the identification of several species: Ischnura elegans, Sympetrum striolatum, Chalcolestes viridis, Sympetrum sanguineum, Enallagma cyathigerum, and Sympecma fusca. It is noted that there is no correspondence among the taxa identified at the species level between the data obtained by eDNA and the data obtained by visual survey, suggesting three points: i. a. significant variability in species detectability, ii. the complementarity of approaches, iii. the need to supplement the reference sequence database used for the taxonomic assignment of molecular data. By restricting the data available in OpenObs to September, the number of species already observed in the municipality is reduced to 11. Among these species, two were already recorded: one identified by eDNA: Crocothemis erythraea, and one identified visually: Chalcolestes viridis. The field surveys (eDNA and visual) thus contributed to increasing the total diversity of Odonata recorded in September in the municipality by 42%, bringing the total diversity to 19 species. Considering all available data (OpenObs and data collected during the field trip), the monthly taxonomic diversity documented on the commune of Chambord is distributed as follows: January (7), February (1), March (0), April (1), May (25), June (31), July (39), August (26), September (19), October (1), November (2), December (0)."] Address: https://hal.science/hal-05140351/document

25431. Popescu, I.E.; Gostin, I.N.A (2025): Biodiversity Hotspot for European Invertebrates of Community Importance (Natura 2000), Bârnova-Repedea Forest in Romania (ROSCI0135). Conservation 2025, 5, 41. https://doi.org/10.3390/conservation5030041: 36 pp. (in English) ["ROSCI0135 Bârnova-Repedea Forest, covering 12,236.20 ha, is a relatively large Natura 2000 site from Romania, though not as large as other Natura 2000 sites. However, in terms of the number of invertebrate species of community importance, with 18 species present, Bârnova Forest ranks as the fourth richest site in Romania, with the following species:…Cordulegaster heros, Coenagrion ornatum, ... Bârnova-Repedea Forest can be considered a true mosaic of habitats, providing favourable conditions for the existence of these rare Natura 2000 species. The threats to the site are complex and challenging to manage." (Authors)] Address: Popescu, I.E., Faculty of Biology, Alexandru Ioan Cuza University of Ias, i, Bdul Carol I, No. 11, 700506 Iasi, Romania. Email: irinagostin@yahoo.com

25432. Prisacariu, E.G.; Dumitrescu, O.; Stratila, S.; Sima, M.; Savescu, C.; Vladuca, J.; Cuciumita, C. (2025): Additively manufactured dragonfly-inspired wings for bio-faithful flapping MAV development. Biomimetics 2025, 10, 849: 28 pp. (in English) ["This work presents a first-iteration bio-faithful dragonfly-inspired wing designed for future flapping micro air vehicle (MAV) applications. Using high-resolution imaging, the natural venation pattern of fore- and hindwings was reconstructed in CAD and reproduced through high-precision stereolithography at 1:1 and 3:1 scale. The printed polymeric wings successfully preserved the anisotropic stiffness distribution of the biological structure, enabling realistic bending and torsional responses. Modal analysis and dynamic testing confirmed that the lightweight designs operate within the biologically relevant 20–40 Hz range and that geometry and material choices allow predictable tuning of natural frequencies. Preliminary aerodynamic estimates captured the characteristic anti-phase lift behavior of four-wing flapping, while schlieren and infrared thermography demonstrated that heat dispersion and flow features follow the vein-driven structural pathways of the printed wings. Together, these results validate the feasibility and functional relevance of bio-faithful venation architectures and establish a solid foundation for future iterations incorporating membranes, full kinematic actuation, and higher-fidelity aeroelastic modeling." (Authors)] Address: Prisacariu, Emilia, Romanian Research & Development Institute for Gas Turbines COMOTI, 061126 Bucharest, Romania

25433. Ramya, P.; Jayaseelan, T.; Dass, K. (2025): Odonates diversity in Pattukkottai Taluk, Thanjavur district, Tamil Nadu, India. International Journal of Entomology Research 10(6): 15-18. (in English) ["Odonates are fascinating insects that continue to captivate people with their unique appearance and impressive ability and are important for the environment; they are biological indicators as well as biocontrol agents. The present survey recorded a total of 17 odonate species, among 12 species from the Anisoptera and 5 species from the Zygoptera. The diversity observed indicates the ecological value of these insects and their role in maintaining healthy aquatic ecosystems. Furthermore, understanding their population dynamics can offer important clues about environmental changes and habitat quality." (Authors)] Address: Ramya, P., Dept Zoology, Tamilavel Umamaheswaranar Karanthai Arts College, Affiliated to Bharathidasan Univ., Tiruchirappalli, Karanthai, Thanjavur, Tamilnadu, India

25434. Resende, B.O.; Juen, L.; Schietti, J.; Baccaro, F.B.; Krempser, E.; Moura Jr., J.; Colares, L.; Carvalho, R.L.; Phillips, O.L.; Souza, G.; Michelan, T.S.; Ghidini, A.R.; Demori, A.; Barreto Façanha, B.L.; Rosa, C.; Venticinque, E.; Bomfim, F.; Raseira, M.; Famelli, S.; Esquivel-Muelbert, A.; Kasseboehmer, A.C.; Fares, A.L.; Ferreira, A.S.; Ribas, C.C.; Castilho, C.; Nunes, C.A.; de Andrade, D.F.C.; Silvério, D.; Cunha, E.J.R.; Antunes, E.; Rodrigues, E.; Silva, E.; Alves-Martins, F.; Schmidt, F.A.; Elias, F.; Geraldo de Carvalho, F.G.; Vaz-de-Mello, F.Z.; Cruz, G.; Palheta, G.; Teodoro, G.; ter Steege, H.; Albert, J.; Nascimento, J.; Brito, J.; Toledo, J.J.; Oliveira-Junior, J.M.B.; Monteles, J.; Arieira, J.; Stropp, J.; Dias-Silva, K.; Castello, L.; Giacomin, L.L.; Brasil, L.S.; Calvão, L.; Vieira, L.; Stegmann, L.; Montag, L.; Dantas Santos, M.P.; Silveira, M.; Guerrero-Moreno, M.A.; Nascimento, N.; Hamada, N.; Marini-Filho, O.; Melo, P.; Ferreira, P.; de Marco Júnior, P.; Maciel, R.; Pinheiro, R.; Ligeiro, R.; Lima, R.; Martins, R.; Koroiva, R.; Silva, R.R.; Ribeiro, S.; Vieira, T.B.; Tagliacollo, V.A.; Santos Ferreira, V.R.; Beiroz, W.; Kuikuro, Y.; França, F.M. (2025): Collaborative research networks as a strategy to synthesize knowledge of Amazonian biodiversity. Proc. R. Soc. B 292: 20252069. https://doi.org/10.1098/rspb.2025.2069. 12 pp. (in English) ["The Amazon region is critical for maintaining global biodiversity and mitigating climate change; however, it faces escalating threats from deforestation and habitat degradation. Addressing these threats requires evidence-based strategies grounded in investments in science, technology, innovation and collaborative research. The Brazilian National Institute of Science and Technology (INCT) programme plays a central role in advancing scientific and technological progress by establishing collaborative research networks across diverse fields and regions. In this context, we present the INCT in Synthesis of Amazonian Biodiversity (INCT-SynBiAm) as a case study, illustrating how research networks can promote diversity in academia and enhance our understanding of biodiversity in hyperdiverse tropical regions. The SynBiAm network integrates 47 academic and non-academic institutions from Brazil and abroad. Its key objectives are to establish and expand a collaborative initiative for research synthesis in Amazonia, deepen

our understanding of biodiversity patterns, threats and drivers in forest and freshwater ecosystems, inform environmental and educational practices and policies, and train future educators, decision-makers and scientists committed to the Amazon's conservation and sustainability. We outline the INCT programme and demonstrate how the INCT-SynBiAm network can achieve these goals, providing a model for future collaborative initiatives aimed at addressing socio-ecological challenges in tropical regions." (Authors)] Address: Resende, Bethânia Oliveira, Universidade Federal do Pará, Belém, Pará, Brazil. Email: bethania-nx@hotmail.com

25435. Ribeiro, W.; Guerrero-Moreno, M.A.; da Silva, E.C.; Oliveira, F.A.; Lameira, H.L.N.; Juen, L.; Dias-Silva, K.; Moura Jr., J.F.; Oliveira-Junior, J.M.B. (2025): Citizen science as a tool in the biomonitoring of freshwater ecosystems using aquatic insects. Conservation 2025, 5(4), 75; https://doi.org/10.3390/conservation5040075 (registering DOI): 29 pp. (in English) ["Anthropogenic pressures and climate change have increasingly affected biodiversity and ecosystem services, particularly in freshwater ecosystems, which are among the most sensitive and vulnerable environments. Citizen science has emerged as a promising approach to expand ecological knowledge and strengthen biomonitoring efforts, mitigating the limitations of conventional research in scale, cost, and speed. This study presents a global bibliometric analysis of citizen science applied to freshwater biomonitoring using aquatic insects. A total of 153 articles indexed in Scopus and Web of Science, published between 2002 and 2025, were analyzed. Results reveal a marked increase in publications since 2010, concentrated mainly in the Global North, especially the United States (37.51%) and Germany (14.42%). The most frequent taxa were Odonata (25.58%) and Diptera (25.19%), with studies focusing primarily on species (70.59%) level, and adult stage (69%). Participants were mainly from the general public (70%) and naturalists (12%), predominantly under contributory models (98%). Reported challenges involved taxonomic limitations (28%) and citizen science engagement (28%). Despite these constraints, the findings highlight the growing relevance of citizen science as a complementary tool for aquatic biomonitoring, emphasizing the need for inclusive approaches, taxonomic training, and participatory strategies in biodiversity conservation." (Authors)] Address: Ribeiro, W., Programa de Pós Graduação em Sociedade, Ambiente e Qualidade de Vida, Instituto de Formação Interdisciplinar e Intercultural (IFII), Univ. Federal do Oeste do Pará (UFOPA), Santarém 68041-100, Pará, Brazil. Email: josemaxoliveira@gmail.com

25436. Ridley, F.; Sayer, C.A.; Mair, L.; Baisero, D.; Böhm, M.; Brooks, T.M.; Butchart, S.H.M.; Clausnitzer, V.; Freyhof, J.; Grill, G.; Harrison, I.; Jiménez, R.R.; Lehner, B.; Macfarlane, N.B.W.; Plumptre, A.J.; van Soesbergen, A.; Worthington, T.A.; Starnes, T. (2025): Mapping area of habitat for inland wetland species. Conservation Biology 2025;e70163.: 27 pp. (in English) ["Area of habitat (AOH) maps provide a high-resolution representation of the habitat available in a species' range and can support conservation policy and planning processes. However, until recently, there was insufficient knowledge on the distribution of inland wetlands and freshwater biodiversity to develop AOHmapping methods specifically tailored to inland wetlands. We used a combined empirical and thematic approach to translate inland wetland habitat classes in the International Union for Conservation of Nature (IUCN) Habitats Classification Scheme into spatially explicit wetland-cover types derived from the Global Lakes and Wetlands Database 2 and the World Karst Aquifer Map. The AOH was subsequently estimated as the area in the mapped range that corresponded to each species' habitat and elevation associations. We developed and tested the method with IUCN Red List assessment data, range maps, and point locality data for fishes, odonates, decapod crustaceans, and mollusks (22,876 species). The method performed well in comparison with similar methods already developed for terrestrial mammals, birds, amphibians, and reptiles. The mean map prevalence (proportion of area in a species' range that was AOH) was 18–32% for each taxonomic group. Based on data on known localities of occurrence, 78–100% of species per taxonomic group had a higher classification accuracy than expected if AOH were distributed in the range at random. This represents an increased accuracy in the distribution of wetland species. Our study represents the first attempt to distinguish between inland wetland habitat subclasses and to include subterranean habitats in an AOH mapping method. Our method will facilitate the inclusion of previously underrepresented taxa in key conservation tools and analyses and is expected to increase the accuracy of AOH mapping for any species associated with inland wetlands." (Authors)] Address: Ridley, Francesca, School of Natural & Environmental Sciences, Newcastle University, Ridley Building 2, Newcastle upon Tyne NE1 7RU, UK. Email: francesca.ridley@ncl.ac.uk

25437. Roger, S.; Gaget, E.; Lambret, P. (2025): Les plans de gestion des aires protégées sont déterminants pour la conservation de Lestes macrostigma en Camargue. https://tourduvalat.org/actualites-projets/les-plans-de-gestion-des-aires-protegees-sont-determinants-pour-la-con servation-de-lestes-macrostigma-en-camargue/. Publié le 18 novembre 2025: 4 pp. (in French) ["L. macrostigma is classified as "Endangered" in France and "Vulnerable" in the Provence-Alpes-Côte d'Azur region. Its range is large but highly fragmented. This stenoecious species depends on rare habitats for its reproduction: temporary brackish waters, characterized by alternating periods of flooding and drying throughout the year. It is also known for the significant fluctuations in its population size from year to year. To understand these variations, we modeled its population dynamics in the Camargue region by studying whether, independently of rainfall, the management practices implemented in protected areas had an effect on the occurrence and abundance of the species." (Authors/Google translate)] Address: https://tourduvalat.org/wp-content/uploads/2025/11/Roger-S.2025_RetourNaturaliste-edit_VFinale.pdf

25438. Roger, S. (2025): Dynamique de population de Lestes macrostigma en Camargue. Université de Bourgogne - Master BEE - Parcours Dynamique et Conservation de la Biodiversité. Mémoire de stage de Master deuxième année, année universitaire 2024-2025: 44 pp. (in French) ["L. macrostigma is classified as "Endangered" in France and "Vulnerable" in the Provence-Alpes-Côte d'Azur region. Its range is large but highly fragmented. This stenoceanic species depends on rare habitats: temporary brackish waters, characterized by alternating periods of flooding and drying throughout the year. It is also known for the significant fluctuations in its population size from year to year. To better understand these variations, we modeled its population dynamics in the Camargue region, studying whether targeting the species in a management plan implemented in protected areas has an effect on the species' occurrence and abundance, both independently and in addition to rainfall patterns. This work is based on monitoring data collected over the past 15 years, using standardized protocols or through citizen science projects. They were confronted with explanatory factors such as autumn and spring water balances, as well as the water management practices of protected areas. Three water management approaches were distinguished: no management, management favorable to L. macrostigma, and management not targeted at the species.

