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2001

21039. Woodward, G. (2001): Book Review: Dragonflies: Behaviour and Ecology of Odonata P. S. CORBET (1999). Harley Books, Colchester, UK. Pp. 882. ISBN 0-946-58964-X. £62.50 (hardback). Freshwater Biology 46: 141-143. (in English) [Book review.] Address: Woodward, G., IERM, University of Edinburgh, Mayfield Road, Edinburgh, EH9 3JU: UK. E-mail: Guy.Woodward@ed.ac.uk

2006

21040. Beichle, U.; Fuhrmann, K. (2006): Die Libellen-Sammlung im Landesmuseum für Natur und Mensch Oldenburg: ein Modell für das Leitmotiv "Sammeln, bewahren, erforschen, ausstellen". Schriftenreihe des Landesmuseums Natur und Mensch Oldenburg 43: 68-72. (in German) [General introduction in the museum collection of Odonata at the Landesmuseum, with a focus on the regional species of Weser-Ems-region in Niedersachsen, Germany.] Address: Beichle, U., Landesmuseum für Natur und Mensch Oldenburg, Damm 38-44, 26135 Oldenburg, Germany. Email: ulf.beichle@web.de

21041. Rothfels, C.J. (2006): The dragonflies and damselflies (Odonata) of Halton Region, Ontario. Halton Natural Areas Inventory 2006: Volume 2 Species Checklists. Hamilton Naturalists' Club, Halton-North Peel Naturalists' Club, and South Peel Naturalists' Club. Hamilton, Ontario: 135-158. (in English) ["Key results: Diversity: Halton's tally of 80 species is impressive for an area of its size. Much of this diversity of odonates is due to the variety of habitats found within Halton, and to the northsouth spread of the Region. Some species are typical of more "northern" habitats (e.g. Libellula quadrimaculata) and are absent or rare in Halton below the Escarpment, while others (e.g. Pachydiplax) are largely confined to the southern areas of the Region. Species: The two most significant results of the recent odonate investigations are the large local populations of Unicorn Clubtail (Arigomphus villosipes) and Arrowhead Spiketail (Cordulegaster obliqua). Prior to 2002, there were approximately 13 records of Arigomphus villosipes from Ontario, and it was extirpated at some of those (Rothfels, in press). Since 2002, this species has been discovered to be locally widespread (with five stations in Hamilton and eight in Halton). These 13 sites double the known Ontario records! Our current data suggest that western Lake Ontario is the centre of this species' distribution in Ontario (Rothfels, in press). C. obliqua is even rarer; by the end of 2003 there were only 11 records for the province, none from Halton (Bree 2004a). Unlike A. villosipes, C. obliqua is not confined to southern Ontario. Instead, its records are scattered thinly across the province from a historic Hamilton record in the south, east to the Ottawa area, and northwest to Sudbury. The Halton records are particularly significant in light of Bree's observation that the previous recent records were confined to the Canadian Shield, Imd he was concerned that the Arrowhead Spiketail's "continued occurrence off of the Shield [is] doubtful" (Bree 2004a)." (Author)] Address: Rothfels, C., Dept of Biology, Duke University, Durham, NC 27707-0338 E-mail: rothfels@zoology.ubc.ca

2007

21042. Faucheux, M.J.; Meurgey, F. (2007): Sensilla chaetica and filiformia in Uropetala chiltoni Tillyard, 1930 larval antennae (Odonata, Anisoptera, Petaluridae). Martinia 23(4): 127-132. (in French, with English summary) ["Sensilla chaetica and filiformia in I ropetala chiltoni Tillyard, 1930 larval antennae (Odonata. Anisoptera, Petaluridae). The sensory equipment of the larval antenna of U. chiltoni is studied here using scanning electron microscopy. Two sensillum types (aporous curved sensilla chaetica and aporous sensilla filiformia classed in two subtypes) are present on all the segments, both on the scape and the pedicel and on the four flagellum segments. This equipment differs from that of Zygoptera and Anisoptera previously described, especially as regards the small number of sensillum types and the abundance of sensilla filiformia whose function is presumed to be vibroreceptive. These results are discussed in relation to the larval ecology." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, 44000 Nantes, France. Email: Francois.Meurgey@mairie-nantes.fr

2008

21043. Lockwood, M. (2008): Los Odonatos de Cataluña. I jornadas sobre la conservación de los artrópodes en Extremadura. Centro de Educación Ambiental de Cuacos de Yuste 16, 17 y 18 de Junio de 2007. Edición: Fondos LIFE-Proyecto LIFE 2003/NAT/E/000057 "Conservación de Artrópodos Amenazados de Extremadura". Junta de Extremadura. Consejería de Industria, Energía y Medio Ambiente. Coordinación técnica: Javier Pérez Gordillo y Ángel Sánchez García. Depósito legal: BA-004-2008: 103-115. (in Spanish) ["Conclusions: Undoubtedly, the hobby in the Iberian Peninsula for dragonflies is booming without having even come close to reaching the levels of popularity that exist in other European countries, where the tradition of the amateur naturalist goes back literally centuries, and where there are dental societies that gather thousands of people. However, the advent of new digital technology in the imaging world, with near-professional performance cameras at pocket-friendly prices, has helped encourage a new crop of naturalists to head out into the countryside in search of spectacular images. And it has been the Odonata, insects with intense colors and intriguing behavior where they exist, that have captured the imagination of many of these amateur photographers. We hope that these new trends bear fruit, which we believe can complement the work of universities and, increasingly, the interest in this group of insects

that is palpable in certain regional administrations. The organization of the World Dentistry Congress in Vigo in 2005, the First Conference on Arthropods in Extremadura in June 2007 and the field work undertaken in Catalonia, Valencia and Extremadura could be the first firm steps towards a new respect for the Odonata and the arthropods in general in the Iberian Peninsula." (Author/Googletranslate)] Address: Lockwood, M., Grupo Oxygastra Institució Catalana d'Història Natural Carrer del Carme, 47; 08001 Barcelona, Spain. Email: info@oxygastra.org

21044. Manolis, T. (2008): Spiders residing in odonate exuviae — An update and request for information. Argia 20(3): 19- (in English) [Verbatim: In early August, at the DSA annual meeting in Bend, Oregon, I gave a presentation on the use of dragonfly exuviae for roosting and nesting by a jumping Spider, Sassacus vitis. I have observed this behavior to be fairly common at a site along the American River near my home in Sacramento, California, but would like to get a better idea of just how widespread this practice might be (the Spider in question is common and wide-ranging in Western North America, from British Columbia to Panama). As luck would have it, the day after my presentation, Steve Krotzer told me he had found a small jumping spider in an exuvia of Macromia magnifica (Western River Cruiser) he had collected along the John Day River a few days prior. Steve graciously provided me with the spider, and lo and behold — it was a male Sassacus vitis! I know a lot of ARGIA readers collect exuviae, at least occasionally, and would love to hear from any of you about any Spiders, especially — but not limited to, jumping Spiders, you may find in them. You may even send me specimens (alive or dead) if you like.] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

21045. Mezquita, I. (2008): Primera cita de Oxygastra curtisii (Dale, 1834) (Odonata: Corduliidae) para la provincia de Bizkaia (País Vasco, España). Boletín de la S.E.A. 42(1): 438- (in Spanish) ["In the municipality of Ajangiz (a town close to Gernika) the Oca River (Oka in Basque) flows on its way to its mouth in the Urdaibai Biosphere Reserve. It is a medium-sized river with plenty of gallery trees and little current in this section. Bordering all this space there is a dense grove, mainly oak. It is within the perimeter belonging to the "Lurraska" School of Environmental Education. In a section of this river (30TWN258943) the wooded gallery that protects it has an open space of approximately a couple of hectares next to it, where groups of Juncus sp. precede a large mass of bramble (Rubus fruticosus). It is here that O. curtisii was located. On June 18, 2007, an anisopteran resembling O. curtisii was seen in a nearby pond, but its secure identification was not possible as it could not be captured. The next day the first contact takes place in which the species is perfectly identifiable. Three males are sighted at 08:10 solar time that are disputing a territory (the aforementioned stretch with Juncus sp. and Rubus sp.). The dispute between these males lasts from 08:10 in the morning until 14:30 in the afternoon, when they disappear. The temperature around 30º and the relative humidity above 90%, the sky is absolutely free of cloudiness. Pictures are taken of the males perched on the Juncus sp. The next day a single female is observed in the reed area, quite trusting and with fairly short flights after which she remains clinging to them, when she is photographed. Its activity ceases at 08:30, having started at 07:20 solar time. The sky gradually clouded over, until around 10:00 a.m. it began to rain with some intensity." (Author / google translate)] Address: Mezquita, I., Departamento de Entomología de la Sociedad de Ciencias Aranzadi, Pseo de de Zorroaga 11, 20014 Donostia-San Sebastián, Spain. E-mail: mezquitaaranburu@gmail.com

21046. Norma-Rashid, Y.; Sofian-Azirun, M.; Rosli, R.; Rosli, H. (2008): Dragonflies on the Islands in the Straits of Malacca. Malaysian Journal of Science 27(3): 105-111. (in English, with Malaysian summary) ["The odonate fauna of Pulau Perak, Pulau Jarak and some islands of the Sembilan group of islands were surveyed. Although no endemics were found, fifteen species, all first records for the islands were documented. Various biological aspects of the dragonfly such as population, distribution and relative abundance were discussed. Morphometric aspects were also studied and possible explanations for the attributed differences between the island populations of Pulau Perak and Pulau Lalang are proposed." (Authors) Agrionoptera insignis, Diplacodes trivialis, Macrodiplax cora, Neurothemis fluctuans, Orthetrum chrysis, O. glaucum, O. testaceum, Pantala flavescens, Rhyothemis phyllis phyllis, Rhodothemis rufa, Trithemis aurora, T. festiva, Tholymis tillarga, Agriocnemis femina femina, Ischnura senegalensis] Address: Norma-Rashid, Y., Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: norma@zoology.um.edu.my

21047. Rodríguez, P.C. (2008): Primera cita de Onychogomphus costae Selys, 1885 (Odonata: Gomphidae) para La Rioja (España). Boletín de la S.E.A. 42(1): 404- (in Spanish) ["In the 2006 campaign, it was possible to collect a male of O. costae on July 9, which represents its first record for La Rioja (Spain). 2017, special attention has been paid to the exact location of this species. The dates and specimens observed They were the following: "Valparaíso": 23.VI.2007, 1male; "He Plano": 03.VIII.2007, 8males; Hillside south: 28.VIII.2007, 1 male. Due to its rarity, only one specimen was collected." (Author/google translate)] Address: Rodríguez, P.C., La Manzanera, 13 bajo. 26004, Logroño, La Rioja, Spain. Email: patekphi@yahoo.es