Our models show the influence of climatic conditions on the probability of L. macrostigma's presence. The species is observed more frequently if the autumn is dry or the spring wet. However, regardless of climatic conditions, its probability of presence remains significantly higher and more consistent in sites benefiting from a management plan specifically designed for the species. This targeted approach, combined with water management practices in these sites, mitigates water balances, especially in spring, and maintains a consistent presence of the species even during dry years. Indeed, outside of sites specifically targeting the species, L. macrostigma is only observed during very wet springs. These results are corroborated by the analysis of evidence of native status. Furthermore, abundance follows a similar dynamic. It is more stable in areas with favorable management and particularly high in protected areas after a dry autumn. The combination of favorable management and a wet spring creates optimal conditions for the species. These results show that protected areas and their targeted water management play a crucial role in the conservation of L. macrostigma. Faced with climate change, characterized by greater unpredictability of rainfall and increased evaporation due to rising temperatures, this management ensures the presence of water in key habitats. It thus helps maintain population levels, ensure native status, and preserve core populations." (Author/Google translate)] Address: https://-tourduvalat.org/wp-content/uploads/2024/12/Roger-S.-20-25-Dynamique-Lmacrostigma-Camargue.pdf

25439. Ruchin, A.B.; Egorov, L.V. (2025): Results of long-term research of threatened insect species in selected regions of European Russia. Nature Conservation Research 10(4): 66-91. (in Russian, with English summary) ["Insects, as the most diverse group of invertebrates, are often unfairly underrepresented in Red Lists of threatened taxa. Despite the significant biodiversity and ecosystem functionality of this group, regional Red lists of taxa often ignore truly threatened species and, conversely, include species that are quite common in adjacent regions. The paper presents the results of long-term monitoring of rare insect species in 14 regions of European Russia (Vladimir Region, Volgograd Region, Voronezh Region, Lipetsk Region, Moscow Region, Nizhny Novgorod Region, Penza Region, Ryazan Region, Republic of Mordovia, Republic of Tatarstan, Samara Region, Saratov Region, Tambov Region, Ulyanovsk Region). The aim of the study was to summarise the results of long-term research of rare species listed in regional Red Data Books and the Red Data Book of the Russian Federation. A wide variety of insect collection and census methods were used. To characterise regional Red Data Books during the research, the taxonomic lists, which were actual at the time of the research, were used. The information resulted in 96 insect species from eight orders (one from Odonata [Anax imperator], three from Orthoptera, seven from Hemiptera, 64 from Coleoptera, two from Neuroptera, one from Raphidioptera, 13 from Lepidoptera, 5 from Hymenoptera), included in the Red Data Books of the studied regions; of these, 18 species are also included or were included in the recent (2021) or previous (2001) edition of the Red Data Book of the Russian Federation, respectively. Between one and three species listed in the Red Data Book of the Russian Federation were recorded for the first time in seven regions. The number of species included in the regional Red Data Books ranges from 47 species in the Volgograd Region to 261 species in the Voronezh Region. It is assumed that 30 species from the studied taxa do not require special protection measures and should be excluded from protected lists of regional Red Data Books. Justification for such recommendations is provided in each specific case. Leptura aurulenta is proposed to be included on the list of the Red Data Book of the Russian Federation." (Authors)] Address: Ruchin, A.B., Dept of Biology, Mordovian State University, Bolshevitskaya Ul., Saransk 430000 Russia. Email: ruchin.alexander@gmail.com

25440. Schneider, T.; Verstraete, A.; Kosterin, O.E.; Ikemeyer, D.; Hu, F.-S.; Kompier, T.; Dumont, H.J. (2025): Molecular phylogenetic analysis of the family Chlorogomphidae (Odonata, Anisoptera). Invertebrate Systematics 39, IS25016. doi:10.-1071/IS25016: 16 pp. (in English) ["Phylogenetic analysis of the family Chlorogomphidae was carried out using two nuclear markers, the ITS and histone H3–H4 regions, and a barcoding fragment of the mitochondrial COI gene, using sequences obtained in this study and adopted from GenBank. Their joint analysis was performed using StarBEAST software. In total, 36 (64%) of 56 species of all three genera currently recognised in this family were analysed. Our analysis showed Chlorogomphidae as a monotypic family containing the single speciose genus Chlorogomphus Selys, 1854. Chlorogomphus montanus Chao, 1999, syn. nov., is synonymised to Chlorogomphus nasutus Needham, 1930, Chlorogomphus urolobatus Chen, 1950, syn. nov., is synonymised to Chlorogomphus infuscatus Needham, 1930. The synonymy of Chlorogomphus suzukii Oguma, 1926 and Chlorogomphus tunti Needham, 1930 is confirmed. Some other potential synonyms are discussed. The phylogenetic trees reconstructed here showed that the species name C. nasutus Needham, 1930 actually refers to two (not three) different taxa. Thus, we suggest considering these two taxa as separate species, C. nasutus and C. satoi Asahina, 1995." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, D-14109 Berlin-Wannsee, Germany. Email: thomas.rs@gmx.de

25441. Schneider, T.; Ikemeyer, D.; Vierstraete, A. (2025): Some observations of endemic and endangered dragonflies (Odonata) from the Asir Mountains, Saudi Arabia. Entomologist's Monthly Magazine 161(4): 265-280. (in English) ["During two short visits to southwestern Saudi Arabia in January and May 2024 observations were made on the endemic and endangered Arabian Odonata species Pseudagrion arabicum and Pinheyschna yemenensis. P. arabicum females were polychromatic with three adult colour forms; these are described here for the first time. The behaviour of P. yemenensis adults, emergence and exuviae frequency on a brook in the Asir Mountains ca 2,700m a. s. l. are reported. Morphometric data from the two Arabian endemics and Anax speratus are provided. In total, 29 species were recorded from the Asir Mountains, including Tramea limbata reported for the first time from Saudi Arabia." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany

25442. Sevrell, F. (2025): Could female fecundity selection or sexual selection promote evolutionary and genetic rescue? Long-term changes in body size and the fitness consequences for a small insect. MSc thesis, Zooekologi, Biologiska institutionen, Lunds universitet: (in English, with Swedish summary) ["Due to human-induced environmental changes, many natural populations are undergoing extensive fitness declines. Natural or sexual selection could potentially shift the phenotypic mean of critical traits towards new phenotypic optima, promoting evolutionary rescue. However, this process has rarely been studied in natural populations. Furthermore, the population fitness can also be increased by genetic contribution from immigrants, promoting genetic rescue. In Ischnura elegans, body sizes have decreased over the past decades, presumably due to increased temperatures associated with ongoing climate change. Here, I investigated whether sexual selection on body size and immigration could counteract this phenotypic change, combining 23 years of data from a

long-term population study with data on female fecundity and behavioural experiments aimed to investigate female mate preferences for male body size and male migration status. I also investigated the role of male body size and male migration status on mating harassment on females. I found evidence for directional fecundity selection in females towards larger body size, as well as a female preference for larger males in the mate choice experiments. Male migration status affected mating harassment on females, and there is potential for gene flow between populations, allowing for genetic rescue. Sexual selection on male body size in the field (reflecting the combined effects of intra- and intersexual selection) varied in both direction and magnitude across populations in the long-term study. This indicates strongly context-dependent sexual selection that is shaped by local ecological and/or demographic factors. Taken together, the results suggest that both sexual selection on males and female fecundity selection on body size, as well as migration, could potentially counteract the population fitness decline in I. elegans that is expected under climate change that reduces body size. However, spatial and temporal variability in sexual selection modulates these effects and highlights the dynamic nature of counteracting selection pressures on body size." (Author)] Address: http://-lup.lub.lu.se/student-papers/record/9215071

25443. Sharma, M.; Isvaran, K. (2025): The importance of quantifying selection climates: predictable and unpredictable variation in predation risk and the implications for prey responses. Proceedings of the Royal Entomological Society (B) 292 (2051): (in English) ["Prey behavioural traits within a population are commonly variable, unexpectedly so, given that predation is thought to be a strong selection pressure. This variation likely arises from complex, variable selection pressures, but experimental evaluations of prey responses to natural variability in selection pressures remain limited. We focus on the rock-pool-breeding mosquito Aedes vexans, which can influence the predation risk to its offspring through site selection for oviposition. We quantified the nature of selection pressures in the wild, i.e. the spatial and temporal variation in larval predation risk, by measuring densities of predatory dragonfly nymphs in rock pools along the mosquito breeding season. To examine the implication of selection pressure regimes for the evolution of oviposition site selection, we conducted manipulative experiments and measured female oviposition responses to variation in predation risk. Predation risk varied extensively over space and time; this variation showed both predictable and unpredictable elements. Females avoided large pools with permanent predators but appeared to show variable responses to medium-sized pools with unpredictable predation risk. We suggest that while it might be challenging to quantify complex selection environments and their impact on wild prey responses, more such studies can help explain puzzling variation in anti-predator responses." (Authors)] Address: Sharma, M., Centre for Ecological Sciences, Indian Institute of Science, Bengaluru 560012, India. Email: manvigsharma@gmail.com

25444. Siddiqui, A.A.; Zeiri, A.; Shah, M.A. (2025): Insect lipids as novel source for future applications: Chemical composition and industry applications — A comprehensive review. Food Science & Nutrition, 2025; 13:e70553: 59 pp. (in English) ["Nutritional values of some insects are correlated with species, developmental stages, temperature, reproduction, flight, migration, and their diet. Insect oil may be utilized as an ingredient in feed and food, in the cosmetic industry, or as biofuel. Lipid content is composed mainly of fatty acids (FAs) of nutritional importance. Insects' fat body (FB) is crucial for lipid synthesis, accumulation, and hydrolysis. Triacylglycerol (TAG) accumulation occurs mainly in adipocytes. The major transported lipid is diacylglycerol, which is carried by high-density lipoprotein (lipophorin [Lpp]) from the gut into a trip to tissues for storage and utilization. About 1900 insect species, mainly from the Coleoptera, Lepidoptera, Hymenoptera, Orthoptera, Hemiptera, Isoptera, Odonata, and Diptera orders, were recorded to be consumed by humans in the world, particularly in Asia, Latin America, and Africa. Different methodologies used to extract lipids are currently applied to insects, such as the aqueous extraction, the Soxhlet method, the Folch method, the Matyash method, the supercritical fluid extraction method, the Aqueous Enzymatic method, and the acid fermentation method. This review shows that the Coleoptera, Lepidoptera, and Isoptera orders contain the higher amount of fat/oil at the same level as palm and palm kernel oil. In the larval stage, Samia ricini had the higher fat content in terms of crude fat, followed by Rhynchophorus phoenicis, R. ferrugineus, commercial palm oil, Aspongopus viduatus (adult), Oryctes owariensis (larvae), and Macrotermes nigeriensis (adult) and palm kernel oil. Understanding lipid metabolism, composition, and physiological implications is fundamental for insect mass rearing and harvesting according to the final use target. This review aimed to contribute to knowledge about insects as sources of fats and FAs. Lipids from insects could play an important role as a source of energy if incorporated into human diets and make a valuable integration into feed and food as long as they are safe, legal, and accepted." (Authors)] Address: Shah, M.A., University Centre for Research & Development, Chandigarh University, Gharuan, Mohali, Punjab, India. Email: m.asif@kardan.edu.af

25445. Ssenkuba, F.; Tumusiime, J.; Akite, P.; Toloa, E.; Ndimulodi, J.; Dusabe, M.-C.; Albrecht, C.; Kagoro-Rugunda, G. (2025): Unveiling management implications for Odonata assemblages in Tropical Rain Forests of the Albertine Rift, Uganda. Aquatic Conservation: Marine and Freshwater Ecosystems 35(12), e70257: 14 pp. (in English) ["Odonata is a cosmopolitan, indicator group of insects residing on all continents except Antarctica, with notable species richness in Africa's tropical montane forests. In East Africa, this group is threatened by habitat loss and degradation driven by rapid population growth. This study investigated odonate assemblages and their conservation concern in Bwindi Impenetrable National Park (BINP, Afromontane) and Bugoma Central Forest Reserve (BCFR, mid-altitude) in the Albertine Rift in Uganda. From December 2022 to July 2023, 61 sites were cross-sectionally surveyed (26 in BCFR, 35 in BINP) to analyse community composition, habitat preferences, and conservation threats. Odonate key habitats in these forests were mapped. Nonmetric multidimensional scaling revealed distinct odonate communities in BCFR and BINP with limited overlap. Odonate diversity was computed using both Shannon diversity indices and species richness. BCFR registered a significantly higher overall species richness (median=3.0) than BINP (median H=2.0, $p<0.01$). However, BINP hosted more range-restricted and globally threatened species, with a higher threat-based score (median TBS=2.00) compared to BCFR (median TBS = 0.00, $p<0.01$). Threatened species such as Neodythemis munyaga (Endangered) and Albertine Rift endemics such as Stenocypha molindica and Stenocypha jacksoni were strongly associated with BINP's high-altitude, pristine streams characterized by clear water with low salinity, total dissolved solids and electrical conductivity. Substantial anthropogenic pressures were recorded in BCFR, threatening critical odonate habitats. We emphasise the urgent need for targeted conservation efforts to preserve the forest ecosystem services and their unique odonate diversity." (Author)] Address: Ssenkuba, F., Dept Biol., Mbarara Univ. Sci. & Tech., Mbarara, Uganda

25446. Stan, C.; Tuca, O. (2025): Researches regarding the entomofauna of Cetate area - Dolj County. Annals of the University of Crajova 30(66): 613-616. (in English) [Orthetrum spp., Libellula depressa] Address: Stan Cătălin, University of Craiova. E-mail: catalin.stan@edu.ucv.ro

25447. Stinshoff, P.; Henn, Y.; Rommel, S.H.; Helmreich, B. (2025): Heavy metal leaching from stormwater control measures – insights into field and lab prestressed media and road-deposited sediments. Environmental Science Water Research & Technology 11: 328-340. (in English) ["The risk of heavy metal leaching from sorptive filter media in stormwater control measures (SCMs) treating road runoff is mainly assessed through lab-scale studies. In contrast, investigations with filter media prestressed under real conditions are crucial. Therefore, the leaching potential of five traffic-relevant heavy metals (Cr, Cu, Ni, Pb, and Zn) from field-scale and lab-scale prestressed sorptive filter media and road-deposited sediments (RDSs) from a decentralized treatment facility was assessed using quiescent batch leaching tests with and without adding de-icing salts. The hydraulic retention times of a maximum of 7 days should represent prolonged submerged conditions during dry periods. The leaching quantity order was Zn » Cu > Ni, whereas no observed leaching was quantified for Cr and Pb for all tested materials. Considerable loads of Cu only leached from the field-scale prestressed sorptive filter media, which was mainly associated with the presence of dissolved organic matter. Regarding the tested filter media, zeolite and carbonate sand revealed significantly higher leaching of Zn under the influence of de-icing salts. The leaching of Cu and Zn concerning the mobile heavy metal fraction was less than 0.2%. The highest concentrations of heavy metals were observed for the RDSs, where up to 0.3% leached of the potential mobile fraction during one dry cycle." (Authors) The paper includes a reference to Odonata, but giving no details.] Address: Stinshoff, P., Chair of Urban Water Systems Engineering, Technical Univ. of Munich, Am Coulombwall 3, 85748 Garching, Germany. Email: sww@tum.de

25448. Stroup, G.L. (2025): Odonata conservation: Re-archiving & application of an historical odonate collection for tracking the effects of ecological disturbance in New York state. MSc thesis, Graduate School – University of Utah: IV + 61 pp. (in English) ["This report documents the rehousing and digitization of over 300 odonate specimens collected by Henry K. Townes in 1930s New York, currently held at the Natural History Museum of Utah (NHMU). To ensure consistency and longevity, a Standard Operating Procedure (SOP) was developed, now serving as a template for future digitization efforts. The digitized specimens provide valuable historical range data for many odonate species. When analyzed using modern GIS tools, alongside watershed maps, land cover data, and protected area boundaries, they reveal significant shifts in species distributions over the past 90 years. Three common species (Calopteryx amata, Sympetrum rubicundulum, and Epitheca cynosura) were found to have shifted their ranges in response to widespread urbanization and formation of mosaic landscapes. These findings underscore the role of historical entomological collections in filling biogeographic data gaps and shed light on the conservation challenges facing mosaic ecosystems and their bioindicator species." (Author)] Address: https://www.researchgate.net/publication/396400923_Odonata_Conservation_Re-archiving_and_Application_of_an_Historical_Odonate_Collection_for_Tracking_the_Effects_of_Ecological_Disturbance_in_New_York_State

25449. Sudarso, J.; Yoga, G.P.; Suryono, T.; Imroatushshoolikhah; Samir, O.; Ibrahim, A. (2025): Association of benthic macroinvertebrate organisms with plastic waste in small urban lakes. International Journal of Environmental Studies 82(2): 950-968. (in English) ["Most research on plastic waste has focused on lotic environments, with limited knowledge of still-water (lentic) ecosystems, especially small urban lakes. This study aimed to identify benthic macroinvertebrate communities associated with plastic waste and examine key factors regulating their structure. Conducted over 3 months in five small urban lakes, the research employed transects to collect benthic macroinvertebrates across 1 m² areas. A total of three sampling repetitions were performed at each site in inlet and outlet. The result showed that diversity based on the Shannon-Weiner index ranged from 0.3 to 3.07 bits, correlating with high plastic waste mass and organic matter enrichment. Plastic waste disrupted ideal habitats for collector-gatherers, although other benthic groups like scrapers persisted. Despite the adverse conditions, these species adapted and dominated the sediments of small urban lakes, heavily contaminated by plastic waste and organic matter. This research highlights the significant impact of plastic pollution on benthic macroinvertebrate diversity and community structure in urban lentic environments, emphasising the need for targeted conservation and pollution mitigation strategies." (Authors) Macromiidae] Address: Pratama Yoga, G.P., a Research Centre for Limnology and Water Resources, National Research and Innovation Agency, Cibinong, Indonesia. Email: rgun002@brin.go.id

25450. Suhardono, S.; Sunarhadi, M.A.; Septiariva, I.Y.; Rachman, H.T.; Suryawan, I.W.K. (2025): Biomonitoring of Bedog river water quality using dragonfly diversity as bioindicators in Yogyakarta, Indonesia. Nature Environment and Pollution Technology 24(2), D1711: 8 pp. (in English) ["The quantity of contaminants being released into rivers is rising in direct correlation with the growth of the human population. Bedog River is a tributary located in the vicinity of Mount Merapi. This river flows through agricultural, residential, and cattle sectors, making it easier to detect river contamination. The objective of this study is to evaluate the water quality of the Bedog river. The research employs a methodology that evaluates water quality by considering biological indicators, specifically the existence of dragonfly species, with the analysis of other chemical and physical properties in river water. The water quality research findings indicate that the physical and chemical characteristics remain satisfactory, with the water falling into the moderately polluted category. It also meets the water quality criteria outlined in PPRI No. 82 of 2001, specifically class 2 threshold. The dragonfly variety index in the Bedog River is relatively high, with values of 2.08, 2.79, and 1.47 for the upstream, middle, and downstream sections, respectively. The Pearson correlation coefficient indicates a strong positive correlation of 0.961, while the significance level of 0.179 suggests a statistically meaningful association. The findings highlight the potential of using dragonflies as bioindicators for long-term monitoring of river health and pollution levels. This study contributes to the understanding of how water quality impacts biodiversity and provides a basis for future research and river management practices. This research fills a gap by integrating biological indicators with traditional water quality assessments in a specific regional context. It provides new insights into the relationship between water quality and dragonfly diversity, offering valuable information for environmental monitoring and conservation efforts." (Authors)] Address: Suryawan, I.W.K., Dept Environmental Engineering, Fac. Infrastructure Planning, Univ. Pertamina, Jakarta Selatan 12220, Indonesia. Email: i.suryawan@universitaspertamina.ac.id

25451. Sun, W.-; Wang, L.; Wang Y.Q. (2025): Wing–wing

coupling enhances the aerodynamic performance of dragonflies during forward flight. Physics of Fluids 37, 013610 (2025): (in English) ["Dragonflies have garnered significant attention due to their ability to perform various complex flight maneuvers. As a dipteran insect, the wing–wing coupling between forewing and hindwing (FW and HW) in dragonflies plays a crucial role in aerodynamic performance. In this study, a numerical simulation model is developed to elucidate the impact mechanism of wing–wing coupling in dragonflies during forward flight. The results reveal that the wing–wing coupling mainly enhances the aerodynamic force for hindwing, thereby improving the aerodynamic performance of dragonflies. There is a synergy between flapping deviation angle and phase angle. Dragonflies with negative flapping deviation angle and a suitable phase angle about 45° can generate high horizontal force and propulsive efficiency significantly while maintaining the vertical force. The effect of wing–wing coupling is related to the wing spacing of dragonflies, and proves to be advantageous at small dimensionless wing spacing (less than 2.5). These findings deepen our understanding of the exceptional flight capabilities of dragonflies and provide valuable insights for the design of tandem flapping wings." (Authors)] Address: Wang Y.Q., Key Lab.f Structural Dynamics of Liaoning Province, College of Sciences, Northeastern Univ. Shenyang 110819, China. Email: wangyanqing@mail.neu.edu.cn

25452. Tan, Y. (2025): Forecasting divergence: Climate-driven habitat shifts in North American odonates depend on functional groups. Conservation 5(4), 76; https://doi.org/10.3390-/conservation5040076: 15 pp. (in English) ["Climate change is expected to have significant yet distinct impacts on arthropods. Studying the species distribution of odonates, which are considered a model taxon for studying climate change and a flagship group for assessing ecosystem health, can reveal potential future patterns of geographic change. My study predicts the impacts of different climate change scenarios on the future habitat and distribution of odonates. I used MaxEnt to construct species distribution models (SDMs) for 30 North American odonate species across seven functional groups, categorized based on functional traits about each genus's life history, dispersal, morphology, and ecology. Each model was applied to three future years and three different Shared Socio-economic Pathways (SSPs). My results show that odonates will experience increasing overall habitat suitability and increasing range size with shifts northward; however, the total suitable habitat will shrink into smaller, geographically separated pockets. While most functional groups will follow the aforementioned trends, Libellula will experience a decrease in range size, and Aeshna will move the furthest north while experiencing the greatest increase in overall habitat suitability and range size. Overall, SSP5 will result in increased variability among functional groups in their habitat and distribution. This study has implications for understanding invertebrate responses to global change and may refocus conservation efforts on species with specific functional traits. The functional approach used here may be further applicable to other organisms and regions." (Authors)] Address: Tan, Y., UWC Atlantic College, Llanilltud Fawr CF61 1WF, UK. Email: a24ytan@-uwcatlantic.org

25453. Theischinger, G. (2025): The final instar exuvia/larva of Austroargiolestes amabilis (Förster) (Odonata: Zygoptera: Argiolestidae). Australian Entomologist 52(3): 97. (in English) ["A final instar exuvia/larva of A. amabilis is described, illustrated and compared with the known final instar exuviae/larvae of its congeners." (Author)] Address: Theischinger G., 2A Hammerley Rd, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

25454. Tolman, E.; Bobo, D.; Frandsen, P.B.; Sahlén, G.; Toups, M.; Ware, J.L.; Kohli, M. (2025): First genomic insights into an Aeshnidae dragonfly: unveiling the genome of a Holarctic species, Aeshna juncea. International Journal of Odonatology 28: 187-193. (in English) ["Temperature oscillations in the Arctic may present a unique opportunity to study how insect species respond to such changes. A. juncea, … thrives in this environment; molecular adaptations that allow it to survive in the Arctic have yet to be evaluated. Here, we present the first assembled and annotated draft genome assembly and annotation of A. juncea. The assembly is both highly contiguous and complete. This resource is presented and used here to provide further evidence that transposons and unclassified repetitive elements are a major driver behind genome size variation in Odonata and show that the effective population size of A. juncea populations from Alaska went through bottlenecks during the most recent ice age. We believe this genome will be an important resource in understanding how species like A. juncea survive in Arctic habitats." (Authors)] Address: Tolman, E., Dept of Biological Science. Virginia Tech, Blacksburg VA, USA. Email: etolman@amnh.org

25455. Tolman, E.R.; Beatty, C.D.; Goodman, A.; Ramchand, P.; McAllister, T.; Reyes, K.; Zahara, A.; Taveras, K.; Wade, V.; Abbott, J.; Bybee, S.; Guralnick, R.; Harding, K.M.; Kohli, M.K.; Frandsen, P.B.; Ware, J.; Suvorov, A. (2025): Elevational and Oceanic barriers shape the distribution, dispersal and diversity of Aotearoa's Kapokapowai (Uropetala) dragonflies. Evolution 79(10): 2219-2235. (in English) ["Mountains and islands provide an opportunity for studying the biogeography of diversification and population fragmentation. Aotearoa (New Zealand) is an excellent location to investigate both phenomena due to alpine emergence and oceanic separation. While it would be expected that separation across oceanic and elevation gradients are major barriers to gene flow in animals, including aquatic insects, such hypotheses have not been thoroughly tested in these taxa. By integrating population genomic from sub-genomic Anchored-Hybrid Enrichment sequencing, ecological niche modeling, and morphological analyses from scanning-electron microscopy, we show that tectonic uplift and oceanic vicariance are implicated in speciation and population structure in Kapokapowai (Uropetala) dragonflies. Although Te Moana o Raukawa (Cook Strait), is likely responsible for some of the genetic structure observed, speciation has not yet occurred in populations separated by the strait. We find that the altitudinal gradient across Ka Tiritiri-o-te-Moana (the Southern Alps) is not impervious, but it significantly restricts gene flow between the aforementioned species. Our data support the hypothesis of an active colonization of Ka Tiritiri-o-te-Moana by the ancestral population of Kapokapowai, followed by a recolonization of the lowlands. These findings provide key foundations for the study of lineages endemic to Aotearoa." (Authors)] Address: Tolman, E.R., Dept of Biological Sciences, Virginia Tech, Blacksburg, VA, Division of Invertebrate Zoology, American Museum of Natural History, New York, NY. Email: etolman@amnh.org

25456. Toups, M.A.; Vicoso, B. (2025): Insect sex chromosome evolution: conservation, turnover, and mechanisms of dosage compensation. Current Opinion in Insect Science 72: 101411: 7 pp. (in English) ["Sex chromosomes have evolved many times throughout the tree of life, and understanding what has shaped their unusual morphological, sequence, and regulatory features has been a long-standing goal. Most early insights into insect sex-chromosome biology came from a few model species, such as the fruit fly Drosophila melanogaster, which limited broad-scale evolutionary inferences. More recently, extensive comparative genomics studies

have uncovered several unexpected patterns, which we highlight in this review. First, we describe the conservation of the ancestral X chromosome over 450 million years, but also its recurrent turnover (i.e. its reversal to an autosome when a new X chromosome arose) in at least one order. We then summarize classical and more recent findings on how insects modulate the expression of X-linked genes following the degradation of the Y chromosome, and how the diverse mechanisms of dosage compensation identified may elucidate important principles of sex-chromosome regulatory evolution." (Authors) The study includes references to 'Ischnura elegans' or 'Odonata'.] Address: Toups, Melissa, Dept of Biology, Univ. of Louisiana at Lafayette, Lafayette, LA 70503, USA. Email: melissa.toups@louisiana.edu

25457. Tran, M.K.; Huong, L.T.T.; Phan, Q.T. (2025): Notes on the genus Onychargia Selys, 1865 (Odonata: Zygoptera: Platycnemididae) with description of O. hungeri sp. nov. from southern Vietnam. Zootaxa 5729(4): 519-534. (in English) ["This study updates the distribution and provides notes on the habitat of three species of the genus Onychargia Selys, 1865 in Vietnam, including the description of a new species, O. hungeri sp. nov. (holotype male, 10.52238° N, 107.47591°E, altitude 41 m, Binh Chau-Phuoc Buu Nature Reserve, Ho Chi Minh City, southern Vietnam), which is described based on male and female specimens. The new species can be easily distinguished from two other congeners by having smaller body size, U-shaped pruinosity on male's synthorax and differences in the male's appendages structures." (Authors)] Address: Phan, Q.T., The Center for Entomology & Parasitology Research, Duy Tan Univ., 120 Hoang Minh Thao, Lien Chieu Ward, Da Nang City, Vietnam. Email: pqtoan84@gmail.com