2010

21048. Forestry Bureau, Council of Agriculture (2010): Taiwan's special rare wildlife habitat use surveys and plans to create a co-ordination Four spot fine Featherlegs [Mortonagrion hirosei] habitat conservation and education promotion plan. Results report. Corp. Taiwan Society of Wilderness, Republic of China on December 31, 2010: 144 pp. (in Chinese) ["7.4 Designation of important habitats for wild animals M. hirosei is listed as vulnerable by the World Conservation Union (IUCN) and is only distributed in a few places such as Taiwan, Japan, and Hong Kong. In the water purification park planning and basic design entrusted technical service project, the relevant domestic and foreign literature was collected, and with the observation and survey results of volunteers, it was suggested that the existing habitat of the four-spotted weeter should be well protected, and the habitat range should be expanded. Relevant experiential education facilities can play the role of environmental education. At the same time, it is suggested that relevant government units should allocate funds as soon as possible to carry out investigation and research on the species and habitat of M. hirosei. The area is a protected area or an important habitat for wild animals, and a management plan for the habitat of the four-spotted weed is formulated to protect its habitat and avoid human interference. The survival crisis of the ethnic group, including habitat degradation and other factors, has caused a rapid decline in the distribution range and density of the ethnic group in the past five years. This

result shows that our efforts and progress in the conservation of the four-spotted species are far from enough, and related conservation work is urgent. In eyebrows, the local government and the agricultural committee and other competent authorities should face up to this problem, invest in the required conservation research and habitat management resources as soon as possible, and designate the Wugu wetland as a wild habitat. An important habitat for animals to effectively preserve their habitat. In Taiwan, the rare and beautiful habitat of M. hirosei is close to the two major metropolitan areas of New Taipei City and Taipei City. It is the blessing and pride of the residents of the two metropolitan areas. The best indicator of district health, quality of life for residents, and sustainable values. Based on a one-year investigation and research, this plan puts forward the above suggestions for the conservation work of M. hirosei." (Authors/Google translate)]

2011

21049. Costes, A. (2011): État des lieux des connaissances des populations de trois libellules d'finteret communautaire en Midi-] Pyrénées: Macromia splendens, Oxygastra curtisii et Gomphus graslinii. Conservatoire d'espaces naturelles Midi Pyrénées: 33 pp. (in French) ["Three dragonflies species of community interest are attached to the large rivers of southern France. These three species are currently covered by the "National Odonate Action Plan". Although the Midi-Pyrénées has a significant conservation responsibility for these species, their distribution is currently poorly known. Numerous actions should eventually be envisaged at regional level for the preservation of these three species. Beforehand, it is necessary to draw up an inventory of their distribution. This report presents a synthesis of data collected from various structures and individuals in the Midi-Pyrenean naturalist landscape, supplemented by the results of a survey in 2011 on regional waterways in search of new sites favourable to the development of these three dragonflies. The aim is to update and strengthen knowledge of M. splendens, O. curtisii and G. graslinii in the Midi-Pyrénées." (Authors/DeepL) http://cen-mp.org/wp-content/uploads/2018/07/rapport_odonates_Costes2011_cenmp.pdf] Address: Conservatoire d'espaces naturelles Midi Pyrénées, 75 Rue Luce Boyals, 31300 Toulouse, France

21050. Jones, J.I.; Murphy, J.F.; Collins, A.L.; Sear, D.A.; Naden, P.S. (2011): The impact of fine sediment on macro-invertebrates. River Research and Applications 28(8): 1055-1071. (in English) ["The sustainable use of water resources requires clear guidelines for the management of diffuse pollution inputs to rivers. Without informed guidelines, management decisions are unlikely to deliver cost-effective improvements in the quality of rivers as required by current water policy. Here, we review the evidence available for deriving improved guidelines on the loading of fine sediment to rivers based on the impact on macro-invertebrates. The relationship between macro-invertebrates and fine sediments is poorly defined. Studies of the impacts of fine sediment on macro-invertebrates have been undertaken at various scales, which has an influence on the range of responses displayed and the reliability of the results obtained; results obtained from investigations at smaller scales may not manifest at the scale required to manage rivers and vice versa. Many of the identified effects of increased loading of fine sediment on macro-invertebrates occur as a consequence of deposition on the river bed, yet many current management guidelines are based on suspended sediment targets. On this basis, existing water quality 2013 guidelines for sediment management are unlikely to be appropriate." (Authors) Xanthocnemis zealandica, Ischnura aurora] Address: Jones, J.I., School of Biological and Chemical Sciences, Queen Mary University of London, Mile End Road, London, E1 4NS, UK. E-mail: j.i.jones@qmul.ac.uk

21051. Leatherman, D. (2011): Dragonflies and Damselflies. Colorado Birds 45(3): 211-215. (in English) [General account on Odonata with focus of dragonflies as prey of birds.] Address: Leatherman, D., 612 Stover Street #7, Fort Collins, CO 80524, USA. E-mail: daleatherman@msn.com

2012

21052. Hou, Y.; Wang, F. (2012): Vibration, structural engineering and measurement II. Applied Mechanics and Materials 226 - 228: 844-849. (in English) ["Flapping-wing flying is a kind of rhythmic movement with symmetry of time and space essentially, and this movement is generated and controlled by Central Pattern Generator (CPG). A 2-DOF flapping mechanism was designed according to the flapping-wing flying principle of insects, and the flapping-wing flying CPG model was constructed by nonlinear oscillators. The system responses were studied, and the influences of the model parameters to the system characteristics were analyzed. Through the engineering simulation of flapping-wing flying control model, the first modal vibration of the system was selected, and the different flying modes of bionic aircraft were realized by adjusting system parameters. This kind of bionic control strategy promoted the movement and control ability of flapping-wing flying, and provided a new method to the generation and control of flapping-wing rhythmic movement. ... According to the mass, wingspan of dragonfly wing, take the equation parameters as follows: m= 20mg, lw=0.04m, l1=0.02m, l2=0.018m, l3=0.01m, k1=320N/m, k2=320N/m, c1=0.00005Ns/m, c2=0.00005Ns/m, c3= 0.00001Ns/m. Through calculating, the two natural frequencies ..." (Authors)] Address: Hou, Y., College of Mechanical Automation, Wuhan University of Science and Technology, Wuhan, China. E-mail: af]y_houyu@ 163.com

21053. Seehausen, M.; Blanckenhagen, B. von (2012): Pseudagrion microcephalum (Rambur, 1842) und Crocothemis servilia (Drury, 1773) - zwei exotische Libellenarten in Hessen. Libellen in Hessen 5: 58-62. (in German) [A male P. microcephalum emerged from an aquarium of M. Seehausen on 24-VIII-2011. A larva of a female C. servilia was reared in March/April 2008 by Benno v. Blanckenhagen.] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen-@museum-wiesbaden.de

21054. Soissons, A.; Martinant, S.; Barbarin, J.-P. (2012): Déclinaison régionale du plan national d'actions en faveur des Odonates - Auvergne - 2012-2016. Conservatoire d'espaces naturels d'Auvergne - Société d'histoire naturelle Alcide d'Orbigny - DREAL Auvergne: 116 pp. (in French) ["The first restoration plans were initiated by the Ministry of Ecology in 1996. More than forty national plans are currently being developed or implemented. The Office for Insects and their Environment (Opie) was responsible for drafting the National Action Plan for Odonates (PNA Odonates). It was drafted in collaboration with the French National Odonatology Society (Sfonat) during 2009. Its validation by the Conseil National de Protection de la Nature (CNPN) has been effective since June 2010 (DUPONT, 2010). This plan has two main objectives: - to acquire quantitative data on

the conservation status of species, - to improve the conservation status of species and their habitats in France. In accordance with the provisions of the PNA Odonates, the operational phase involves the production of regional versions. The drafting of the regional version of this plan for the Auvergne region was entrusted to the Conservatoire d'espaces naturels d'Auvergne (Sylvie Martinant, coordinator & Aurélie Soissons, odonatologist) for the coordination and drafting of the plan, in collaboration with the Société d'Histoire Naturelle Alcide d'Orbigny (Jean-Philippe Barbarin, odonatologist expert) for the synthesis of knowledge and drafting of the naturalistic section. The actions selected in the framework of this first Regional Action Plan for Odonates (PRA Odonates) in the Auvergne region cover the period 2012-2016. The 15 species selected for Auvergne, including 10 from the PNA Odonates and 5 added, are all rare and threatened either at national level or in Auvergne. However, these 15 species should not in any way mask the interest of the entire odonatological suite present in Auvergne, which to date numbers 74 species. The 15 species selected, whose habitats are representative of the topographical and altitudinal diversity of Auvergne, are "flagship" species that should serve as a lever for preservation actions that could benefit all Odonata. Furthermore, the geographical position of the Auvergne in the heart of France and the Massif Central, at a climatic crossroads, makes it a privileged "sentinel" region for the evaluation of current or future climate changes. Translated with www.DeepL.com/Translator (free version) Coenagrion lunulatum, C. mercuriale, C. ornatum, Cordulegaster bidentata, Epitheca bimaculata, Gomphus graslinii, G. flavipes Ophiogomphus cecilia, Somatochlora arctica, Leuccorrhinia dubia, L. pectoralis, Oxygastra curtisii, Sympetrum depressiusculum, S. pedemontanum, Macromia splendens] Address: Barbarin, J.-P., Société d'histoire naturelle Alcide d'Orbigny (SHNAO), France. E-mail: jeanphilippe.barbarin@orange.fr

2013

21055. Hamill, S.E. (2013): Recovery Strategy for the Pygmy Snaketail (Ophiogomphus howei) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario: v + 14 pp. (in English) ["Executive Summary: O. howei is a small, brightly-coloured dragonfly which lives in large rivers with steady flow. Adults are thought to forage in the canopy of forests surrounding the rivers. Eggs are laid into the water where they are carried downstream and eventually sink. During the day the larvae burrow into sand or gravel sediments. At night they come to the surface and prey on other invertebrates or small fish. This species is a globally rare dragonfly which occurs only in Eastern North America. In Canada it has been found in 11 locations in New Brunswick and at one site in Ontario. The Ontario location is on the Namakan River in the Rainy River district of northwestern Ontario. The species is listed as endangered on the Species at Risk in Ontario (SARO) List under Ontario's Endangered Species Act, 2007 (ESA). The greatest potential threat to O. howei in Ontario is the impoundment of running waters, but others include forest harvesting and invasive species. Other threats common to dragonflies, such as road-kill, recreational use of waters during the emergence period, construction and pollution, may be of lower concern due to the remote northern location. Limiting factors include a need for pristine conditions and the species' short travel distance. Knowledge gaps are many, but major ones are the complete lack of information on population size and the unknown precise egg-laying location in Ontario. The recovery goal is to ensure the long-term survival of O. howei in Ontario by protecting the existing population. The protection and recovery objectives are to: *protect and maintain the quality and quantity of habitat on the Namakan River in Ontario where Pygmy Snaketail occurs; *implement a monitoring program at the location where Pygmy Snaketail is known to exist; *conduct additional inventories for Pygmy Snaketail in suitable habitat. When adult Pygmy Snaketails and/or breeding sites are found, it is recommended that the protection provided by a habitat regulation should be applied to those areas, including the river and 200 metres of forested habitat on either side. " (Author)] Address: not stated