25458. Tsubaki, Y.; Hooper, R.E.; Plaistow, S.; Samejima, Y.; Sherratt, T.N. (2025): Similar survival rates of territorial and sneaker males in a polymorphic damselfly: A multi-year study. Ecology and Evolution, 2025; 15:e72623: 14 pp. (in English) ["Male alternative reproductive tactics (ARTs) have been documented across diverse taxa and typically involve a male morph that defends resources to attract females and an alternate morph that exploits this behavior to obtain matings by stealth (territorial-sneaker tactics). One might expect that territorial morphs would live shorter lives than sneaker morphs due to their higher vulnerability to predators, their propensity to get injured and higher energetic costs. To date, there have been few direct field tests of this prediction. A mark-release-resighting (MRR) study conducted in 1992 found that orange-winged territorial morphs of Mnais costalis had on average a shorter minimum reproductive lifespan than clear-winged sneaker morphs, if one assumed that they all emerged on a single day, but not if they were assumed to be of age 0 at the time of capture. We fitted Cormack–Jolly–Seber models to these 1992 data, as well as MRR studies conducted on M. costalis in four subsequent years. These models allowed us to jointly estimate the daily survival and resighting rates of the morphs and identify consistent predictors of their survival and detectability. There was no evidence of a significant difference in survival between male morphs or between males and females, although daily survival did consistently rise then fall with time since capture (age) and consistently declined with temperature above 17°C. By contrast, there was strong evidence that the resighting rates of individuals differed among morphs, with orange-winged males being more detectable. While there is no compelling evidence that the territorial and sneaker morphs have different daily survival rates, this does not preclude the possibility that orange-winged territorial males have high reproductive success on the days they are able to maintain a territory while the reproductive success of clear-winged sneaker males has reproductive success that is more broadly distributed across their lives." (Authors)] Address: Sherratt, T.N., Dept of Biology, Carleton University, Ottawa, Ontario, Canada. Email: tom.sherratt@carleton.ca

25459. van der Heijden, A. (2025): Pseudagrion sublacteum in Andalusia, a new damselfly species for Europe (Odonata: Coenagrionidae). Odonatologica 54(3/4): 159-164. (in English) ["On 04.vi.2025, a male P. sublacteum was photographed perched on a rock in the Río Guadiaro near El Colmenar (Málaga province, Andalusia) in southern Spain. This damselfly species is common in sub-Saharan Africa and occurs also in the Levant, with a few relict populations in Morocco. The record from Río Guadiaro constitutes the first record of this species in Europe. Despite searching by several odonatologists in the following days, the species was not found again at the same site." (Authors)] Address: van der Heijden, A., De Fintsjes 5, Rottevalle, The Netherlands. Email: odonatophiliac@gmail.com

25460. van Leeuwen, C.H.A.; Csabai, Z.; Szloboda, A.; Móra, A.; Declerck, S.A.J. (2025): Length-dry mass relationships of aquatic insects: Geographic and taxonomic variation in a digital database. Freshwater Biology 70(7), e70056. 12 pp. (in English) ["Aquatic insects are an abundant, yet declining, taxonomically heterogeneous group with special importance in both aquatic and terrestrial ecosystems. Accurate estimations of insect biomass during their aquatic life stages are essential to advance our fundamental knowledge about insects, their roles in ecosystems, and their vulnerability to human impact. However, assessing insect biomass from samples using classical drying techniques is time-consuming and prohibits the use of samples for other analyses. A widely applied method is therefore to use length-dry mass power regressions to obtain dry mass (DM) from body lengths (BL) using literature-derived parameter values. However, the application of this method relies on reliable and accessible parameter values, preferably matching the studied specimens both taxonomically and geographically. Here, we aimed to increase parameter accessibility in the literature to (1) facilitate researchers in employing more appropriate length-mass regressions in their studies, (2) identify knowledge gaps that can direct future research towards unexplored regions and understudied taxonomic groups, and (3) visualise the relative contribution of geographic variation (differences among continents) and taxonomic variation (differences among families within each order) to regression lines. We compiled a parameter dataset based on 25 publications for eight insect orders with aquatic life stages: Coleoptera, Diptera, Ephemeroptera, Hemiptera, Megaloptera/Neuroptera, Odonata, Plecoptera, and Trichoptera, and made the dataset available digitally. This parameter dataset is derived from over 15,000 measured insects of 84 (sub)families and 233 genera from all continents, except Africa and Antarctica. We found parameter values to be widely available at the order level, but at the resolution of family and genus levels, values were missing for 65% and 94% of the taxa, respectively. Identified knowledge gaps were the need for (1) more data on variation among families that is collected standardised within the same geographic regions, (2) targeted collections of data for different orders within the same study areas, to reveal variation among families and genera, and (3) careful reporting of the exact methodologies used, to identify variation introduced by methodological dissimilarities. Geographic and taxonomic variation is visually presented in figures for further interpretation. We conclude that length-mass regressions can be a powerful method, but due to data shortage at the genus and family taxonomic levels, order-level regressions with less reliability are necessarily applied. By providing parameters in a new digital dataset, we hope to facilitate users in more efficient

assessment of parameter availability for studied taxa in any geographic region. The identified knowledge gaps can be used to direct future research efforts. More accessible parameter data will facilitate more reliable assessments of aquatic insect biomass and benefit future studies on this important and abundant group of organisms, bridging aquatic and terrestrial ecosystems." (Authors)] Address: van Leeuwen, C., Dept of Aquatic Ecology, Netherlands Insti. Ecol. (NIOO-KNAW), Wageningen, the Netherlands. Email: casper.vanleeuwen@ru.nl

25461. Vargas-Acosta, J. (2025): Indicadores biológicos del estado de ecosistemas acuáticos en Zaragoza, Antioquia: un enfoque con macroinvertebrados bentónicos y comunidades de Odonata. Trabajo de grado profesional]. Universidad de Antioquia, Caucasia, Colombia: 40 pp. (in Spanish, with English summary) ["Aquatic ecosystems are essential for the development and maintenance of life on Earth. However, in recent years, adverse climatic factors and anthropogenic activities have severely affected water quality. This situation is particularly concerning in the municipality of Zaragoza, Antioquia, where mining exerts significant pressure on water bodies. Therefore, it is crucial to implement rapid indices and protocols to evaluate the quality and degree of disturbance in these ecosystems. In this context, this study assessed the effectiveness of biotic indices based on aquatic macroinvertebrates (BMWP-/Col and %EPT), along with an index developed in Amazonian streams in Brazil that is based on the ratio between the richness and abundance of Zygoptera and Anisoptera. Additionally, physicochemical and habitat variables were measured in three microwatersheds supplying the water system of Zaragoza, a locality situated in the northern foothills of the Central Andes of Colombia. Linear mixed models were applied to analyze the influence of parameters such as pH, temperature, total dissolved solids (TDS), electrical conductivity (EC), river habitat heterogeneity index (IHF), and habitat integrity index (IIH) on the calculated biological indices. The results showed that pH had a significant effect on the odonate richness index (Z/A-R) (ß=1.39, sd=0.65, p=0.032), while temperature negatively affected the %EPT model (ß=-3.53, sd=1.67, p=0.034) and the Z/A-A model (ß=-0.31, sd=0.13, p=0.021). A marginally significant positive relationship was also found between Z/A-A and IIH (ß=7.67, sd=3.93, p=0.051), and a positive association between BMWP/-Col and IHF was observed (ß=3.20, sd=1.01, p=0.001). The results demonstrate that both benthic macroinvertebrates and adult odonates respond sensitively to physicochemical and habitat variables, confirming their usefulness as bioindicators in the municipality of Zaragoza, Antioquia." (Author)] Address: not stated

25462. Vilenica, M.; Schmidt, B.; Koren, T. (2025): The EU's Habitats Directive Dragonfly Cordulegaster heros Theischinger, 1979 in Croatia — Distribution and Habitat Requirements. Insects 2025, 16(12), 1284; https://doi.org/10.3390/insects-16121284: 19 pp. (in English) ["C. heros is an endemic species for Central and Southeastern Europe and one of the species protected under the European Union's Habitats Directive. To adequately protect this species and its habitats, it is of crucial importance to have detailed information on its distribution, habitat requirements and potential threats to its survival. The main aims of this study were to record Cordulegaster heros geographical and altitudinal distribution and habitat requirements (stream width, fine substrate content and habitat shading), along with the importance of protected area network in its conservation and threats to its habitats in Croatia. To achieve those aims, we investigated 201 perennial and intermittent streams across three biogeographical regions (Continental, Alpine, Mediterranean). Additionally, in a small-scale study conducted in streams located within a protected area, we assessed the species' relationship with water quality. According to the current results, C. heros was confirmed to reproduce in 44 perennial streams in the Continental and Alpine regions, with a significantly higher number of sites and species' abundance recorded in the Continental region. As the species was not recorded in the Mediterranean region, its occurrence there remains unverified. The species occurred at an altitudinal range between 150 and 665 m a.s.l., with 77% of the sites being between 150 and 350 m a.s.l. It was mostly documented in streams with widths up to 250 cm, fine sediment content up to 30%, and high habitat shading (>75%). A small-scale assessment of its relationship with water parameters within a protected area revealed a significant correlation with higher concentration of oxygen and lower conductivity, confirming its requirements for clean and well-oxygenated habitats. Approximately 57% of the sites where this species was recorded are within the protected area network. However, because most known occurrences are concentrated within only one area, the Continental region, along with the rather low population densities and anthropogenic threats (e.g., deforestation, hydro-morphological alterations) present at 43% of those streams, further monitoring activities are necessary. The presented results provide a basis for further monitoring of C. heros and its habitats in Croatia." (Authors)] Address: Vilenica, Marina, Fac. of Teacher Education, Univ. of Zagreb, Trg Matice Hrvatske 12, 44250 Petrinja, Croatia. Email: marina.vilenica@ufzg.hr

25463. Waseem, M.; Arshad, R.; Bano, N.; Khwaja, S.; Murtaza, T.; Iqbal, S.; Abdullah, M. (2025): The insect fauna of Pakistan: diversity, ecological significance, and conservation challenges. Journal of Basic and Applied Zoology 86(93): 20 pp. (in English) ["Background: Pakistan, located at the crossroads of the Palearctic, Oriental, and Afrotropical biogeographical realms, hosts a diverse insect fauna due to its varied ecosystems, ranging from Himalayan peaks to coastal deserts. Despite its ecological and economic significance, the insect fauna remains understudied, with fragmented data and significant taxonomic gaps, particularly for less economically relevant groups. This review synthesizes peer-reviewed literature to provide a comprehensive overview of Pakistan's insect diversity, their ecological and economic roles, and the conservation challenges they face. Main text: This review consolidates data on the insect fauna of Pakistan, focusing on major orders such as Coleoptera, Lepidoptera, Diptera, Hemiptera, Hymenoptera, and Odonata. Over 1,400 Lepidoptera species, 366 aphid species, and 169 grasshopper species have been recorded, with molecular techniques revealing cryptic and new species. Insects play dual roles: as pests causing significant agricultural losses (e.g., aphids on wheat, bollworms on cotton) and as beneficial organisms providing pollination (valued at US$1.59 billion annually) and natural pest control. Mosquitoes and sandflies pose public health risks by transmitting diseases like dengue, Zika, and leishmaniasis. Major threats include habitat loss from agricultural expansion and urbanization, and extensive pesticide use, which harm non-target beneficial insects. Conservation efforts are hindered by the absence of insects on national and international threatened species lists. Conclusions: Pakistan's insect fauna is a critical ecological and economic asset, yet it faces significant threats from habitat degradation and pesticide misuse. The lack of formal conservation assessments limits targeted conservation efforts. Integrating traditional taxonomy with molecular tools, initiating a national insect Red List, and aligning agricultural practices with biodiversity conservation are essential for sustainable management and preservation of this vital biodiversity." (Authors)] Address: Waseem, M., Dept of Zoology, Cholistan University of Veterinary & Animal Sciences, Bahawalpur, Pakistan. Email: dr.waseemcuvas_@gmail.com

25464. Weiß, S.B.; Allgeier, S.; Brühl, C.; Frör, O. (2025): Assessing the trade-offs in more nature-friendly mosquito control in the Upper Rhine region. Journal of Environmental Planning and Management 68(1): 84-103. (in English) ["Recent studies show that the widely used mosquito control agent Bti has more negative effects on nature than previously expected. However, it is not yet clear whether people support a more nature-friendly mosquito control, as such an adaptation could potentially lead to higher nuisance. This study explores this question by assessing the willingness to pay for an adapted mosquito control strategy that reduces the use of Bti, while maintaining nuisance protection within settlements. For this purpose, a Contingent Valuation Study was conducted in the German Upper Rhine Valley. The results show that the majority of the surveyed population attaches a high value to a more nature-friendly mosquito control in terms of willingness to pay and is willing to accept a higher nuisance outside the villages. Policy makers should, thus, foster the development and implementation of such more nature-friendly mosquito control strategies to increase both environmental and societal benefits." (Authors) The paper includes a reference to an odonatological publication.] Address: Weiß, S.B., Institute for Environmental Sciences, Environmental Economics, RPTU Kaiserslautern-Landau, Landau, German. Email: soeren.weiss-@rptu.de

25465. Whittington, A.E. (2025): The type specimens, publications and travels of Scottish Entomologist, Kenneth J. Morton. ZooNova 36: 1-61. (in English) ["Scottish entomologist Kenneth John Morton FRES (1858 - 1940) was a prolific Scottish insect collector and writer, although not a trained Entomologist. In 214 entomological papers and notes, he described 3 genera, 82 species and 4 subspecies with an 83% validity and details of his type specimens are listed here providing evidence of just how remarkable and broad was his interest in entomology. His published works have only been partly listed in dispersed bibliographies until now, while many remained obscure. For the first time a complete bibliography is presented. This list includes all his major papers and short notes published over a time period of 58 years (1882-1940), plus a single paper published posthumously by Fraser in 1942, which included notes by Robert McLachlan and Kenneth J. Morton. His many correspondents and travels are also discussed and listed, providing evidence of just how remarkable and broad was his interest. As a gentleman entomologist, the study of insects was a pursuit in his leisure-time, for he was an employee of the British Linen Bank first in Glasgow then, later in the Edinburgh branch. After retirement, he devoted his time to entomology and his large collection of insects from the net-winged orders now resides in the National Museums of Scotland." (Authors)] Address: Whittington, A.E., FlyEvidence, Pentrefoelas, LL24 0TA, Wales, UK. Email: awhittington@-flyevidence.co.uk