21056. Heeffer, J. (2013): Libellen in De Kaaistoep. In: T. Peeters, A. van Eck & T. Cramer (red.), Natuurstudie in De Kaaistoep. Verslag 2012, 18e onderzoeksjaar. - TWM Gronden BV, Natuurmuseum Brabant & KNNV-afdeling Tilburg, 117 pp: 55-58. (in Dutch) [https://knnv.nl/wp-content/-uploads/sites/31/2020/12/2012-Kaaistoep-Jaarverslag.pdf] Address: KNNV-afdeling Tilburg, Secretariaat: Marie-Cécile van de Wiel. Email: secretaris@tilburg.knnv.nl

21057. Sharma, P.; Kangale, M.; Agase, D.M. (2013): Study of odonates diversity near Koradi Lake, Koradi, Nagpur, Maharashtra. Journal of Entomology and Zoology Studies 11(1): 126-130. (in English) ["The objective of the present study was to determine the diversity of odonates in the area around Nagpur's Koradi Lake, which is home to a wide variety of birds and insects. Twenty species of Odonates from 15 genera and three families were discovered during the monitoring in the marked areas near the lake. In total, 1071 individual odonates have been observed in the Koradi region. Libellulidae had the most species (12), followed by Coenagrionidae (7 species), and Aeshnidae (1 species). It was noted that urbanisation and pollution could have a negative impact on the diversity of odonates in the Koradi region." (Authors)] Address: Agase, D.M., Govt. J.S.T.P.G. College, Balaghat, Madhya Pradesh, India

21058. Shulse, C.D.; Semlitsch, R.D.; Trauth, K.M. (2013): Mosquitofish dominate amphibian and invertebrate community development in experimental wetlands. Journal of Applied Ecology 50: 1244-1256. (in English) ["1. Restored and constructed habitats can play important conservation roles. Predators help shape communities in these habitats through complex interactions with prey, other predators and biotic and abiotic characteristics of the environment. However, introduced predators can have dramatic effects that may be difficult to predict. 2. Using regression models, we compared influences of introduced invasive western mosquitofish Gambusia affinis to those of two naturally colonizing predators (crayfish and dragonflies), and vegetation, on three anuran species in experimentally constructed wetlands. Using analyses of covariance, we also examined influences of mosquitofish and vegetation on aquatic invertebrate communities. 3. We found that mosquitofish reduced abundances of grey treefrogs Hyla versicolor and H. chrysoscelis and boreal chorus frog Pseudacris maculata, but had no significant influence on green frog Lithobates clamitans. Mosquitofish also reduced invertebrate abundance, but their effect on richness was less clear. Vegetation cover did not significantly increase most anuran or invertebrate abundances. However, vegetation increased invertebrate richness. After fish removal, invertebrate abundance increased. Fish removal may have facilitated chorus frog re-colonization into wetlands with low abundance of invertebrate predators. 4. Our results indicate that mosquitofish are detrimental to wetland communities, and we recommend that

managers avoid stocking mosquitofish. We also encourage temporary or drainable wetlands to prevent mosquitofish persistence if colonization occurs. Implementing these recommendations will improve the conservation potential of restored wetlands." (Authors)] Address: Shulse, C.D., Missouri Dept Transportation, P.O. Box 270, Jefferson City, MO, 65102, USA. E-mail: Christopher.Shulse@modot.mo.gov

21059. van der Valk, J. (2013): Libellen op de dagvlindermonitoringsroutes in De Kaaistoep. In: T. Peeters, A. van Eck & T. Cramer (red.), Natuurstudie in De Kaaistoep. Verslag 2012, 18e onderzoeksjaar. - TWM Gronden BV, Natuurmuseum Brabant & KNNV-afdeling Tilburg, 117: 59-62. (in Dutch) [https://knnv.nl/wp-content/uploads/sites/31/2020/-12/2012-Kaaistoep-Jaarverslag.pdf] Address: not stated

2014

21060. Adve, N. (2014): Moving home. Global warming and the shifts in species' range in India. Economic & Political Weekly xlix no 39: 34-38. (in English) ["Global warming and changing rainfall patterns have resulted in shifts or extensions in species' range in every terrain, region and ecosystem in India. If it is indicative of a wider unfolding process related to climate change, it would suggest that a staggering number of species in India are moving home. This would adversely affect human habitat as well." (Author) The paper includes a reference to odonata.] Address: Adve, N.; Email: nagraj.adve@gmail.com

21061. Álvarez, X.P. (2014): Aeshna mixta atrapada nun fento Pteridium aquilinum. Chioglossa 4: 129-130. (in Spanish, with English summary) ["A rare observation of an Aeshna mixta accidentally trapped by the plant Pteridium aquilinum is reported. This plant lacks specific methods of capture or defense against insects. Other similar cases found in the literature are commented." (Author)] Address: Revolta, 2 - Noalla. 36990 Sanxenxo. Pontevedra, Spain. Email: xurxolusitanica@gmail.com

21062. Barry, M.J. (2014): The energetic cost of foraging explains growth anomalies in tadpoles exposed to predators. Physiological and Biochemical Zoology 87(6): 829-836. (in English) ["Theoretical models predict that predator-induced phenotypes should have lower fitness in the absence of predators. Tadpoles frequently respond to invertebrate predators by reducing activity levels and changing their body proportions. While some studies have shown that induced defenses in tadpoles reduce growth rates, others have found no effect. The aim of this study was to measure the effects of predator presence [Anax imperator] on energy expenditure in tadpoles. Predator exposure lowered overall metabolic rate by 19%, while specific dynamic action due to food consumption increased resting metabolism by 11%. Control tadpoles moved significantly more (93.6 ± 3.9 cm/min) than predator-exposed animals (50.1 ± 7.5 cm/min), and swimming increased metabolic rate by up to 400% compared to stationary tadpoles, indicating that activity can be energetically expensive and can consume as much as 37% of assimilated energy. These findings suggest that the costs of reduced foraging are context dependent and may even be beneficial in environments where high-quality resources are closely spaced but detrimental when extensive movement is required to obtain optimal resources for growth. ... The aim of this study was to measure the main components of energy expenditure in tadpoles of the Arabian toad (Bufo arabicus) in the presence and absence of predation cues from dragonfly larvae. ... The dragonfly larvae were fed two 50 ± 10-mg tadpoles daily. " (Author)] Address: Barry, M.J., Biology Dept, Sultan Qaboos University, PO Box 36 AL Khoud, Muscat, 123, Oman. E-mail: mjbarry@squ.edu.om

21063. Bolshakov, L.V. (2014): [The first information on the dragonfly fauna (Insecta: Odonata) in the Ugri section of the Ugra National Park (Kaluga region)]. Proceedings of the Mordovia State Nature Reserve named after P. G. Smidovich 12: 414-418. (in Russian) [Google translate: "At least 43 species of dragonflies are currently recorded on the territory of the Kaluga region, without taking into account 5 species unusual for this region, previously indicated on the basis of definitions for larvae, the presence of which in the fauna of the region requires confirmation (Bolshakov, 2013). However, the territory of the region has been studied very unevenly in terms of odonatology. The vast majority of dragonfly species are known in the Zhizdrinsky section of the Utra National Park, much less in some other areas. In particular, data on the fauna of dragonflies in the Ugorsky section of the national park have so far been practically absent in the literature, except for 13 eurytopic and numerous species recognized, taking into account data from adjacent areas, distributed throughout the territory of the Kaluga region (Bolshakov, 2013). In 2013, the author conducted entomological studies in the Dzerzhinsky district of the Kaluga region, mainly in the southern part of the Ugorsky site, related to the Galkinsky forestry of the national park. At the same time, for the first time in this part of the region, collections of dragonflies were held. This year, the first dragonflies were observed here on May 16, but after August 30, the research was interrupted due to prolonged rains. As a result, 28 species of dragonflies were identified in the Galkinsky forestry, of which 3 were new for the Kaluga region. The material is stored mainly in the collection of the author, partially (species new to the region) - in the Zoological Museum of Moscow State University. It should be noted that the area under consideration is located in the subzone of coniferous-deciduous forests. The river network is represented by the river. Ugra and its tributaries. In the forests of the Galkinsky forest area there are numerous swamps, among which low-lying black briers and grass swamps predominate. However, most of the collections in the Galkino locality were carried out on the famous Galkinsky swamp, a unique and relict natural complex, including extensive sphagnum quagmire with specific taiga-boreal biota. Collections in the Gorbenki locality were carried out on the no less famous Zalidovsky meadows, where there are oxbow lakes and small grassy swamps, which partially dry up in summer. In the proposed list, the order system is adopted according to (Belyshev, Kharitonov. 1981), the nomenclature according to (Skvortsov. 2010). Species reported for the first time for the Kaluga Region are marked with an asterisk (*). Annotations of species previously known in the area are limited to localities and frequency of occurrence during the research period, since the bibliography by species and their ecological characteristics were covered in detail (Bolshakov. 2013). More detailed comments are given on the most rare and new species of fauna." The list includes species as Coenagrion johanssoni, Sympecma paedisca, Nehalennia speciosa, Aeshna cyanea, Gomphus vulgatissimus, Ophiogomphus cecilia, Cordulia aenea, Leucorrhinia dubia, L. rubicunda, L. pectoralis] Address: Bolshakov, L.V., Russian Entomological Society (Tula branch), Russia. Email: l. bol2012-@yandex.ru

21064. Cabana, M.; Romay, C.D.; 1,2, Anxos Romeo, A.; Martínez, E.; Sanmartín, P.; Reigada, X.R. (2014): Distribución de Trithemis annulata en Galicia (NW Península

Ibérica). Chioglossa 4: 15-27. (in Spanish, with English summary) ["An updated distribution of T. annulata in Galicia (NW Iberian Peninsula, Spain) is presented. Data of this species in 24 UTM grids (10x10 km), of which 17 are new, are summarized. Most sightings were obtained during fieldwork carried out in 2010-2013 in SW Galicia, although sparse records in other parts of the country are described as well." (Authors)] Address: Cabana, M., Grupo de Investigación en Bioloxía Evolutiva (GIBE), Centro de Investigacións Científicas Avanzadas (CICA). As Carballeiras, s/n, Campus de Elviña, Universidade da Coruña. 15071 A Coruña (Galicia, Spain). Email: mcohyla@yahoo.es

21065. Ferreiro, R. (2014): Predación de Passer domesticus sobre Cordulegaster boltonii. Chioglossa 4: 1 p. (in Spanish, with English summary) [July 29, 2013, Elviña in A Coruña, Spain. The observation of handling and transportation of an imago of C. boltonii by a female of P. domesticus is reported.] Address: Ferreiro, R., Grupo Naturalista Hábitat, Rúa Camariñas 9 baixo. 15008 A Coruña, Spaib. Email: ricardo.ferreiro@gnhabitat.org

21066. Herremans, M.; De Knijf, G.; Hansen, K.; Westra, T.; Vanreusel, W.; Martens, E.; Van Gossum, H.; Anselin, A.; Vermeersch, G.; Pollet, M. (2014): Monitoring van beleidsrelevante soorten in Vlaanderen met inzet van vrijwilligers. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2014 (rapportnr. INBO.R.2014.1628917). Instituut voor Natuur- en Bosonderzoek, Brussel: 88 pp. (in Dutch) ["This final report sets out the framework for using volunteers to carry out structured monitoring networks. Chapters 1 and 2 provide basic information on the taxonomic scope and monitoring methods. Chapter 3 broadly describes the data used for the 2013 HRL/VRL reporting. The subsequent chapters (4-8) look in more detail at the individuality of the volunteer work. Specific focus here is on the significance of loose observations (Ch. 4), the blueprint review process (Ch. 5), specific concerns for (Ch. 6), and the dynamics of this operation (Ch. 7). It then outlines a conceptual framework for guiding and supporting volunteers in monitoring networks, and launches a concrete proposal (Ch. 8). Following this, the existing nature data systems in Flanders are mapped, as well as the existing and planned partnerships between Natuurpunt and the other volunteer organisations (Ch. 9). The future monitoring network application is also briefly explained here. Chapter 10 provides an overview of relevant aspects for the monitoring network budget. ... 5.2.6 BD-LIB - Dragonflies Volunteer organisation involved: Libellenvereniging Vlaanderen (LVV). Three monitoring network types are proposed for dragonflies: transect counts, area counts, and larval skin counts on a fixed route. LVV sees co-standardised monitoring of species as a goal of the association and wants to do its utmost to achieve this. However, it cannot do this alone, and there is an important demand for professional supervision (by guiding the volunteer organisation), and for finding and deploying volunteers from outside the association. Natuurpunt still sees significant opportunities for this in its fabric. Translated with www.DeepL.-com/Translator (free version)" (Authors)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. Email: geert.deknijf@inbo.be

21067. Joest, R.; Jaworski, N.; Langenbach, A.; Rödel, A. (2014): Entwicklung der Libellenfauna in der renaturierten Lippeaue. Natur in NRW Nr. 1/2014: 28-31. (in German) ["Conclusion: In the Lippe floodplain in the area of the Klostermersch and the Hellinghauser Mersch (Nordrhein-Westfalen, Germany), a number of dragonfly species characteristic of lowland rivers and their floodplains occur. The dragonfly fauna shows great similarity to other floodplain areas of Westphalian lowland rivers, especially the Ems (ARTMEYER 2000, CONZE 2000). Similar species communities and their developments on regenerated floodplain waters were also observed by LOHR (2010) on the basis of long-term studies of the dragonfly fauna in the floodplains of the Upper Weser (Germany) and the Lower Allier (France). The results also correspond to experiences made, for example, after renaturation measures on the Main (SCHLUMPRECHT et al. 2004). The species diversity of dragonflies has increased since the beginning of the surveys in parallel with the renaturation measures carried out. For species of flowing waters, the creation of bank breaks with shallow water zones and flow-calmed sections has created favourable living conditions. Species of temporary water bodies and flood zones depend on near-natural flood dynamics. Their habitats could be improved by creating small water bodies and reactivating the floodplain by removing the embankment and creating flood channels that allow even smaller floods to enter the floodplain more quickly. In addition to these measures acting in the area, supra-regional factors such as climate warming have also contributed to the increase in the number of species. Species such as the firefly, which have expanded their range due to climatic changes, can only colonise the floodplains if suitable habitats are available. Thus, floodplain restoration is also a prerequisite for adaptation to climate change by enabling species to shift their range. The renaturation of floodplains in particular creates a great diversity of habitats and enables water storage during drier summers (STRÄTER et al. 2010). This also applies to the Lippe floodplain, where without renaturation measures even otherwise permanent water bodies would dry up in dry years." (Authors/DeepL)] Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz, Biologische Station Soest, Teichstr. 19, 59505 Bad Sassendorf-Lohne, Germany. E-Mail: r.joest@abu-naturschutz.de

21068. Karima, B. (2014): Contribution à l'étude de la biologie des Odonates de la région d'Oued Djedi (Biskra). MSc thesis, République Algérienne Démocratique et Populaire, Ministère de l'Enseignement Supérieur et de la Recherche Scientifique, Université Mohamed Khider Biskra, Faculté des Sciences Exactes et des Sciences de la Nature et de la Vie, Département des Sciences de la Nature et de la Vie: 66 pp. (in French, with Arabian and English summaries) [Between January and May 2014, 12 odonate species were recorded in the area of Oued Djedi, Algeria. Abundance and phenology are documented from the following species: Ischnura fountaineae, Coenagrion caerulescens, Anax ephippiger, Anax imperator, Anax parthenope, Orthetrum coerulescens, Orthetrum chrysostigma, Crocothemis erythraea, Sympetrum fonscolombii, Trithemis annulata, Trithemis arteriosa, and Trithemis kirbyi.] Address: not stated

21069. Patrício, P.M.B. (2014): How does exposure to the fungus Batrachochytrium dendrobatidis affects the tadpoles of the common toad, Bufo bufo, under different stresses? Tese de mestrado. Biologia (Biologia da Conservação), Faculdade de Ciências, Universidade de Lisboa: 49 pp. (in English, with Portuguese summary) ["The current global decline of amphibians is caused by multiple factors, and one of the most important is the spread of the fungus Batrachochytrium dendrobatidis (Bd) which is directly responsible for the infection of 350 amphibian species. The factors

that influence susceptibility to infection by Bd are not completely known, but it is known that factors such as density, intra-and inter-specific competition, and predation may have consequences for the development and possibly the immune system of larval amphibians. The effects of single stresses on anurans have been widely studied and documented, but studies examining the extent to which anurans can respond to multiple stresses are scarce. We tested the effect of stress-inducing factors, namely intraspecific competition, the existence of chemical and visual signals indicating the presence of a predator [Aeshna cyanea], and environmental exposure to Bd, in tadpoles of Bufo bufo (common toad), in a factorial experiment that tested all combinations of the three stress-inducing agents considered. Tadpole mortality was very low and not related with infection by Bd. In fact, all the tadpoles were cleared of Bd at the end of the experiment. However, our results demonstrated that the non-lethal infection by Bd can be a stressor and have impacts on larval life-history traits. The responses we found included reduced activity levels, shortened larval period, reduced ability to jump after metamorphosis, and differential use of the aquarium. So, the fungus does not directly affect B. bufo survivorship, but influences traits related to behavior, growth and development. Our study did not support the hypothesis that the exposure to natural stresses resulting from predation and/or competition increases susceptibility to B. dendrobatidis, and shows that a link between stress exposure and disease susceptibility cannot be assumed in all cases." (Author) https://repositorio.ul.pt/bitstream/10451-/16015/1/ulfc107584_tm_pedro_patricio.pdf] Address: not stated

21070. Shi, X.-j.; Yu, H.-y. (2014): Dragonfly wing structural stiffness of the finite element analysis. Journal of Anhui Agricultural Sciences 2014, (5): 1395-1397,1400. (in Chinese) ["Objective: To explore the important role of arching in the space structure of dragonfly wings. Method: The finite element analysis software ANSYS was used to analyze the deformation of each model under different loads, and the arch structure of dragonfly wings was studied. The effect of stiffness. Result: Under the same load conditions, the structural stiffness of the two mesh models increases with the increase of the arching height. When the load and arching height are the same, the deformation of the mesh with membrane is smaller than that of the mesh without membrane The stiffness of the hexagonal grid is significantly enhanced; under the same load conditions, the deformation of the hexagonal grid is always greater than that of the combined grid model. Provide new ideas." (Authors/Google translate)] Address: not stated

21071. Stockwell, M.P.; Srorrie, L.J.; Pollard, C.J.; Clulow, J.; Mahony, M.J. (2014): Effects of pond salinization on survival rate of amphibian hosts infected with the chytrid fungus. Conservation biology 29(2): 391-399. (in English, with Spanish summary) ["The chytrid fungus Batrachochytrium dendrobatidis has been implicated in the decline and extinction of amphibian populations worldwide, but management options are limited. Recent studies show that sodium chloride (NaCl) has fungicidal properties that reduce the mortality rates of infected hosts in captivity. We investigated whether similar results can be obtained by adding salt to water bodies in the field. We increased the salinity of 8 water bodies to 2 or 4 ppt and left an additional 4 water bodies with close to 0 ppt and monitored salinity for 18 months. Captively bred tadpoles of green and golden bell frog (Litoria aurea) were released into each water body and their development, levels of B. dendrobatidis infection, and survival were monitored at 1, 4, and 12 months. The effect of salt on the abundance of nontarget organisms was also investigated in before and after style analyses. Salinities remained constant over time with little intervention. Hosts in water bodies with 4 ppt salt had a significantly lower prevalence of chytrid infection and higher survival, following metamorphosis, than hosts in 0 ppt salt. Tadpoles in the 4 ppt group were smaller in length after 1 month in the release site than those in the 0 and 2 ppt groups, but after metamorphosis body size in all water bodies was similar. In water bodies with 4 ppt salt, the abundance of dwarf tree frogs (Litoria fallax), dragonfly larvae, and damselfly larvae was lower than in water bodies with 0 and 2 ppt salt, which could have knock-on effects for community structure. Based on our results, salt may be an effective field-based B. dendrobatidis mitigation tool for lentic amphibians that could contribute to the conservation of numerous susceptible species. However, as in all conservation efforts, these benefits need to be weighed against negative effects on both target and nontarget organisms." (Authors)] Address: Stockwell, Michelle, Conservation Biology Research Group, School of Environmental & Life Sciences, Univ. Newcastle, University Drive, Callaghan, NSW, Australia. E-mail: michelle.stockwell@newcastle.edu.au