25466. Wildermuth, H. (2025): Diet and foraging of larvae of Somatochlora alpestris, an alpine dragonfly at its upper distribution limits (Odonata: Corduliidae). Odonatologica 54(3/4): 217-241. (in English) ["S. alpestris is a Palaearctic dragonfly distributed in cold areas from Europe to the Far East. It is adapted to environments with low mean annual temperatures and short summers. At the upper limit of its altitudinal distribution, conditions for the larvae are particularly unfavourable. Little is known on what and how the larvae prey on during the short summer growth period. To answer this, larvae of S. alpestris were collected in the Central Alps and kept in aquaria until they had egested all their faecal pellets. These were examined under the microscope for remains of prey animals. In addition, various experiments were carried out in the laboratory to determine how the larvae recognize and capture prey. The diet consisted mainly of Cladocera, Chironomidae, and Hydrachnidia, living in peat mud together with the dragonfly larvae. Cannibalism also occurred. The prey is detected and recognised by tactile stimuli, visual and olfactory senses play virtually no role. The perfectly camouflaged larvae are typical sit-and-wait predators, hiding in mud and among plant debris. At the study sites, S. alpestris mostly occurred together with Aeshna juncea. The former predominated in small ponds and in runnels arising from seepages, while the latter dominated in large ponds. A. juncea is considered the main predator of S. alpestris larvae, probably restricting local population sizes. The upper and lower altitudinal limits of distribution are briefly discussed with respect to global warming and the corresponding habitat changes." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. Email: hansruedi@wildermuth.ch

25467. Wildermuth, H. (2025): Interaktionen zwischen Teufelsabbiss Succisa pratensis Moench (Caprifoliaceae), Insekten und Spinnen (Insecta, Arachnida). Entomo Helvetica 18: 21-42. (in German, with English and French summaries) ["Interactions between the Devil's-bit Scabious Succisa pratensis, insects and spiders. Between 2021 and 2024, a total of 137 insect and 11 spider species were recorded on Devil's-bit Scabious in the eastern Swiss Plateau. The study focused on the photographic documentation of direct and indirect interactions with S. pratensis. Their populations provided arthropods with nectar, pollen, fruits and leaves as well as places for ambush hunters, hunting grounds for flying hunters, anchoring frames for spider webs, rendez-vous and mating sites for butterflies and spiders as well as basking sites and hiding places for orthopterans and other insects. The one-sided use by insects and spiders was hardly disadvantageous for the plant, but advantageous in the context of the nutrition-pollination symbiosis with bees and butterflies. There was hardly any competition between the users. Spiders as predators benefitted from the attractiveness of the inflorescences for insects. Kleptoparasitism by wasps in orb-weaving spiders and commensalism by tiny flies (Milichiidae) on spider victims were rarely observed." (Author) The publications includes observations of ten odonate species using S. pratensis meadows as copulation, hunting or maturation biotope.] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi-@wildermuth.ch

25468. Wildermuth, R. (2025): Rotfuchs Vulpes vulpes erbeutet Larve von Aeshna mixta (Mammalia: Canidae; Odonata: Aeshnidae). Libellula 44(3/4): 245-250. (in German, with English summary) ["Red Fox Vulpes vulpes preys on larva of the Migrant Hawker Aeshna mixta – At the edge of a fen ditch in rural landscape of the canton of Zurich (Switzerland), the complete exoskeleton of an F-larva of A. mixta was found in the dropping of a Red Fox, along with numerous mouse hairs and parts of terrestrial insects, i.e. Mole Crickets Gryllotalpa gryllotalpa and grasshoppers (Acrididae). It is discussed as to whether the fox caught the unusual prey underwater or above the water surface before emergence." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. Email: hansruedi@wildermuth.ch

25469. Wilkie, C.; Law, A.; Thackeray, S.J.; Ward, C.; August, T.; Baker, A.; Belmont, J.; Carvalho, L.; Chapman, D.; Dobel, A.; Miller, C.; Pringle, H.; Scott, M.; Siriwardena, G.; Taylor, P.; Willby, N. (2025): Landscape-scale responses of freshwater biodiversity to connectivity and stressors. Global Ecology and Biogeography 34:e70069: 14 pp. (in English) ["Aim: There is compelling evidence that drivers and patterns of biodiversity

and ecosystem functioning vary across multiple spatial scales, from global to regional, landscape and patch. However, macroecological processes impacting freshwater biodiversity are poorly understood compared to marine and terrestrial ecosystems. Despite step changes in data availability, we have a fragmented view beyond the local scale of how hydrological and landscape connectivity interact with ecosystem stressors to shape freshwater biodiversity and functioning. While macroecological patterns can vary substantially among taxonomic groups, previous studies have focussed on individual habitat types, sites or taxonomic groups within landscapes, hindering direct comparisons. We present a cross-landscape, multi-species analysis of the interactive effects of landscape and hydrological connectivity and stressors on standing freshwater quality and the diversity of several major freshwater taxonomic groups. Location: Great Britain (United Kingdom). Time Period: 2000–2016. Major Taxa Studied: Phytoplankton chlorophyll-a, macrophytes, molluscs, Coleoptera, Odonata, fish and birds. Methods: Using random forests and generalised additive modelling, we quantified the interactive effects of landscape and hydrological connectivity and stressors on water quality (phytoplankton chlorophyll-a) and the diversity of selected taxa in standing freshwaters. Results: We found evidence of connectivity changing from positive to negative relationships with biotic responses with increasing human-induced stress levels. Some species groups showed the inverse, reflecting complexities of modelling at large, crosslandscape scales. Almost all responses were affected by stress or connectivity, often interacting and with non-linear relationships. Main Conclusions: Patterns in stressor-connectivity interactions differed across taxa, but were important in shaping 6 of 8 biotic responses. This emphasises the need for taxon-specific analyses to resolve freshwater ecological responses to stressors, connectivity, and their interactions. Our results also highlight that connectivity effects must be integrated in landscape-scale, evidence-led decision-making, designed to reduce impacts of stressors on water quality and biodiversity. ... 3.5 | Odonata Richness: Approximately 20% of the variance in Odonata richness was explained. Greater Odonata richness was found where catchments had higher mean temperatures, as the distance from the sea increased, and as the pond density increased in the surrounding buffer (2 km). Richness varied among RBDs, geology types (greater in low to medium alkalinity lakes) and lakes of different size types (with small and very small lakes having a greater species richness). Modelling suggested the presence of connectivity-stressor interactions. For high agricultural land use, a positive relationship between Strahler 4+ density and Odonata richness was observed, but no relationship was found under low agricultural land use. For low Strahler 4+ density, there was a negative relationship between Odonata richness and agricultural land use, but for high Strahler 4+ density, the relationship was positive. For low urban land use, there was no clear relationship between Odonata richness and river density, but where urban land use was high, river density had a positive relationship with richness. There was an overall positive relationship with increasing obstacle (weirs, dams, lock gates, etc.) density, although the effects were highly variable when obstacle density was at its highest (Figure 3a)." (Authors)] Address: Wikie, C., School of Mathematics & Statistics, Univ. of Glasgow, Glasgow, UK. Email: craig.wilkie@glasgow.ac.uk

25470. Wilson, K. (2025): Ian David Endersby 18 April 1941 to 19 April 2024. Agrion 29(1): 3. (in English) [obituary] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

25471. Worthen, W.B.; Powell, R.E.; Claire, V.G.; Carter, C.A. (2025): Relationship between lotic odonate communities, waterway width, and habitat integrity in the mountains and piedmont of South Carolina, USA. International Journal of Odonatology 28: 159-170. (in English) ["Odonata are sensitive to anthropogenic disturbances that affect water quality, siltation, and riparian canopy cover; but these characteristics also vary with waterway size. We used the visual scan method to sample adult odonates in a 100 × 10 m plot at 20 sites (sampled six times each) on 12 waterways of different size (1–50 m wide) in forested habitats in northwestern South Carolina, USA. We used AICc to compare 'best-subset' linear models evaluating the effects of waterway width and nine other habitat characteristics, considered independently and as a combined Habitat Integrity Index (HII), on odonate communities. Mean adult abundance (log10 transformed) and species richness (improved Chao estimated) were only predicted in linear models by waterway width, and were significantly greater in large waterways (> 10 m) than small (< 10 m; t-tests). Simpson's diversity (Chao estimated) was only predicted by the HII and was only positively correlated with the index when waterway width was included. The species composition of odonate communities inhabiting large waterways was also significantly different than in small waterways (NMDS and PERMANOVA analyses). Communities on small waterways were significantly nested subsets of species in communities on larger waterways, whether waterways were ordered by waterway width or grouped in 'large' and 'small' categories (NODF nestedness analyses). Forest specialists needing shady habitats used all waterways, but large waterways also supported habitat generalists preferring sunny areas and river specialists. Because large waterways already have open canopies, differences in waterway width may complicate the effects of anthropogenic disturbance." (Authors)] Address: Worthen, W.B., Biology Dept, Furman University, Greenville, SC, USA. Email: wade.worthen@furman.edu

25472. Worthen & Guevara-Mora (2025): Habitat associations of riverine odonates near La Fortuna, Costa Rica. International Journal of Odonatology 28: 71-82. (in English) ["The dragonflies of Costa Rica are well-described, providing a solid foundation for studies in community ecology. We described the effects of stream size and habitat matrix (forest vs. pasture/development) on several indices of odonate community structure: abundance, species richness, diversity, and composition. We sampled adults in eight 100 × 5 m plots on six waterways near La Fortuna, Alajuela Province, Costa Rica. Four plots were on waterways in secondary forest: single plots were on large rivers (Río Caño Negro and Río Caliente), and two plots were on a small unnamed stream. Four plots were on smaller waterways in agricultural areas: two on the Río Chachagua and single plots on the Río Chachagüita and a small creek. Plots were surveyed seven times from January–March 2023. The composition of the communities exploiting rivers, the forested stream, and agricultural streams were significantly different using NMDS and PERMANOVA. Plots on the forested stream had significantly fewer individuals, fewer species, and lower diversity than the waterways in agricultural areas, and large rivers were intermediate (GLM and Tukey post-hoc mean comparison tests). Communities exhibited significant nested-subset structure (NODF), with species in forested stream plots nested within river communities that were nested within communities in agricultural areas. These patterns are not explained by differences in mean light levels, which were greatest in rivers. This suggests that evaluating the effect of anthropogenic riparian canopy removal during land transformations may be complicated by initial differences in community composition related to stream/river size." (Authors)] Address: Worthen, W.B., Biol. Dept, Furman Univ., Greenville, SC, USA, 29613. Email: wade.worthen@furman.edu

25473. Wu, Y.-C.; Wei, C.-H.; Chiu, M.-C.; Chen, Y.-C.; Kuo, M.-H.; Resh, V.H. (2025): Automated μFTIR Imaging demonstrates variability in microplastic ingestion by aquatic insects in a remote Taiwanese mountain stream. Environments 2026, 13(1), 3; https://doi.org/10.3390/environments13010003. 10 pp. (in English) ["The use of focal plane array micro-Fourier transform infrared spectroscopy (FPA-μFTIR) enables high-resolution characterization of microplastics (MPs) in a wide variety of matrices, including both biotic and abiotic samples. However, this technique has not yet been applied to study MP ingestion in organisms in areas with low MP pollution (e.g., national parks or protected areas). In this study, FPA-μFTIR was used to quantify MPs in the bodies of aquatic insects collected from a high-altitude stream (~2000 m) in Taiwan. Results showed that MP ingestion occurred in nearly all examined taxa, except for Trichoptera: Stenopsychidae and Gomphidae [Sinogomphus formosanus]. The majority of MPs were smaller than 500 μm, and the dominant MP polymers identified were polyethylene (65%) and polypropylene (30%), which occurred mainly as fragments (83%) and, to a lesser extent, as fibers (17%). The highest number of MP particles was in the scraper functional-feeding group (FFG), while MPs were not detectable in collector–filterer FFG. The highest MP concentration (particles/individuals) was found in the waterpenny beetle Ectopria sp., followed by the mayflies Paraleptophlebia sp. and Epeorus erratus, and Chironomidae in the subfamily Tanypodinae. We suggest that using high-resolution FPA-μFTIR can be effectively applied to study and monitor MP ingestion in remote, pristine ecosystems." (Authors)] Address: Kuo, M.-H., Dept Entom., National Chung Hsing Univ., Taichung 402, Taiwan. Email: mhkuo@dragon.nchu.edu.tw

25474. Yamamoto, S.; Katayama, N.; Yamasako, J.; Ito, K.; Okubo, S.; Baba, Y.B. (2025): Optimal Environmental DNA sampling strategy for comprehensively assessing biodiversity in rice paddy fields. Environmental DNA, 2025; 7:e70224: 11 pp. (in English) ["Irrigated paddy fields provide alternative habitats for aquatic species amid degrading natural wetland habitats. Paddy field biodiversity depends on surrounding landscapes and agricultural practices, and biodiversity surveys are important in understanding it. However, its assessment is often time-consuming and depends on specialist skills. To overcome these limitations, we used environmental DNA (eDNA) metabarcoding of paddy water samples to detect species diversity of insects, fishes, and birds, and assessed the optimal sampling effort and sampling design. From each of seven paddy fields, we collected samples at each of eight positions. eDNA metabarcoding detected 118 insect, 14 fish, and 6 bird operational taxonomic units, most of them aquatic. Resampling analyzes suggested that four sampling replicates can recover all detectable operational taxonomic units of fishes and birds with > 50% probability, but the species accumulation curves suggested greater insect diversity than we detected, attributable to insufficient reference data. Samples collected near inlets included eDNA from irrigation channels, so inlets should be avoided in assessing biodiversity in paddy fields. Pooled samples could detect abundant species, but the samples detected fewer species than the total species diversity detected from eight sampling replications. Our findings are applicable to most paddies in Japan because the research was conducted in Japanese standard rectangular paddies. Moreover, given the prevalence of small agricultural fields in many Asian countries, our findings will promote the use of eDNA in biodiversity monitoring in paddy fields." (Author) The supplementary material includes Sympetrum darwinianum.] Address: Yamamoto, S., Division of Agroecosystem Management Res., Inst. Agro-Environmental Sciences, NARO, Tsukuba-shi, Ibaraki, Japan. Email: yamamoto.satoshi463@naro.go.jp

25475. Yang, G.; Xiao, F.; Li, X.; Wang, Y.; Pan, T.; Zi, Q.; Ma J. (2025): Investigation on the diversity of benthic macrofauna in Qinghuadian National Wetland Park, Lanping, Yunnan Province. Journal of Fujian Forestry Sci. and Tech. 52(2): 36-45. (in Chinese, with English summary) ["This study investigated water quality parameters and benthic macrofauna diversity in typical riverine habitats of Lanping Qinghuadian National Wetland Park using standardized sampling methodologies. Results indicate favorable overall water quality and high biodiversity of benthic macrofauna. Across six sampling sites, a total of 23946 individuals were collected, belonging to 59 species within 45 families and 9 orders, including 55 aquatic insect species and 4 non-insect taxa. The community exhibited pronounced dominance by a limited number of taxa, with uneven species distribution. Dominant taxa included Nemouridae (Plecoptera, relative abundance: 22.55%), Orthocladiinae (Diptera, 20.99%) and Baetidae (Ephemeroptera, 9.76%). Significant differences in species diversity and richness were observed between riverine streams and swamp streams, driven by habitat heterogeneity, substrate composition, flow velocity, and water quality parameters. These findings provide critical insights for benthic macrofauna conservation, habitat management, and biodiversity research in high-altitude wetland ecosystems." (Authors) The list of taxa includes Planaeschna sp. and Anotogaster sp..] Address: Yang, G., Ecology Branch, Yunnan Institute of Forest Inventory and Planning, Kunming 650031, Yunnan, China