21072. Suriana; Dwi Arinto Adi; dan Wa Ode Dian Hardiyanti (2014): Dragonfly (Odonata) stocktaking around river and Moramo swamp, Sumber Sari village, Moramo district, South Konawe Regency, southeast Sulawesi. Biowallacea 1(1): 49-62. (in Indonesian, with English summary) ["The aim of this research was to know the dragonfly (Odonata) species around River and Moramo Swamp, Sumber Sari Village, Moramo District, South Konawe Regency, South-East Sulawesi. Dragonfly captured on three site namely river, swamp I and swamp II/Moramo swamp. This research used descriptive method. There are 28 species of dragonfly which are include of 8 family namely Lindeniidae, Libellulidae, Megapodagrionidae, Lestidae, Coenagrionidae, Calopterygidae, Chlorocyphidae and Platycnemididae. Suborder Epiprocta found 13,33% family and 50% suborder Zygoptera of all families. There are 12 species in river, 15 species in swamp I and 13 species in swamp II/Moramo swamp. The Calopterygidae, Megapodagrionidae and Platycnemididae only found in river, whereas Lestes concinnus found in swamp only. The dragonfly species found in river were different from swamp I and swamp II/Moramo swamp." (Authors)] Address: Suriana, Jurusan Biologi, Fakultas MIPA Universitas Halu Oleo Kendari, Sulawesi Tenggara, Indonesia. Email: suriana0568@gmail.com

2015

21073. Lopes, A.S.P. (2015): Biodiversidade e ecologia de borboletas (Lepidoptera) e libélulas (Odonata) do planalto superior da Serra da Estrela. M.Sc. thesis, Ecologia Aplicada, Universidade de Aveiro: 73 pp. (in Portugual, with English summary) [Portugal "Serra da Estrela has a high natural value due to the presence of rare habitats and a remarkable biodiversity. The aim of this study was to evaluate the importance of different areas of the upper plateau of Serra da Estrela for the conservation of nature through the study of two bio-indicators groups, Odonata and Lepidoptera. The sampling methodology was based on the count of adult individuals, using fixed transects with a length of 150 meters along four different habitats: natural ponds, small dams, large dams and inland areas (dry spots). In 2301 observed individuals, 55 Lepidoptera species were identified, and in 2580 individuals, 23 species of Odonata were identified. The presence of Lepidoptera species Vanessa virginiensis,

Cyaniris semiargus and Coenonympha iphioides, and Odonata species Aeshna juncea and Sympetrum flaveolum, is noteworthy, since they are considered rare or vulnerable in Portugal. Significant differences on the biodiversity of both orders were found between the different types of studied habitats. The biodiversity of butterflies was higher in large dams, mainly due to the existence of a greater richness and abundance of nectariferous plant species, while the diversity of Odonata species was higher in natural lakes and some small naturalized dams, where disturbance levels are low. In these habitats exists some stenotopic species, and also species very sensitive to disturbance. Due to the high diversity of species present in Serra da Estrela with the status of vulnerable, rare, endemic or protected by the law, appropriate management measures should be promoted, and the protection of habitats may be the one of greatest relevance." (Author)] Address: not stated

21074. Payandeh, R. (2015): Verbreitung und Ökologie der Vogel-Azurjungfer, Coenagrion ornatum (SELYS, 1850) in der Steiermark. MSc. thesis, Karl-Franzens-Universität Graz: 118 pp. (in German, with English summary) ["In a GIS-based randomized sampling procedure, 61 rivulets were preselected in the eastern, southern and western parts of Styria to study the distribution and ecology of the Ornate Bluet (Coenagrion ornatum). In May, June and July 2014, field trips were carried out and data on the Odonata fauna and several habitat parameters were collected. GIS and MaxEnt tools allowed us to estimate the likelihood of the occurrence of C. ornatum for whole Styria. Dragonflies could be recorded along 55 of the 61 water bodies, and C. ornatum was present along 14 rivulets. The analysis of habitat parameters showed that the presence of this species depends mainly on the altitude, flow velocity, width of the rivulet and on the water depth. C. ornatum utilizes lowland rivulets (200 to 450 meters) and prefers a stream velodity between 0 and 20 seconds per 5 meters. Furthermore, the rivulet width should not exceed 4.5 m and a depth of 50 cm. The inclination should not exceed 5 degrees. The presence of C. ornatum also correlates positive with e.g. a higher number of serene days, a larger drainage area of the rivulet and a total rainfall in spring of about 220 mm. C. ornatum localities are concentrated in the east and southeast parts of Styria with one exception in the district Voitsberg." (Author)] Address: not stated

2016

21075. Gottardo, M.; Dallai, R.; Mercati, D.; Hörnschemeyer, T.; Beutel, R.G. (2016): The evolution of insect sperm - an unusual character system in a megadiverse group. Journal of Zoological Systematics and Evolutionary Research 54(4): 237-256. (in English) ["Spermatozoa provide an unusual character system, with a limited number of components organized in a single cell. Similar spermatozoa occur in groups widely separated in the phylogenetic tree of Metazoa. Nevertheless, the character system contains phylogenetic information. Hexapoda have acquired spermatophores along with the switch from aquatic to terrestrial habitats, and related to this, a multitude of different sperm types. The aim of this study is a formal evaluation of the phylogenetic information content of spermatozoa. For the first time, sperm characters are coded for formal phylogenetic analyses. Different approaches are used and compared. Mainly due to a high level of homoplasy, the evaluation of sperm characters alone is insufficient for a reconstruction of the phylogeny of the group. Yet, a reliable reconstruction of the evolution of insect sperm is possible when character transformations are assessed using a phylogeny based on extensive molecular data. Important changes took place in the early evolution of Hexapoda. Sperm characters support some major clades (e.g. Hexapoda, Dicondylia, Polyneoptera, Psocodea), but important steps in the evolution are not reflected by transformations of spermatozoa, notably the rise of Pterygota or Holometabola. Important innovations are the formation of mitochondrial derivatives and the acquisition of accessory microtubules. Some features are conservative, whereas others evolved rapidly (e.g. presence or absence of the acrosome vesicle). Some groups are conservative in their sperm features (e.g. Odonata, Heteroptera), whereas the evolution of spermatozoa was distinctly accelerated in others (e.g. Ephemeroptera). The rate of evolution can change drastically in closely related groups. Profound changes in the morphologically uniform Zoraptera underline that sperm evolution can follow a pattern very different from the general somatic morphology. The mode of character reconstruction preferred here will be useful for the evaluation of specialized morphological character systems and strengthen the concept of evolutionary morphology." (Authors)] Address: Beutel, R.G., Institut für Spezielle Zoologie & Evolutionsbiologie mit Phyletischem Museum, Friedrich-Schiller-Universität Jena, Jena, Germany. Email: rolf.beutel@uni-jena.de

21076. Hushtan, K.V. (2016): The ecomorphological classification of dragonflies larvae (Insecta: Odonata) of the Ukrainian Carpathians. The Kharkov Entomol. Soc. Gaz. 24(1): 5-21. (in Russian, with Ukrainian and English summaries) ["The main classifications of the ecological and morpho-ecological types of dragonflies' larvae have been analyzed. The papers that could be the basis for creation the unified ecomorphological classification of Odonata are analyzed. Morphological method is suggested as the main for selecting the categories for ecomorphs of dragonflies' larvae. It is suggested to take into account ecological (spatial niche), ethological (the type of movement, behavioral characteristics) and morphological (body shape, type of mouthparts, structure of sense organs and legs) criteria. Twenty dimensional features have been analyzed for larvae of 15 genera of water dragonflies from the Ukrainian Carpathians. Seventeen indicators have been selected, which exactly characterize relations of larvae with environment. On the base of suggested approach, hierarchical classification for dragonflies' larvae from the Ukrainian Carpathians has been developed. It includes 3 types, 6 classes, and 10 subclasses." (Author)] Address: Hushtan, Kateryna, State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine. Email: katrinantonyuk@gmail.com

21077. Kolozsvary, M.B.; Holgerson, M.A. (2016): Creating temporary pools as wetland mitigation: How well do they function? Wetlands 36(2): 335-345. (in English) ["Temporary forested pools are an important ecological resource throughout northern and eastern North America, yet they are often destroyed or degraded. Pool creation offers a potential mitigation solution, but long-term monitoring to assess the functioning of created pools is scarce. Furthermore, studies rarely integrate multiple, interacting levels of the pool ecosystem, including physical, chemical, and biological parameters. To address this knowledge gap, we compared the physical habitat, water chemistry, productivity, and community composition of macroinvertebrates and amphibians from 7-year old created pools (n=?7) to reference pools (n=6). Created pools were smaller in size, received more sunlight, had greater amounts of Lemna, Typha, and Phragmites, and were less likely to dry. Created pools had higher pH and conductivity, but algal biomass did

not differ. Macroinvertebrate richness was similar across pools, but composition starkly differed. Amphibian species richness and composition was similar between created and reference pools; however, created pools had fewer focal pool-breeding amphibians, including the spotted salamander and wood frog. By assessing the entire pool ecosystem, we found that the ability of created pools to mimic the physical conditions and ecological functions of natural temporary pools is suspect." (Authors) Aeshnidae, Coenagrionidae, Lestidae, Libellulidae.] Address: Kolozsvary, M.B., Dept of Environmental Studies & Sciences, Siena College, Loudonville, NY, 12211, USA

21078. Koparde, P. (2016): Damsels in distress – seasons, habitat structure and water pollution changes damselfly diversity and assemblage in urban wetlands. Animal Biology 66(3-4): 305-319. (in English) ["Odonates are considered to be good ecological indicators, hence, they are used in biological assessment of habitat quality. However, species responses may vary spatiotemporally and therefore, it is useful to establish species-habitat relationships at a regional level. To test if tropical urban odonates respond to seasons, and to explore species-habitat relationships with an emphasis on water pollution, I studied six wetlands in the city of Pune for a year. I also investigated whether combining data on dragonflies and damselflies, as is often done in many studies, skews the results. I recorded seasons, water pollution and habitat attributes as predictors of the odonate diversity and assemblage. I analyzed the data on dragonflies, damselflies and odonates (dragonfly-damselfly combined) separately for seasonal variation, and species-habitat relationships. I used multiple regression and canonical correspondence analyses. Forty-four species were recorded during the study. No seasonal variation was detected, except for damselflies, which showed an increase in the diversity and species number post-monsoon. Multiple regression analysis showed that damselfly and dragonfly diversity varied as a function of season and water pollution, and monsoon respectively. In pre-monsoon, damselfly diversity marginally increased with pollution. Both the analyses suggest that combining data on dragonflies and damselflies may skew the end results. Therefore, I recommend further intensive and long-term research using accurately sampled habitat and pollution attributes, as well as habitat restoration through conserving urban green spaces and promoting gardens with streams and ponds." (Author)] Address: Koparde, P., 107, Radhika Apartment, Survey no. 12/1/2, Anandnagar, Sinhgad road, Pune 411051, Maharashtra, India. E-mail: pankajkoparde@gmail.com

21079. Kosterin, O.E. (2016): A survey of Odonata of Mondulkiri, the elevated eastern province of Cambodia, for ten days in June 2014. IDF-Report 98: 1-85. (in English) ["Results of an odonatological survey of Mondulkiri Province of Cambodia, at the footills and Central Plateau of the Annamese Mts. in June 8 - June 17, 2014 are presented. Of 106 Odonata species met (46 zygopterans, 60 anisopterans), 97 were identified to previously known named species, of which 17 are reported for the first time for Cambodia, namely Mnais mneme Ris, 1916, Rhinocypha seducta Hämäläinen et Karube, 2001, Philoganga loringae Fraser, 1927, Rhinagrion hainanense Wilson et Reels, 2001, Amphiallagma parvum (Selys, 1876), Ceriagrion chaoi Asahina, 1967, Paracercion malayanum (Selys, 1876), Prodasineura doisuthepensis Hoess, 2007, Protosticta grandis Asahina, 1985, Tetracanthagyna waterhousei McLachlan, 1898, Gomphidia kruegeri Martin, 1904, Heliogomphus chaoi Karube, 2004, Leptogomphus baolocensis Karube, 2001, Microgomphus jurzitzai Karube, 2000, Onychothemis culminicola Förster, 1904, and two species for which the specimens collected on this trip were described as new subspecies: Indolestes gracilis expressior Kosterin, 2015, Coeliccia poungyi dasha Kosterin, 2016. Five species collected on this trip have been described elsewhere as new to science, namely Onychargia priydak Kosterin, 2015, Prodasineura hoffmanni Kosterin, 2015, Asiagomphus reinhardti Kosterin et Yokoi, 2016, Euthygomphus schorri Kosterin, 2016 and Risiophlebia guentheri Kosterin, 2015. So the total number of the first country records of named species made on this trip is 22. Still five species found may be undescribed. The number of named species recorded in Cambodia has reached 179. Remarks on taxonomy and variation of Euphaea masoni Selys, 1879, E. ochracea Selys, 1859, Aciagrion approximans (Selys, 1876), and Lamelligomphus castor Lieftinck, 1941 are provided. Characters of mature males of R. seducta are updated. Notes on habitats and habits of some species are provided. Onychothemis culminicola and O. testacea Laidlaw, 1902 seem to exclude each other at rivers, the former occupying smaller and more elevated ones; a putative hybrid male was observed. General notes on the area and field impressions are briefly outlined." (Author)] Address: Oleg E. Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State Univ., Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

21080. Rohmare, V.B.; Rathod, D.M.; Parasharya, B.M. (2016): Diversity and population dynamics of Odonata (Insecta: Odonata) in rice growing area of central Gujarat. Journal of Biological Control 30(3): 129-137. (in English) ["Odonates diversity was studied in Paddy field of Central Gujarat during 2012 to 2015. Total 39 species belonging to 25 genera, under six families and two suborders were recorded. Total 17 species of Zygoptera and 22 species of Anisoptera were recorded. Community structure and population dynamics of adult odonates were studied at Lingda village during July to December, 2012 through monitoring their population by point count method on three microhabitats (paddy field, village pond and fish farm). Total seventeen species were encounterd in the point count. Diversity index (H') was highest (2.13) for paddy fields followed by fish farm (2.07) and village pond (1.99). Evenness value of the odonates also ranged between 0.7 and 0.8. Total four species (Viz. Ditch Jewel (25.0%), Green Marsh Hawk (17%), Ruddy Marsh Skimmer and Coromandal Marsh Dart (16% each) were dominant species in all three microhabitats. Both suborders showed similar trend of population fluctuation during the study. Relative abundance was higher and remained constant during 4th week of September to 2nd week of October." (Authors)] Address: Rohmare, V.B., AINP on Agricultural Ornithology, Anand Agricutlral University Anand - 388 110, Gujarat, India, India

21081. Sjöwall, P.; Lundström, R (2016): The environmental and anthropogenic impact onfreshwater biodiversity in Lajeado, RS, Brazil.: A study of using dragonflies as indicators for theenvironmental status in freshwater biomes. Independent thesis Basic level (university diploma): 31 pp. (in English) ["Fragmentation of the Atlantic rainforest and alteration of waters due to agricultural expansion has greatly affected the species diversity in Brazil. In this study, we investigate how different environmental factors affect dragonfly communities and dragonfly species richness in sixteen different locations in Rio Grande do Sul, Brazil. A total of 328 individuals distributed among 46species and eight families were collected. At each sampling location the water was

analyzed and the surrounding environment recorded and plotted. Our goal was to investigate if we could find species for use as bio indicators on water quality and if the fragmentation of the forests in Rio Grande do Sul affects the species richness negatively. Our data suggested that the amount of forest, pH level and water temperature have a strong correlation to the number of species. For the number of specimens we found that amount of forest, pH level, water temperature, conductivity, amount of dissolved solids in the water and amount of surrounding urban area affects the population. We found that still water holds more species as well as specimens than current water. T. binotata, M. ocellata, Oxyagrion sp., L. pictus, M. stawiarskii, R. planaltica, L. auritus and L. dichrostigma could possibly be used as indicators for pH level, and that S. reticulata, L. bipupillatus, B. furcata, R. bonariensis, D. mincki and T. cophysa possibly could be used as indicators for conductivity. Further studies has to be done in order to be certain about the use of these species as indicators." (Authors)] Address: not stated

21082. Staats, E.G.; Agosta, S.J.; Vonesh, J.R. (2016): Predator diversity reduces habitat colonization by mosquitoes and midges. Biology Letters 12(12): 4 pp. (in English) ["Changes in predator diversity via extinction and invasion are increasingly widespread and can have important ecological and socio-economic consequences. Anticipating and managing these consequences requires understanding how predators shape ecological communities. Previous predator biodiversity research has focused on post-colonization processes. However, predators can also shape communities by altering patterns of prey habitat selection during colonization. The sensitivity of this nonconsumptive top down mechanism to changes in predator diversity is largely unexamined. To address this gap, we examined patterns of dipteran oviposition habitat selection in experimental aquatic habitats in response to varied predator species richness while holding predator abundance constant. Caged predators [larval Celithemis eponina, larval Enallagma spp. and first-year Procambarus crayfish] were used in order to disentangle behavioural oviposition responses to predator cues from potential post-oviposition consumption of eggs and larvae. We hypothesized that because increases in predator richness often result in greater prey mortality than would be predicted from independent effects of predators, prey should avoid predator-rich habitats during colonization. Consistent with this hypothesis, predator-rich habitats received 48% fewer dipteran eggs than predicted, including 60% fewer mosquito eggs and 38% fewer midge eggs. Our findings highlight the potentially important links between predator biodiversity, prey habitat selection and the ecosystem service of pest regulation." (Authors)] Address: Staats, E.G., Dept of Biology, & Center for Environmental Sciences, Virginia Commonwealth University, Richmond, VA, USA. Email: egstaats6@msn.com

21083. van Strien, A.J.; Gmelig Meyling, A.W.; Herder, J.E.; Hollander, H.; Kalkman, V.J.; Poot, M.J.M.; Turnhout, S.; van der Hoorn, B.; van Strien-van Liempt, W.T.F.H.; van Swaay. C.A.M.; van Turnhout, C.A.M.; Verweij, R.J.T.; Oerlemans, N.J. (2016): Modest recovery of biodiversity in a western European country: The Living Planet Index for the Netherlands. Biological Conservation 200: 44-50. (in English) [oas 68;"Highlights: •In line with the global Living Planet Index, we calculated a LPI for the Netherlands based on 361 animal species. •Overall, the state of biodiversity has slightly increased from 1990 to 2014. •This was mainly due to the growth of freshwater animal populations. •In farmland and in open semi-natural habitats animal populations have been declining and in woodland they were stable. •The LPI enables us to monitor the state of biodiversity in a clear and consistent way. Abstract: We calculated a Living Planet Index (LPI) for the Netherlands, based on 361 animal species from seven taxonomic groups occurring in terrestrial and freshwater habitats. Our assessment is basically similar to the global LPI, but the latter includes vertebrate species and trends in population abundance only. To achieve inferences on trends in biodiversity more generally, we added two insect groups (butterflies and dragonflies) and added occupancy trends for species for which we had no abundance trends available. According to the LPI, the state of biodiversity has slightly increased from 1990 to 2014. However, large differences exist between habitat types. We found a considerable increase in freshwater animal populations, probably because of improvement of chemical water quality and rehabilitation of marshland habitats. We found no trend in the LPI for woodland populations. In contrast, populations in farmland and open semi-natural habitats (coastal dunes, heathland and semi-natural grassland) declined, which we attribute to intensive agricultural practices and nitrogen deposition, respectively. The LPI shows that, even in a densely populated western European country, ongoing loss of animal biodiversity is not inevitable and may even be reversed if adequate measures are taken. Our approach enabled us to produce summary statistics beyond the level of species groups to monitor the state of biodiversity in a clear and consistent way." (Authors)] Address: van Strien, A.J., Statistics Netherlands, P.O. Box 24500, 2490 HA The Hague, The Netherlands. Email: asin@cbs.nl

21084. Weihrauch, F.; Vieira, V.; Cordero-Rivera, A.; Loureiro, N. (2016): Update on the zoogeography of Odonata in the Macaronesian Islands. Boletín Rola nº 8: 9-22. (in English, with Spanish summary) ["Based on the comprehensive review by Weihrauch (2011), the checklists of all archipelagos of the Macaronesian Islands and the available literature on the distribution of their Odonata are brought up to date. Pantala flavescens is new to the Azores and the Canary Islands. The first record of Ischnura hastata from Graciosa Island confirms the species' breeding in all nine islands of the Azores. The presence of Ischnura senegalensis in the Canary Islands is confirmed. Single specimens of Agriocnemis exilis, Anax rutherfordi, and Anax tristis found in museum collections bring the checklist of Cape Verde to 17 species. No new species have been reported from Madeira or the Savage Islands. In summary, the checklist of Macaronesian Odonata now comprises acknowledged records of 23 species (8 Zygoptera, 15 Anisoptera)." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