25476. Yang, G.-H.; Zhang, H.-M. (2025): Description of Cephalaeschna flabellata sp. nov. (Odonata: Aeshnidae) from Yunnan, China. Zootaxa 5691(3): 579-586. (in English) ["Cephalaeschna flabellata sp. nov., is described and illustrated in colour from Yunnan Province, China. As the sixteenth species of the genus recorded in China, this new species is characterized by: (1) head with an extremely broad frons, almost 2/3 the width of the head in dorsal view; (2) the absence of a T-shaped mark on the top of the frons; (3) abdomen with a single fan-shaped anterodorsal spot on segments 3 to 7, and with the mediodorsal spots connected to the anterolateral spots; (4) superior appendages expanded in apical 2/3, appearing broadest at the middle and ending with an upward curve in lateral view; and (5) inferior appendage about 2/3 the length of superiors. An updated key for all Chinese Cephalaeschna Selys, 1883 species is provided here. Brief notes on biology of the new species are also included." (Authors)] Address: Zhang, H.-m., Kunming Natural History Museum of Zoology, Kunming Inst. Zool., Chinese Acad. Sci., Kunming, Yunnan 650223, China. Email: zhanghaomiao@mail.kiz.ac.cn

25477. Yang, N.; Wang, T.; Jiang, W.; Shu, F.; Zhang, G. (2025): Decoupling patterns and drivers of macrozoobenthos taxonomic and functional diversity to wetland chronosequences in coal mining subsidence areas. Diversity 2025, 17, 607. https://doi.org/10.3390/ d17090607: 21 pp. (in English) ["Surface subsidence caused by coal mining activities generates diverse wetland ecosystems. These newly formed wetlands exhibit distinct environmental characteristics due to variations in subsidence age, resulting in divergent biological communities. While species adapt to environmental changes through specific functional trait combinations, the response of aquatic community functional diversity to environmental gradients across chronosequences of mining subsidence wetlands remains unclear. This study investigated 13 coal mining subsidence wetlands (1–18 years) of macrozoobenthos in Jining, China. Through seasonal monitoring, we analyzed functional traits along with taxonomic and functional diversity patterns. Initial-stage wetlands were dominated by medium-sized (63.9%) and tegument-respiring taxa, whereas late-stage wetlands

exhibited a shift toward large-sized (43.9%) and gill-respiring groups. Both species richness and functional richness declined over time, with taxonomic diversity demonstrating greater sensitivity to subsidence age. Seasonal community variability was more pronounced in initial-stage wetlands (1–4 years post-subsidence). Despite increasing habitat heterogeneity with subsidence age, functional redundancy maintains ecosystem stability. The shared origin and developmental trajectory of these wetlands may constrain functional divergence. Current research predominantly relies on traditional taxonomic metrics, whereas our findings emphasize functional trait analysis's importance for ecosystem assessment, which provides a theoretical framework for ecological restoration and biodiversity conservation in post-subsidence wetlands." (Authors) The following odonate taxa are listed: Gomphidae, Libellula, Orthetrum, Coenagrion, Ischnura, Erythromma] Address: Zhang, G., School of Life Sciences, Qufu Normal University, Jining 273165, China. Email: zgxqfjn@163.com

25478. Yap, C.K.; Bandong, E.N.; Fauzi, N.F.A.; Mahesvaran, S.; Simon, V.T.; Hew, T.Y.A.; Ramlee, A.; Hadir, M.I.M.; Latif, M.M.; Baharuddin, M.A.S.; Hashim, E.I.; Yusoff, H.R.A.; Tiamiyu, M.A.; Bakar, N.A.; Syazwan, W.M. (2025): Understanding macrobenthos and ecotoxicology through experiential learning: A shared classroom journey. Recent Progress in Sciences 2(1): 9 pp. (in English) ["This paper synthesizes the shared experiences of students and mentor during a practical class on ecotoxicology and macrobenthos analysis conducted at the Department of Biology, Universiti Putra Malaysia. The session combined three linked components: collection of surface sediments from a polluted drainage, short behavioural assays with the catfish Clarias sp. under contrasting pH conditions, and microscopic identification of benthic organisms sorted from sieved sediments. Students encountered tolerant taxa such as oligochaetes, chironomid larvae, odonate nymphs, and freshwater snails, and related their presence to habitat quality and contaminant exposure. Reflections recorded immediately after the class documented excitement, surprise, and a growing ability to frame observations as evidence. Learners reported that touching the sediment, smelling the water, and watching fish opercular movements made abstract concepts concrete and memorable. The objective of this paper is to evaluate how a tightly integrated field-to-laboratory activity fosters conceptual understanding, scientific empathy, and confidence in interpreting ecological signals from disturbed urban habitats. We analyze student vignettes alongside photographic evidence to show how cooperative sampling, rapid identification, and simple bioassays create a coherent pathway from observation to inference. The findings suggest that experiential practice, when guided by clear prompts and on-the-spot mentoring, strengthens the link between environmental processes and their biological indicators, encourages collaborative reasoning, and motivates further inquiry. The paper offers a concise model that other mentors can adapt to help students connect ecotoxicological theory with lived phenomena and to cultivate the habits of careful seeing, patient interpretation, and ethical attention to organisms in degraded environments.] Address: Yap, C.K., Dept of Biology, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia. Email: yapchee@upm.edu.my

25479. Yarger, A.M.; Maeda, M.; Siwanowicz, I.; Kajiyama, H.; Walker, S.M.; Bomphrey, R.J.; Lin, H.-T. (2025): Structural dynamics and neural representation of wing deformation. Proceedings of the National Academy of Sciences of the United States of America 122(46, e2518032122: 9 pp. (in English) ["Locomotor control is facilitated by mechanosensory inputs that report how the body interacts with a physical medium. Effective representation of compliant wing deformations is particularly challenging due to the many degrees of freedom. Structural configurations can constrain the stimulus space, and strategic placement of sensors can simplify computation. Here, we measured and modeled wing displacement fields and characterized spatiotemporal encoding of the wing mechanosensors. Our data show how dragonfly wing architecture prescribes deformation modes consistent across models and measurements. We found that the wing's state under normal flapping conditions is detected by the spike timing of few sensors, with additional sensors recruited under perturbation. The functional integration of wing biomechanics and sensor placement enables a straightforward solution for information transfer." (Authors)] Address: Yarger, Alexandra, Dept of Bioengineering, Imperial College London, London SW7 2AZ, UK. Email: a.yarger@imperial.ac.uk

25480. Yoshioka, A.; Okamoto, R.; Ouchi, H.; Jo, J.; Mitamura, T.; Tabuchi, K.; Matsuki, N.; Fukasawa, K.; Oguma, H. (2025): Combining camera trapping and deep learning for labor saving monitoring of perching Sympetrum dragonflies (Odonata: Libellulidae). Jpn. J. Appl. Entomol. Zool. 69(4): 160-165. (in Japanese, with English summary) ["A camera-trapping system developed for photographing perching Sympetrum dragonflies using passive photosensors is expected to support the biodiversity monitoring and evaluation of rice paddy fields. However, considerable time and labor was required in order to visually check the massive number of captured photographs to determine whether the dragonflies were correctly captured in them. In this study, automatic image classification using a deep-learning artificial-intelligence (AI)model was applied to the photographs captured by camera traps set in rice paddy fields in eastern Fukushima prefecture. The results show that the AI model can accurately detect and classify photographs containing a Sympetrum dragonfly, and that the estimated detection frequency based on the AI image classification is associated with the relative density of Sympetrum dragonflies directly observed in the fields. This suggests that automation by combining camera trapping and AI image classification is promising for monitoring Sympetrum dragonflies in the study area." (Authors)] Address: Yoshiok, A., Fukushima Regional Collaborative Research Center, National Institute for Environmental Studies; 10–2 Fukasaku, Miharu, Fukushima 963–7700, Japan. Email: yoshioka.akira@nies.go.jp

25481. Zagars, M.; Christofersen, K.S.; Cremona, F. (2025): Lake food web structure in Teici Nature reserve, Latvia: fish presence shapes functioning of pristine bog lake food webs. Hydrobiologia 852: 323-339. (in English) ["Studies on the effects of fish presence on lake ecosystems are widespread but only a few have been conducted in pristine aquatic environments. We employed Ecopath model for assessing food web structure in two fish-inhabited and one fishless lake in a pristine bog area. We hypothesized that: (a) fish absence will raise trophic positions of macroinvertebrate predators; (b) fish predation will lead to higher overall predation rates on zooplankton; (c) fish predation on large bodied zooplankton will result in top-down cascading effect, increasing phytoplankton biomasses. We found that fish have direct and indirect effects on zoobenthic communities. Chironomid biomass was greater and predatory macroinvertebrate groups had a higher trophic level in the fishless lake than in fish-inhabited lakes. Consumption rates of the benthic consumer fraction were greater than that of the planktonic fraction in the fishless lake; the opposite was found in the two lakes with fish. No effects of fish presence on zooplankton were found and we explain this partly by the low water transparency masking the impact of fish. Terrestrial insects constituted a crucial part of adult fish diet and

we conclude that terrestrial secondary production contributes to the trophic support of fish communities in pristine bog lakes." (Authors) The paper includes a reference to Odonata.] Address: Zagars, M., Latvian Institute of Aquatic Ecology, Agency of Daugavpils University, 4 Voleru Str., Riga 1007, Latvia. Email: matiss.zagars@lhei.lv

25482. Zakari, H.; Emmanuel, O.A.; Zakari, S.; Bawa, S.I. (2025): Ecological characterisation of Anopheles mosquitoes larval habitats in settlements within selected local government areas of Benue South, Nigeria. Tropical Journal of Medicine and Basic Sciences 1(2): 43-57. (in English) ["Anopheles mosquitoes transmit malaria, a leading cause of mortality in tropical Africa. Objective: This study focuses on the ecological characterisation of diversified anopheline larval habitats within rural communities in the selected local government areas of Benue South, Nigeria. Methods: Random sampling of breeding sites in three LGAs was conducted in September, October, December 2024 and January 2025. Larvae were collected with a dipper; adults were morphologically identified. At each site, we measured key physico-chemical parameters and habitat features. Results: We identified 252 larvae belonging to 14 Anopheles species. The primary vectors are An. gambiae (31.7%) and An. funestus (21.0%) were most common, while secondary species such as An. rufipes (15.1%), An. maculipalpis (10.3%) and An. pretoriensis (6.6%) were also frequent. Larval numbers peaked in the rainy months (September 30.5%, October 38.9%) and fell during the dry season (December 15.1%, January 14.8%). Ricefields (n = 59), domestic containers (n = 50) and swamps (n = 25) were the habitats most often positive for anopheline larvae; none were found in treeholes. Larvae favoured clear, shallow, sunlit waters on sandy, gravel or human-made substrates. Predators observed included tadpoles, odonate nymphs 8no details are given], water beetles and water scorpions. One-way ANOVA followed by Tukey HSD showed that total dissolved solids (TDS) differed significantly between habitat types ($P < 0.05$); other measured variables did not differ significantly. Conclusions: Because key vectors breed widely in ricefields and peri-domestic containers, especially during the rainy season, we recommend targeted larval-source management and biological control focused on these habitats." (Authors)] Address: Zakari, Hajara, Dept Biol. Sciences, Federal Univ. of Health Sciences, Otukpo, Benue State, Nigeria. Email: hajara.zakari@fuhso.edu.ng

25483. Zangl, L.; Fischer, I.; Sittenthaler, M.; Chovanec, A.; Gros, P.; Holzinger, W.; Kunz, G.; Lienhard, A.; Macek, O.; Mayerhofer, C.; Mladinic, M.; Topic, M.; Schäffer, S. (2025): A DNA barcode inventory of Austrian dragonfly and damselfly (Insecta: Odonata) species. Insects 2025, 16,1056. https://doi.org/10.3390/insects16101056: 18 pp. (in English) [Odonata are important indicator species for quality and health of (semi-)aquatic habitats. Hitherto, 78 species of Odonata have been reported for Austria. Ecological data, Red List assessments, and a dragonfly association index exist, but population- and species-level genetic data are largely lacking. In this study, we establish a comprehensive reference DNA barcode library for Austrian Odonata based on the standard barcoding marker COI. Because of the increasing significance of environmental DNA (eDNA) analyses, we also sequenced a segment of the mitochondrial 16S rRNA gene, a marker often used in eDNA metabarcoding approaches. In total, we provide 786 new COI barcode sequences and 867 new 16S sequences for future applications. Sequencing success was >90 percent for both markers. Identification success was similar for both markers and exceeded 90 percent. Difficulties were only encountered in the genera Anax Leach, 1815, Chalcolestes Kennedy, 1920, Coenagrion Kirby, 1890 and Somatochlora Selys, 1871, with low interspecific genetic distances and, consequently, BIN (barcode index number) sharing. In Anax, however, individual sequences clustered together in speciesspecific groups in the COI tree. Irrespective of these challenges, the results suggest that both markers perform well within most odonate families in terms of sequencing success and species identification and can be used for reliably delimiting Austrian species, monitoring, and eDNA approaches." (Authors)] Address: Institute of Biology, University of Graz, Universitätsplatz 2, 8010 Graz, Austria. Email: lukas.zangl@gmx.at