21085. Števove, B.; Kovác, V. (2016): Ontogenetic variations in the diet of two invasive gobies, Neogobius melanostomus (Pallas, 1814) and Ponticola kessleri (Günther, 1861), from the middle Danube (Slovakia) with notice on their potential impact on benthic invertebrate communities. Science of The Total Environment 557–558: 510-519. (in English) ["Highlights: •Bioinvasions can affect negatively native ecosystems through trophic interactions. •Diet and impact of two invasive gobies (fish) in the Danube were examined. •Both gobies preferred chironomids when small, bighead goby shifted to fish when large. •In contrast to round goby, invasive species predominated in the diet of bighead goby. •The impact of invasive gobies develops over time after the onset of the invasion. Abstract: In this study, ontogenetic variations in diet of invasive bighead goby Ponticola kessleri and round goby Neogobius melanostomus from the

middle Danube were analysed. Index of stomach fullness, Fulton's condition factor, index of food importance, frequency of occurrence, biomass, electivity, and proportions of invasive organisms in their diet were examined. Changes in the diet during ontogeny of both species emphasise the differences in their trophic niches. Our results combined with literary data suggest that bighead goby may threaten small native benthic fish species as a predator (especially in the invasion front), whereas round goby can potentially impact native fish species of all ontogenetic phases by competing for food. Round goby appear to have strong impact on bivalves, especially in the invasion front. High consumption of invasive organisms by bighead goby may help the native macroinvertebrate community. Thus, in contrast to round goby, bighead goby does not seem to be a hot candidate for being a nuisance invader." (Authors) The publication includes a passing reference to Odonata.] Address: Števove, B., Dept of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina, 842 15 Bratislava, Slovakia. E-mail: manonik@gmail.com

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21086. Bolshakov, L.V. (2017): New species of Odonata for the Tula Province. 2. Eversmannia 49: 51- (in Russian, with English title) [Verbatim (Google Translate): When studying the odonatofauna of the Tula region, 2 species of dragonflies new to the region were identified. The definition was made by the author. The material is stored in the museum-reserve "Kulikovo Pole" (Tula) and the Tula Regional Exotarium. Species annotations give arealogical characteristics based on [Belyshev and Kharitonov, 1981; Dijkstra, Lewington, 2006] and other cited sources, details of finds and ecological characteristics; the names of localities are accompanied by their numbers in the working list ["Consolidated…", 2007]. Onychogomphus forcipatus is a western Palearctic (to the Trans-Urals, Western Asia) temperate species. In our region, it was reliably known in the more northern subtaiga regions (cited after (Bol'shakov, 2003, 2013)), but relatively rare. Material: Pavlovskoe (36b), 29.08.2016, 1 female (leg. A. Evsyunin). According to the literature, rheophilic appearance. According to the latest observations in the Kaluga region (Yukhnovsky district, Papaevo, 07/30/2014, 1 female, 3 specimens recorded, L. Bolshakov), dragonflies stay along the river banks and sit on coastal vegetation. Aeshna isoceles … is a west-central Palearctic (to Central Asia) subboreal species. In our region, it was first noted at the very end of the 20th century. in the vicinity of Moscow [Matyukhin, 2000] and in the eastern regions of the Lipetsk region [Melnikov, 2000]. Probably, it settled more widely in the forest zone only in the 21st century. due to the softening of wintering conditions; recently found in the Kaluga region (Bol'shakov, 2014). Material: Tula (51), TsPKiO, July 8, 2011, 1 specimen noted; 06/6/2012, 2 specimens noted. (L. Bolshakov); Lupishki (129), 5.06.2013, 1 male (up to 6 specimens noted); 07/04/2013, 3 specimens noted; Krasnopolye (129a), 06/5/2013, 1 male, 2 specimens noted. (L. Bolshakov). The first sightings in Tula were not previously put into circulation, because before the capture of dragonflies in 2013, the identification of an unfamiliar species in flight did not seem reliable. A moderately eurytopic limnophilous species that develops in various stagnant water bodies and, probably, in backwaters of rivers. Dragonflies were noted only above water bodies and near them. After the publication of the latest addition (Bol'shakov, 2012), 45 species of dragonflies become known in the fauna of the Tula region. Thanks. The author thanks A.A. Evsyunin (Tula Regional Exotarium) for providing the collected material. The research was partly funded by the Kulikovo Pole Museum-Reserve.] Address: Bolshakov, L.V., Russian Entomological Society (Tula branch), Russia. Email: l.bol2012@yandex.ru

21087. Brown, T. (2017): Predator-prey space use in response to chemical cues of predation. Undergraduate Research Theses, Ohio State University. Dept of Evolution, Ecology, & Organismal Biology: 22 pp. (in English) ["Interactions between predators and prey are a major component of ecosystems and have the potential to shape ecosystem dynamics. As predators and prey move together spatially and temporally throughout their habitat, each makes decisions to increase its own fitness. To make optimal movement decisions, individuals must accurately interpret their surroundings using available information. Two chemical cues are important for predator-prey interactions: predator kairomones and prey alarm cues, the chemical cue components of a typical predation event. How organisms use available information to make movement decisions and how their space use differs after chemical cue exposure is not yet fully understood. We measured space use within a system of predatory dragonfly larvae (Anax junius) and green frog tadpoles (Rana [=Lithobates] clamitans) exposed to chemical cues. To determine how predators and prey interpret predation events and make movement decisions, we conducted experiments using the components of a predation event: kairomones and alarm cues. We hypothesized that tadpoles would respond more strongly when exposed to a combination of chemical cues and that Anax would attempt to match prey distributions to increase its predation success rate. We found that tadpoles only responded with antipredator behaviours (i.e., spatially move away from perceived predation risk) when exposed to both Anax kairomones and conspecific alarm cues and that predatory Anax do not differ in their space use after chemical cue exposure. Our results suggest that tadpole prey minimize potentially costly antipredator behaviour by selectively responding to environmental information and that predators are behaviourally managing prey fear. Our research has shed insight into how predators and prey use different chemical cues when making movement decisions. Our results can be applied to aquatic and terrestrial systems where predator-prey species rely on chemical cues. " (Author)] Address: not stated

21088. Harabis, F. (2017): Does the management of surrounding terrestrial habitats increase the tendency of odonates to leave aquatic habitats? Biodiversity and Conservation 26(9): 2155-2167. (in English) ["Generally, dragonflies and damselflies (odonates) are considered aquatic invertebrates. However, the ecological requirements of their adults are not different from those of fully, terrestrial insects. Surprisingly, there is a very little information on whether the management and structure of surrounding habitats has any influence on the diversity and seasonal dynamics of odonates. This is important to know because recently, a large proportion of freshwater habitats in Central Europe have becomes surrounded by intensively managed habitats. The aim of this study was to investigate the effects of different types of terrestrial habitats on their long-term utilization by dragonflies and damselflies. I assumed that this pattern varied over time; therefore, I used generalized additive mixed models to analyze the effects of management on seasonal changes in the abundance of individuals in terrestrial environments. From my results, it was evident that the management practices of surrounding terrestrial habitats had a significant impact on the population dynamics of dragonflies. The abundance of dragonfly adults in surrounding terrestrial habitats increased toward the end of the season. However,

this was only, when the natal aquatic habitat was not affected by fish farming and was able to supply surrounding terrestrial habitats with offspring. This was evidenced by the fact that, compared to areas with extensive water management, in sites with fish farming, seasonal increases in abundance was negligible. There is no doubt that the structure of surrounding terrestrial habitats has a significant influence on the diversity of terrestrial invertebrates. However, we must not forget that terrestrial habitats, regardless of their management, are not able to replace the poor quality of the aquatic (natal) habitat. Interestingly, the abundance of damselflies decreased toward the end of the season, regardless of the management practices of the surrounding areas. This indicates that their dynamics is more controlled by time stress or other similar mechanisms than that of dragonflies." (Author)] Address: Harabiš, F., Dept Ecol., Fac. Environmental Sciences, Czech University of Life Sciences Prague, Prague 6, Czech Republic

21089. Lee, D.-Y.; Lee, D.-S.; Park, Y.-S. (2017): Distribution patterns of Odonata communities in Korean streams. Proceedings of the Korean Society of Applied Entomology, 2017 Annual Meeting of the Korean Society of Applied Entomology and International Symposium, Emergence of Applied Insects: 68. (in English) ["Odonata are widely distributed in the global scale. Their distribution and abundance influenced by various environmental factors where they habit. Therefore, their distribution patterns reflect the differences of their habitat condition. In this study, we characterized the distribution patterns of Odonata in Korean streams by considering various environmental condition such as geographical, landscape, hydrological, and water quality factors. Ischnura asiatica, Cercion calamorum, and Onychogomphus ringens displayed the highest abundance and occurrence frequency in the dataset. Among various environmental factors altitude was the most contributing factors on the distribution of Odonata species, and the species richness was higher at low land than at high land." (Authors)] Address: Lee, D.-Y., Dept Biol., Kyung Hee Univ., Seoul 02447, Korea

21090. Miroglu, A.; Demirtas, S. (2017): Ecological niche modeling of Calopteryx splendens (Harris, 1782) (Insecta: Odonata) subspecies in Turkey. Süleyman Demirel University Journal of Natural and Applied Sciences 1(3): 935-941. (in Turkish, with English summary) ["Turkey is an important region in terms of biodiversity because of its geographical location, topographical structure and the presence of various climate types. The emergence of new species and subpopulations can be seen. In this study, we evaluated subspecies of Calopteryx splendens distributed in Turkey. 19 ecological parameters of the current known localities of these subspecies were analyzed. The pottential habitats and new locations for the subspecies populations were investigated. Current distribution maps of C. splendens subspecies have been made using MaxEnt ecological niche modeling methods. According to these results, it was found that the distribution areas of C. splendens subspecies, whose distributions according to faunistic data are known, almost overlapped with the distribution areas of ecological data." (Authors)] Address: Miroglu, A., Ordu Univ., Fatsa Fac. Marine Sciences, Ordu/Turkey. E-mail: alimiroglu@gmail.com

21091. Quante, U. (2017): Aufgespießt - Libellen als Opfer von durch Pflanzen verursachten Unfällen. Mitteilungen Nr. 3 der AG Libellen in Niedersachsen und Bremen: 18-21. (in German) [Anax imperator accidentally victim of rush (Juncus sp.) is documented (11.06.2016, LK Harburg, Niedersachsen, Germany). In addition, some examples of specimens trapped by Cyperaceae and Juncaceae from Gotland, Sweden (Sympetrum vulgatum, Lestes dryas) and from Internet-resources are documented.] Address: Quante, U., Fischteichenweg 29, 21255 Dohren, Germany. Email: quante@aknaturschutz.de