25484. Zhang, D.; Liu, Y.; Bai, X.; Luo, X.; Yang, J.; Li, Z.; Liu, Z.; Jiang, X.; Mo, Y.; Chen, J.; Xie, Z. (2025): Species diversity and recommended rehabilitative strategies of benthic macroinvertebrate in the Chishui River, a tributary of the Upper Yangtze River. Journal of Hydroecology 46(2): 171-183. (in Chinese, with English summary) ["Xijiang River, in the source region and upper reach of Pearl River, supports a high array of freshwater biodiversity and endemics, but the systematic investigation of macroinvertebrate assemblages in Xijiang River has been inadequate, especially in the mainstream. In this study, we carried out a comprehensive faunal survey of macroinvertebrates in Xijiang River, spanning the entire mainstem from the origin (Maxiong Mountain) to the estuary (Shapu Town). We aimed to explore the species composition, spatial distribution of macroinvertebrates across the upper, middle and lower reaches, and identify key ecological mechanisms and factors driving the patterns. In April 2021, quantitative and qualitative sampling of macroinvertebrates was conducted at 50 sampling points along the upper, middle and lower Xijiang River, while simultaneously measuring aquatic environmental parameters and assessing physical habitat conditions at each sampling site. Land use data within the riparian buffer zone (10 000 m~500 m) was extracted from satellite images. A total of 143 macroinvertebrate species were recorded, belonging to 117 genera, 66 families, 21 orders, 10 classes, and 5 phyla. Aquatic insects (85 species) were the species-richest taxa across the region, followed by mollusks (34 species), annelids (15 species), Malacostraca (6 species), and 3 species from other taxonomic groups. In terms of spatial distribution, species richness was the highest (113 species) in the upper reach of Xijiang River, followed by the lower (79 species) and middle (61 species) reaches. The average density and biomass (wet weight) of macroinvertebrates in Xijiang River were (239.58±206.9) ind/m² and (39.11±61.0) g/m². The macroinvertebrate community structure showed significant spatial variations among the upper, middle and lower reaches ($P=0.001$), with higher densities in the upper (275.50 ind/m²) and lower (276.30 ind/m²) reaches and higher biomass (62.84g/m^2) in the upper reach. Dominant species varied among reaches, while Corbicula fluminea (10.1%) and Chironomus spp. (5.7%) were the dominant species (genus) across the entire mainstream. Variation partitioning analysis (VPA) detected three ecological drivers (local environment, land use and spatial factors) that jointly explained 22% of the variation in community structure, while the contribution of land use was negligible. The contribution of spatial factors and local environmental parameters were significant and equivalent, with explanation rates of 6% and 5%, respectively, indicating that environmental filtering and spatial constraints (primarily dispersal limitation) are the key ecological processes driving community variation. Canonical correspondence analysis (CCA) detected additional key environmental parameters (elevation, river width, water depth, salinity, CODMn), spatial variables (PCNM1, PCNM2, PCNM3, PCNM4, PCNM5, PCNM7, PCNM8, PCNM23, PCNM34, PCNM35, PCNM37, PCNM39), and land use factors (water and farmland areas) in structuring community variation. This study provides important data and a

reference for the assessment of benthic diversity and environmental monitoring in the Xijiang River basin." (Authors) The following odonate taxa are listed: Nepogomphus sp., Merogomphus sp., Lamelligomphus sp., Stylurus sp., Zyxomma sp., Anax sp., Coenagrionidae sp1., Coenagrionidae sp2., Ischnura sp., Chlorolestidae sp., Platycnemis sp.] Address: Zhang, D., School of Fisheries and Life Science, Dalian Ocean University, Dalian 116000, P.R. China

25485. Zhang, K.; Su, X.; Zhao, Y. (2025): Linear control of lift in dragonfly vertical flight. Fluid Dynamics Research 56(6), 065507: (in English) ["The lift generation mechanisms of dragonflies have been extensively and deeply studied. As research advances, controlling the lift coefficient faces significant challenges. How the lift coefficient varies and whether a unified model can predict lift tendency remains unresolved. In this study, we propose a flapping amplitude partial advanced model (FAPAM) to control the linear variation of lift in dragonfly vertical flight. The FAPAM model can predict the average lift coefficient by the spatial plane and control the dragonfly lift coefficient over a large range. In this model, the maximum lift coefficient is 2.01 times higher than the weight of a dragonfly. The control parameters of the FAPAM are flapping amplitude (FA) and partial lead percent (PLP). Any linear combination of FA and PLP ensures a linear variation of the average lift coefficient. When FA and advanced rotation angle (ARA) increase by one degree, respectively, the increased lift coefficient of FA is 5.38~9.52 times higher than that of ARA, which is closely related to the leading-edge vortex, trailing-edge vortex, and positive pressure zone. The FAPAM model seamlessly integrates vertical ascending mode and vertical climbing mode by introducing transition mode. Additionally, FAPAM can effectively simulate the lift coefficient required for the vertical undulating motion of dragonflies during their oviposition process on water. Most importantly, the FAPAM model can maximize the energy efficiency of different motion modes." (Authors)] Address: Zhang, K., School of Hydraulic Engineering, Dalian University of Technology, Dalian 116024, People's Republic of China, Email: zkxinvestigation-@163.com

25486. Zhang, L.-J.; Wang, K.; Zhang, X.; Liu, S.; Jing, Z.; Lu, J.; Cui, X.; Liu, Z. (2025): Research on the aerodynamic performance and bionic application of dragonfly wing corrugation. Bioinspiration & Biomimetics 20(3). doi: 10.1088/1748-3190-/adc5bc.: (in English) ["To investigate the aerodynamic performance of dragonfly wing corrugations under gliding conditions, a new method of corrugation deformation is proposed. Firstly, the coordinate transformation functions that describe the amplitude and camber deformation of the corrugation and numerical simulation model are established. Then the effects of the corrugation structural parameters on airfoil performance are investigated by orthogonal experiment. Subsequently, the optimal structural parameters are selected sequentially, and the mechanism of the corrugation producing a high lift-to-drag ratio is analyzed. The results show that the optimized corrugation parameters are: corrugation profile as profile 5, amplitude coefficient $\lambda = 0.8$, vertex x-coordinate $a = 0.9c$, vertex *y*-coordinate $b = 0.04c$. The optimal airfoil achieves the highest lift-to-drag ratio of 5.090, which is increased by 42.82% compared with the flat airfoil (FA). The cambered corrugation airfoil can suppress flow separation. The high-pressure area generated within pressure surface corrugation can increase the pressure difference between the upper and lower surfaces, which is the main reason for the high lift-to-drag ratio. Finally, the bionic airfoils are built by arranging the corrugation on the FFA-W3-211 airfoil, which prove that the dragonfly corrugation with a low Reynolds number is also applicable to the wind turbine airfoil with a high Reynolds number, thereby increasing the lift-to-drag ratio of the prototype airfoil by 1.22%. (Authors)] Address: Zhang, L., College of Mechanical & Electronic Engineering, China University of Petroleum, Qingdao, Shandong, People's Republic of China

25487. Zhang, Y.; Yang, Y.; Shi, R.; Li, X.; Yan, H.; Bai, X.; Gao, S. (2025): Investigation of insect diversity in the restoration area of Yimin Surface Mine in Inner Mongolia. Diversity 2025, 17, 635. https://doi.org/10.3390/d17090635: 16 pp. (in English) ["Elucidating the relationship between changes in insect assemblage structure and diversity and the number of years of ecological restoration will help us evaluate the effectiveness of ecological restoration. Our objective is to investigate the response of the structure and diversity of insect communities in the ecological restoration area of Yimin Surface Mine in Inner Mongolia to different restoration years (1 year, 4 years, 7 years) by monitoring in 2018, 2021, and 2024. A total of 1282 insect specimens were collected using sweep-netting methods, representing 70 species from 46 families across 8 orders. The results demonstrated that as restoration progressed, insect taxa significantly increased from 25 to 55 species ($p < 0.01$), with key functional groups (Coleoptera and Lepidoptera) showing marked richness enhancement. alpha-diversity indices (Shannon–Wiener and Margalef) significantly increased, while the Simpson dominance index decreased, indicating a more homogeneous species distribution. beta-diversity analysis revealed reduced compositional dissimilarity among plots during later restoration stages, reflecting enhanced assemblage stability. The trophic structure shifted from phytophagous dominance to stabilized proportions across all feeding guilds, signaling food web maturation and ecosystem development. Overall, local ecological restoration projects had a significantly positive effect on insect survival and biodiversity development. Our research addresses a gap in faunal assemblage studies of coal mine rehabilitation zones." (Authors) Odonata are represented according Supplementary Material by Sympetrum pedemontanum, S. striolatum and Ischnura senegalensis.] Address: Gao, S., Grassland Research Institute of Chinese Acad. of Agricultural Science, Hohhot 010010, China. Email: gaoshaobo@caas.cn

25488. Zhou, J.; Cai, X.; Gu, K.; Gu, Y.; Zhao, G.; Li, G.; Xie, S.; Chen, K. (2025): Spatial scale effects of land use on the organisms in the streams of Yinggeling Tropical Rainforest. Natural Science of Hainan University 43(4): 398-404. (in Chinese, with English summary) ["To clarify the spatial scale effects of land use on the organisms in tropical rainforest streams, we selected the Yinggeling in Hainan Tropical Rainforest National Park as research area and used Random Forest model to analyze the spatial scale effects of land use on the biodiversity of stream organisms. The results indicated that the explanatory power of land use at different spatial scales for the diversity indices of the benthic macroinvertebrate communities ranged from 45.6% to 52.8%. Among them, the land use at the watershed scale had an important impact on the Shannon diversity index, and the land use within 3.0 km of the watershed upstream was an important land use factor which can explain significant variations of species richness, Simpson diversity index, and evenness index. The explanatory power of land use at different spatial scales for the diversity indices of the fish communities ranged from 30.7% to 42.0%, and the natural forests and the shrub forests within 1.0 km of the watershed upstream were the important land use factors which can explain significant variations of Shannon diversity index, Simpson diversity index, and evenness index of fish. In conclusion, there were significant spatial scale effects of land use in the Yinggeling on the benthic macroinvertebrate communities and the fish communities, and which are most

sensitive to the land use within 1.0 km and 3.0 km of the watershed upstream. Our findings provide the data support and the theoretical basis for the land use planning and protection of the stream biodiversity in the Yinggeling of Hainan Tropical Rainforest National Park. ... A total of 173 taxa of benthic invertebrates were collected and identified, belonging to 14 orders and 74 families. Among them, … Odonata (9 families, 13 taxa), … (Authors) Not species details are given.] Address: Zhou, J., School of Marine Biology and Fisheries, Hainan University, Haikou 570228, China

25489. Zhu, G.; Teixeira, F.F.; Loh, P. (2025): Parametric FEM-based analysis on adaptive vein morphology of dragonfly wings toward material efficiency. Biomimetics 10(12), 799; https://doi.org/10.3390/biomimetics10120799: 16 pp. (in English) ["This study explores how the morphological adaptations of dragonfly wing veins contribute to structural efficiency and material economy to inspire lightweight architectural design strategies. Through digital modelling and finite element analysis (FEA), six parametric models of wing structures were developed with variations in their vein diameter, cross-sectional profile, and thickness. Implemented through parametric software, these models were analyzed under simulated loading conditions to assess their structural performance. The results demonstrate that hollow, tapering, and adaptively shaped veins can reduce material weight by up to 80% while maintaining structural integrity. The highest material efficiency was observed in models incorporating both diameter and thickness variation, validating the role of adaptive morphology in response to local stress. These findings provide a quantifiable foundation for translating the biomimetic principles of dragonfly wings into a structural optimization algorithm and open pathways for their application in lightweight cantilevered structural design." (Authors)] Address: Zhu, G., School of Architecture, Design & Planning, Univ. of Queensland, Brisbane QLD 4072, Australia. Email: guanqi.zhu@uq.edu.au

25490. Zigashane Kaicuya, O.; Bunani Lushombo, E.; Bwaili Bitale, A.; Mutabazi Muhindo, J. (2025): Inventaire des macro-invertébrés benthiques des rivières Cirhindiro et Nkene dans la région de Katana, Est de la RD Congo. Annales de l'UNIGOM 15(3): 351-374. (in French, with English summary) ["A study on the inventory of benthic macroinvertebrates in the Cirhindiro and Nkene rivers was conducted with the aim of contributing to the study of aquatic biodiversity in the South Kivu region in general and Katana in particular. Benthic macroinvertebrates are the primary food source for several fish, insects, and amphibians; therefore, they must be present in sufficient quantities and with significant diversity to maintain the functional balance of river ecosystems. To achieve this objective, specimen collection methods by scraping using a net and simple collection were used. Thus, we obtained the following results: 30 species of benthic macroinvertebrates were inventoried; all these species are constant and only the species Coenagrion sp is abundant; the two rivers have a similarity index of 0.6 and finally, the physicochemical parameters vary from one river to another and from one site to another in the same river. The conservation of aquatic biodiversity should be encouraged to protect the benthic macroinvertebrates of these two rivers because they are threatened by human activities." (Authors) Odonata are misidentified with a key to determine North-American dragonflies.] Address: Zigashane Kaicuya, Enseignant – Chercheur à l'Institut Supérieur Pédagogique – ISP – de Kabare, Sud-Kivu/RD Congo, Département de Biologie et au Département d'Hydrobiologie, Faculté de Sciences, de l'Université Officielle de Bukavu – UOB –, Sud-Kivu/RD Congo. E-mail: jlkayeye@gmail.com

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25491. Guo, C.; Meng, X.; Wang, J.; (2026): Dragonfly-wing-inspired corrugated splitter plates for enhancing flow-induced vibration piezoelectric energy harvesting. Renewable Energy 256, Part B, 1 January 2026, 124009: (in English) ["This study introduces a novel biomimetic strategy to enhance flow-induced vibration (FIV) energy harvesting by incorporating corrugated splitter plates inspired by the microstructural features of dragonfly wings. While conventional splitter plates have been proven effective in improving the performance of piezoelectric energy harvesters, the aerodynamic benefits of bio-inspired surface morphologies have received limited attention. Four innovative bionic splitter plate configurations are designed and integrated into a piezoelectric cylinder system. The effects of these corrugated designs are systematically investigated under three installation angles (30°, 60°, and 90°). The experimental results demonstrate that the bionic splitter plates significantly outperform smooth plates at all three angles, with maximum increases of 23.7 %, 41.6 %, and 20.5 %, respectively. Numerical simulations reveal that the corrugated structures affect vortex shedding patterns, vortex structures, and local aerodynamic characteristics on splitter plates. While the shedding mode remains unchanged at 30° and 90°, a clear transition is observed at 60°, accompanied by the formation of secondary vortices and intensified wake instability. Furthermore, the corrugated structures induce sudden changes in the average pressure distribution, resulting in a larger pressure differential across the splitter plate, which amplifies bluff body oscillations and boosts energy output." (Authors)] Address: Meng, X., School of Mechanical & Power Engineering, Zhengzhou University, Zhengzhou, 450000, China. Email: xianzongmeng@zzu.edu.cn

25492. Hernandez-Pelegrín, L. (2026): The evolutionary history of insect-associated xinmoviruses. Molecular Phylogenetics and Evolution 214, 108453: 10 pp. (in English) ["Viruses are ubiquitous biological entities that shape host evolution and ecosystem dynamics. Among them, negative-sense single-stranded RNA (- ssRNA) viruses form a diverse group that includes well-characterized vertebrate pathogens and an expanding repertoire of invertebrate-infecting viruses. Recent advances in highthroughput sequencing have revealed numerous insect-associated - ssRNA viruses, reshaping our understanding of their diversity, transmission, and ecological significance. This study identified 22 novel xinmoviruses, expanding the known host range of this viral family to include Lepidoptera and Plecoptera for the first time. Additionally, xinmovirus-derived non-retroviral endogenous viral elements (nrEVEs) were identified in multiple insect lineages, expanding previous findings that were limited to mosquitoes. Phylogenetic analysis of the Xinmoviridae family revealed host-driven evolutionary patterns with potential cross-order transmission events. Similarly, nrEVEs provided evidence of specific viral-host interactions, with nrEVEs showing greater similarity to exogenous viruses infecting the same insect order and, in some cases, the same insect species. Together, these findings significantly expand the known diversity and evolutionary landscape of xinmoviruses. By uncovering new hosts, viral lineages, and genomic integrations, this study provides a more comprehensive framework for understanding their ecological distribution, transmission dynamics, and potential biological functions. ... Finally, one Odonata and one Plecoptera were analysed for the presence of xinmoviruses, resulting in the characterization of two new xinmoviruses in Erythrodiplax connata and Susulus venustus. ... the Erythrodiplax connata xinmovirus clustered with other odonatan xinmoviruses (from Cordulegaster boltonii and Ischnura senegalensis) (bootstrap

support = 100)." (Author)] Address: Hernandez-Pelegrín, L., Departamento de Genética e Instituto Universitario de Biotecnología y Biomedicina (BIOTECMED), Universitat de Valencia, 46100–Burjassot, Valencia, Spain

25493. Justino, G.L.; Zanco, B.; Guzman, L.M.; Echeverri, A.; Noriega, J.A.; Fávaro, L.F.; Morimoto, J. (2026): Insects are underrepresented across red lists of threatened biodiversity in the Neotropics. Biological Conservation 314, 111649: 9 pp. (in English) ["Insects are critical to the sustainability and productivity of ecosystems worldwide, yet up to 40 % of insects may face extinction in coming decades. Globally, Brazil is a major producer of agricultural commodities, but we lack robust studies to investigate policy gaps and biases that may threaten the sustainability of insect ecosystem services in this biodiversity-rich region. Our previous work in the UK and Ireland showed that conservation policies informed by species' red lists consistently underrepresent insect biodiversity. However, we still do not know whether similar patterns are present in biodiversity hotspots like Brazil, that rely proportionally more on insect ecosystem services for socioeconomic wealth. Here, we analyzed Brazil's three major red lists which influence national conservation policies: the IUCN Red List (2024), the Ministry of the Environment's official list (2022), and the Chico Mendes Institute's Red Book (2018). Nearly all insect orders are significantly underrepresented, except for Odonata. In contrast, vertebrate groups are consistently well-represented, underscoring a taxon-specific disparity rather than inherent limitations among all three lists. These findings highlight a key barrier to insect conservation in Brazil, where conservation biases threaten not only local biodiversity but also global food security. We argue for better methodologies and funding for more robust biodiversity assessments in underrepresented regions, such as Brazil. This is crucial for strengthening conservation policies to safeguard both ecological and socioeconomic systems against mounting anthropogenic pressures." (Authors)] Address: Morimoto, J., Institute of Mathematics, School of Natural & Computing Sciences, University of Aberdeen, Fraser Noble Building, Aberdeen, AB24 3UE, UK. Email: juliano.morimoto@abdn.ac.uk

25494. Lampou, A.; Skoulikidis, N.; Bonada, N. (2026): Biogeographical regions in the Aegean Archipelago: An assessment for freshwater macroinvertebrates. Journal of Biogeography, 2025; 0:e70117. 12 pp. (in English) ["Aim: To delineate biogeographical regions in the Aegean Archipelago using freshwater macroinvertebrates with different dispersal abilities, and explore the relation of these regions to geological and environmental drivers. Location: Aegean Archipelago, Greece. Taxon: Freshwater macroinvertebrates: Odonata, Trichoptera), and Plecoptera. Methods: Species data information of three macroinvertebrate orders from the Aegean Islands was compiled to identify biogeographical regions. The clustering (UPGMA with Jaccard dissimilarity) method was applied to delineate regions. Differences among regions were tested using PERMANOVA on ß-diversity turnover and nestedness. NMDS and Generalized Linear Models (GLMs) were used to assess the role of environmental variables in explaining the resulting biogeographical regions. Results: Among islands, species turnover was the dominant component of ß-diversity, indicating that compositional differences were primarily driven by species replacement. Six well-supported biogeographical regions reflecting both historical paleogeographic events and contemporary ecological patterns were identified. Differential dispersal abilities among groups also translated into biogeographical patterns, with Odonata showing weaker regional structuring than Trichoptera and Plecoptera. Western and eastern islands formed separate clusters, with central islands showing transitional patterns, reflecting past geological events in the area. Environmental gradients, particularly in precipitation, temperature, and freshwater availability, further shaped the biogeographical regions by influencing habitat stability and acting as ecological filters based on species' environmental tolerances. Main Conclusions: This study provides the first freshwater biogeographical regionalization of the Aegean Archipelago using macroinvertebrate fauna. The six identified regions are ecologically and biogeographically meaningful, shaped by dispersal barriers, paleogeographic history, and local environmental variation. Turnover driven ß-diversity and the contrast between high and low dispersal taxa highlight the value of trait-based approaches in biogeography." (Authors)] Address: Lampou, Anastasia, Freshwater Ecology, Hydrology & Management), Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Facultat de Biologia, Universitat de Barcelona (UB), Barcelona, Catalonia, Spain. Email: alampou@hcmr.gr

25495. Li, Z.; Zhang, S.; Liu, X.; Liu, P.; Jing, Y.; Li, P.; Li, M.; Guo, W.; Chen, M.; Xu, Y. (2026): Dragonfly wing venation-inspired hybrid primitive scaffold for improved mechanical properties and energy absorption. Thin-Walled Structures 218, Part C, 114070: (in English) ["Inspired by dragonfly wing veins, composite Primitive (P) structures reinforced with parallel (V-1) and staggered (V-2) bionic plate structures (BPS) were designed, and furtherly fabricated via laser-based powder bed fusion of polymers (PBF-LB/P) technology. Initially, homogenization analysis combined with Kriging model was employed to optimize the respective relative densities of the BPS and P lattices. Subsequently, the influence of PBS on the mechanical properties of uniform (P70), gradient (P8776), and hybrid gradient (P8678) scaffolds was systematically investigated through experimental testing and numerical simulations. Results demonstrate that the elastic modulus of VP70-1 and VP8678-2 scaffolds reinforced with PBS increased by 328.5% and 327.1%, respectively. Moreover, the maximum energy absorption of the composite scaffold attained 124.53 kJ/m³, representing a 216.9% enhancement compared to unreinforced configurations. Notably, the specific energy absorption (SEA) reached 0.25-0.36 kJ/kg, significantly surpassing that of honeycomb structures with equivalent density. This study reveals the potential of plate-enhanced structures in enhancing mechanical performance and provides meaningful references for their engineering applications." (Authors)] Address: Xu, Y., College of Mechanical & Energy Engineering, Shaoyang University, Shaoyang, 422000, China. Email: xuyong2927@hnsyu.edu.cn

25496. Medina Espinoza, E.F.; Oliveira-Junior, J.M.; Juen, L. (2026): The role of habitat integrity and biogeographic provinces in Odonata (Insecta) habitat specialization in Amazonia. Hydrobiologia 853: 263-279. (in English) ["Amazonia harbors the greatest diversity of freshwater species worldwide and several endemism areas. However, anthropogenic activities are rapidly transforming its landscapes. Odonata are insects that respond to environmental changes in aquatic and terrestrial ecosystems. Their flight performance and thermoregulation abilities influence their permanence in habitats. This study analyzed how stream condition and biogeographic province in Amazonia determine the functional structure of Odonata assemblages and, consequently, their habitat specialization. We also assessed whether the Odonata species' specialization response to environmental degradation depends on the suborder and the biogeographic province. We sampled adult Odonata assemblages in streams distributed in two different biogeographic provinces of Amazonia and measured the stream condition using the Habitat Integrity

Index. We calculated the components of functional structure (richness, evenness, divergence, and originality) and functional specialization of assemblages in each biogeographical province. We found that components of functional structure respond differently to habitat integrity and biogeographic province. Functional specialization of assemblages is influenced by habitat integrity, functional divergence, and originality. This implies that only assessing the different components of functional diversity would give us a more comprehensible understanding of the assemblages' response. Moreover, the response of species specialization to habitat integrity varies according to Odonata suborder." (Authors)] Address: Medina-Espinoza, Emmy Fiorella, Laboratório de Ecologia e Conservação (LABECO), Universidade Federal do Pará, Belém, Pará, Brazil

25497. Pal, A.; Saha, A.; Dubey, V.K.; Chowdhury, S.; Suparmaniam, U.; Ali, H. (2026): Chapter 18 - Tiny in size but mighty in protein: potential of insects as protein powerhouse. Health, Nutrition and Sustainability. Exploring Unconventional Food Sources Volume 1: 429-445. (in English) ["As the world population will surge at a record margin in the upcoming decades, the requirement for food and nutrition security will skyrocket as well. But the conventional meat industry, which is a primary supplier of protein in people's diet across the world, is no longer sustainable due to its limited future prospects, emission source of harmful greenhouse gases. This scenario suggests exploring alternative sources that are more sustainable and efficient for keeping up with future demand in relation to environmental concerns. Insects, irrespective of their insignificant size, can have a significant impact as a protein source in the upcoming food industry. The tradition of consuming insects as food is well renowned all around the world. Several communities across different continents, from Asia, Africa, Oceania to America, consume insects traditionally. Edible insects are a rich source of quality proteins across different orders. The protein content in several insect orders is significantly higher, as in Coleoptera (40.7%), Lepidoptera (45.4%), Hemiptera (48.3%), Hymenoptera (46.5%), Diptera (49.5%), Odonata (55.2%), and Orthoptera (61.3%). By 2030, the worldwide market for edible insects is predicted to extend to a value of US$8 billion. Not only as a protein source for humans, but it can also supplement the existing livestock production as a high-quality feed. So, the prospect for edible insects as a protein source is huge, and in the future decades, it will be crucial to food and nutritional security." (Authors)] Address: Pal, A., Dept of Entomology, Post Graduate College of Agriculture, Dr Rajendra Prasad Central Agricultural University, Samastipur, Bihar, India

25498. Ullah, I.; Ilahi, I.; Zia, A. (2026): Effect of ecological factors and habitat changes on the diversity and distribution of Odonata complex across different ecological zones in Hindu Kush Range Dir, Pakistan. International Journal of Agriculture and Biology 35:350101: 9 pp. (in English) ["The Hindu Kush range represents Palearctic realm and encompasses biodiversity hotspots especially for Odonata, which is still unexplored due to vulnerable climatic conditions and unavoidable conflict situations at border. The current investigation documented the habitat-based diversity and impact of ecological factors on the distribution of Odonata complex in Hindu Kush range, under Dir Upper and Dir Lower Districts of Khyber Pakhtunkhwa, Pakistan. Field surveys were conducted at 46 sites across diverse land types, including riparian, agricultural, springs, forests, subalpine and alpine pastures during the summer and autumn seasons of 2023-2024 on clearly sunny days between 9:00 am to 4:00 pm. Adult specimens were collected using aerial nets and identified under stereoscope by running them through taxonomic keys and following the description of Fraser (1933, 1934, 1936), Zia (2010) and Chaudhry (2010). Ecological factors were recorded at each habitat using data loggers. The present study recorded a sum of 46 Odonata species comprising 35 species of Anisoptera and 11 species of Zygoptera. Among the surveyed habitats, riparian and agricultural land types exhibited the highest species richness, each supporting 36 species, followed by spring habitats with 27 species, forests with 15 species and subalpine pastures with five (5) species, however no species was recorded from alpine pastures due to prevailing low temperature and persistently harsh weather conditions. Orthetrum triangulare triangulare and Orthetrum pruinosum neglectum were recorded as the most abundant species of the study area. The current findings indicate that habitats and ecological factors strongly influence diversity, distribution and population dynamics of Odonata." (Authors)] Address: Ullah, I., Dept of Zoology, University of Malakand, Chakdara, Pakistan. Email: ikramzoology@sbbu.edu.pk

25499. Watanabe, R.; Kubo, S.; Fukuoka, T.; Takahashi, S.; Kobayashi, K.; Sagawa, S.; Ohba, S. (2026): Effects of early summer plowing on aquatic insects in fallow field biotopes. Hydrobiologia 853: 315-336. (in English) ["Fallow field biotopes are expected to compensate for wetland habitats in paddy environments. However, the optimal timing of plowing to support aquatic insect diversity (Odonata, Hemiptera, and Coleoptera) remains unclear. We conducted field experiments to investigate whether early summer plowing in biotopes suppresses vegetation cover and promotes aerial colonization by aquatic insects. We managed 10 abandoned paddy fields as two types: paddy fields and biotopes. The biotopes were not plowed in the early summer of 2023, but both the biotopes and paddy fields were plowed in 2024. We evaluated the indirect effects of vegetation cover differences between the biotopes and paddy fields on the abundance of each aquatic insect species yearly. In 2023, we confirmed that dense vegetation covers suppressed colonization, reducing the abundance of aquatic insects in biotopes than in paddy fields, including the endangered giant water bug, Kirkaldyia deyrolli, which reproduces in early summer. In 2024, early summer plowing resulted in no notable differences in vegetation cover between the biotopes and paddy fields, thereby nullifying the indirect negative effects of vegetation cover. Early summer is the optimal timing for plowing, as reducing vegetation cover at this time could promote the colonization of species that reproduce in early summer." (Authors) Odonata taxa include Lestes sponsa, L. temporalis, Indolestes peregrinus, Pseudocopera annulate, Ischnura asiatica, I. senegalensis, Anax parthenope julius, Trigomphus citimus, T. ogumai, Sympetrum frequens, S. darwinianum, S. kunckeli, Crocothemis servilia, and Orthetrum albistylum.] Address: Watanabe, R., Department of Environmental Life Science, College of Life Science, Kurashiki University of Science and the Arts, Nishinoura, Tsurajima-cho, Kurashiki, Okayama, 712-8505, Japan