21092. Rajabi, H.; Ghoroubi, N.; Stamm, K.; Appel, E.; Gorb, S.N. (2017): Dragonfly wing nodus: A one-way hinge contributing to the asymmetric wing deformation. Acta Biomaterialia 60: 330-338. (in English) ["Dragonfly wings are highly specialized locomotor systems, which are formed by a combination of several structural components. The wing components, also known as structural elements, are responsible for the various aspects of the wing functionality. Considering the complex interactions between the wing components, modelling of the wings as a whole is only possible with inevitable huge oversimplifications. In order to overcome this difficulty, we have recently proposed a new approach to model individual components of complex wings comparatively. Here, we use this approach to study nodus, a structural element of dragonfly wings which has been less studied to date. Using a combination of several imaging techniques including scanning electron microscopy (SEM), wide-field fluorescence microscopy (WFM), confocal laser scanning microscopy (CLSM) and micro-computed tomography (micro-CT) scanning, we aim to characterize the spatial morphology and material composition of fore- and hindwing nodi of the dragonfly Brachythemis contaminata. The microscopy results show the presence of resilin in the nodi, which is expected to help the deformability of the wings. The computational results based on three-dimensional (3D) structural data suggest that the specific geometry of the nodus restrains its displacements when subjected to pressure on the ventral side. This effect, resulting from an interlocking mechanism, is expected to contribute to the dorso-ventral asymmetry of wing deformation and to provide a higher resistance to aerodynamic forces during the downstroke. Our results provide an important step towards better understanding of the structure–property-function relationship in dragonfly wings. Statement of Significance: In this study, we investigate the wing nodus, a specialized wing component in dragonflies. Using a combination of modern imaging techniques, we demonstrate the presence of resilin in the nodus, which is expected to facilitate the wing deformability in flight. The specific geometry of the nodus, however, seems to restrain its displacements when subjected to pressure on the ventral side. This effect, resulting from an interlocking mechanism, is suggested to contribute to dorso-ventral asymmetry of wing deformations and to provide a higher resistance to aerodynamic forces during the downstroke. Our results provide an important step towards better understanding of the structure–property-function relationship in dragonfly wings and might help to design more efficient wings for biomimetic micro-air vehicles." (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology and Biomechanics, Kiel University, Kiel, Germany. Email: hrajabi@zoologie.uni-kiel.de

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21093. Alves Pereira, A.M.; Brito, S.; Filho, J.A.; Martins Teixeira, A.A.; Teles, D.A.; Santana, A.O.; Ferreira Lima, V.; Almeida, W. (2018): Diet and helminth parasites of freshwater turtles Mesoclemmys tuberculata, Phrynops geoffroanus (Pleurodira: Chelidae) and Kinosternon scorpioides (Criptodyra: Kinosternidae) in a semiarid region, Northeast of Brazil. Acta Herpetologica 13(1): 21-32. (in English) ["In this study, the Kinosternon scorpioides, Mesoclemmys tuberculata

and Phrynops geoffroanus freshwater turtles collected in the Cariús River, State of Ceará, were analysed as to their diet composition and presence of helminths. Among the 63 examined turtles 55 (87.3%) were parasitized. We found three Nematoda species (Physaloptera retusa, Serpinema monospiculatus and Spiroxys figueiredoi) and one Trematoda species (Gorgoderina sp.). Phrynops geoffroanus had the highest indexes of prevalence (97.56%) and mean intensity of infection (33.5), followed by M. tuberculata (70% and 12.64, respectively) and K. scorpioides (50% and three, respectively). Host body size was positively related to helminths abundance in both male and female Chelidae species. A significant difference in helminths abundance between the sexes was found only in P. geoffroanus, where females had more parasites than males. Regarding diet, the main food items ingested by M. tuberculata were Odonata nymphs (Aeshnidae and Libellulidae), whilst P. geoffroanus feeds mainly on Diptera larvae (Chironomidae), Odonata nymph (Aeshnidae) and Notonectidae, and only seeds were found in the stomach contents of K. scorpioides. Here, we present the first record of S. monospiculatus parasitizing K. scorpioides, Gorgoderina sp. and P. retusa were reported for the first time in P. geoffroanus, and M. tuberculata represents a new host to P. retusa and S. figueiredoi." (Authors)] Address: Alves Pereira, A.M., Programa de Pós-graduação em Bioprospecção Molecular, Departamento de Química Biológica, Universidade Regional do Cariri – URCA, Rua Cel. Antônio Luiz 1161, Campus do Pimenta, 63105 –100 Crato, Ceará, Brazil. E-mail: marcosalvesp@outlook.com

21094. Belevich, O.; Yurchenko, Y.; Krivopalov, A.; Kryukov, V.; Glupov, V. (2018): Effects of Metarhizium robertsii on the bloodsucking mosquito Aedes flavescens and non-target predatory insects (Odonata). Journal of Applied Entomology 142(6): 632-635. (in English) ["The effects of different concentrations and methods of treatment with Metarhizium robertsii Bisch., Rehner & Humber conidia on the non-target aquatic dragonfly larvae Lestes sponsa Hansemann, Lestes dryas Kirby and Aeshna affinis Vander Linden and on the target bloodsucking mosquito larvae Aedes (O.) flavescens (Muller) were analysed. We found that dragonflies are significantly less susceptible than mosquitoes to the fungus. Larvae of L. sponsa larvae were more susceptible to wet conidia than dry conidia. However, the mortality of the air-breathing larvae of A. affinis was significantly higher after treatment with dry conidia relative to aqueous suspension. The results help to minimize the negative effects of entomopathogenic fungi on non-target predator insects under the control of mosquito larvae." (Authors)] Address: Yurchenko, Yu., Institute of Systematics and Ecology of Animals, Siberian Branch of Russian Academy of Science, Novosibirsk, Russia. Email: yurons@ngs.ru

21095. Bota-Sierra, C.A.; Sandoval-H., A.C.O.J.J.; Viganò, M. (2018): Seventeen new dragonfly records from Colombia and the confirmation of the synonymy of Philogenia monotis and P. tinalandia (Insecta: Odonata). International Journal of Odonatology 21(4): 115-127. (in English) ["During 2.5 months of intensive fieldwork in Colombia (Departments of Cauca, Nariño, and Putumayo, South America) from January to March 2017, we visited 13 localities and collected 291 specimens of 68 species of Odonata, including 17 new records for the country. We report range expansions for several species assessed as data deficient or under some degree of threat by the IUCN Red List. Furthermore, we confirmed that Philogenia tinalandia is a junior synonym of P. monotis, thus solving a longstanding enigma. We also report the rediscovery, after many decades, of Philogenia raphaella, P. sucra and Stenocora percornuta. The data we collected are an important contribution to the knowledge of the dragonfly diversity of the Colombian Andean region and its surroundings, including the nearby areas in Ecuador and Peru, countries with which the Depts visited share boundaries." (Authors)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistematica, Instituto de Ecologia, A.C. Xalapa, Mexico. Email: corneliobota@gmail.com

21096. Buis, M. (ed.) (2018): Liste Rouge des libellules menacées du Limousin - Rapport d'évaluation - Méthode, démarche et résultat. Conservatoire d'espaces naturels, Limousin, Nouvelle-Aquitaine: 92 pp. (in French) ["In 2005, the Societe Limousine d'Odonatologie initiated a red list of threatened odonates in Limousin. This list is an essential tool for a better consideration of odonates by the managers of natural areas. The list is over 10 years old and needs to be updated for several reasons. First of all, the population dynamics of certain species such as Lestes virens, Coenagrion scitulum ... have changed in recent years. A new evaluation of their Conservation Status therefore seemed necessary. Finally, the International Union for Conservation of Nature proposes a new method adapted to the regions, which should be implemented in order to strengthen the weight of the red list. The update of the Limousin Odonata red list will be the means to complete the Aquitaine red list, published by the Aquitaine Wildlife Observatory in 2016. It will provide a better understanding of the odonatological conservation issues in the different territories of the Nouvelle-Aquitaine region." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: not stated

21097. Hushtan, K.V. (2018): The diversity of amphibiotic insects (Insecta: Ephemeroptera, Plecoptera, Odonata) of Latorica river basins ecosystems. Research and development of the State-owned research and development Center 34: 69-74. (in Ukrainian, with English summary) ["The taxonomic and eco-morphological diversity of amphibiotic insects in the ecosystems of the Latoritsa River basin was studied. Îf all 52 species of amphibiotic insects have been identified (32 species of Ephemeroptera, 7 species of stoneflies, 13 species of dragonflies). The main of the number and biomass of the community in the studied localities of the Latoritsa River basin is the families Baetidae and Heptageniidae. The rarity components of this region are investigated. The 3 types of Odonata, 5 types of Ephemeroptera and 3 types of Plecoptera larvae for Latoritsa river basin are discovered. The ecomorphological structure of dragonflies is represented by the following classes: rheophilic drifting and rheophilic velox larvae with spoonlike labium. The largest species diversity of the Ephemeroptera was recorded in 4 types of eco-morphs: siphlonuroides (47% from species diversity), plane-plots (32%), larvae with "tusks" (12%) and "kryshkovoziabrovi" larvae (9%). Among the Plecoptera there are 3 dominant types: lithophilous cryptobionts (42%), phytophilic cryptobionts (31%) and cryptobionts of gaps (27%)." (Author) Calopteryx splendens, C. virgo, Platycnemis pennipes, Aeshna juncea, A. mixta, Lestes viridis, L. barbarus, L. sponsa, Orthetrum brunneum, Onychogomphus forcipatus, Cordulegaster bidentata, Libellula fulva] Address: Hushtan, Kateryna, State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine. Email: katrinantonyuk@gmail.com

21098. Jiang, B.; Mikolajewski, D.J. (2018): Shift in predation regime mediates diversification of foraging behaviour in a dragonfly genus. Ecological Entomology 43: 525-533. (in English) ["1. Behavioural adaptations to avoid and evade

predators are common. Many studies have investigated population divergence in response to changes in predation regime within species, but studies exploring interspecific patterns are scant. Studies on interspecific divergence can infer common outcomes from evolutionary processes and highlight the role of environmental constraints in shaping species traits. 2. Species of the dragonfly genus Leucorrhinia underwent well-studied shifts from habitats being dominated by predatory fish (fish lakes) to habitat being dominated by predatory invertebrates (dragonfly lakes). This change in top predators resulted in a set of adaptive trait modifications in response to the different hunting styles of both predator types: whereas predatory fish actively search and pursue prey, invertebrate predator follow a sit-and-wait strategy, not pursuing prey. 3. Here it is shown that the habitat shift-related change in selection regime on larval Leucorrhinia caused species in dragonfly lakes to evolve increased larval foraging and activity, and results suggest that they lost the ability to recognise predatory fish. 4. The results of the present study highlight the impact of predators on behavioural trait diversification with habitat-specific predation regimes selecting for distinct behavioural expression." (Authors)] Address: Jiang, B., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Str. 1–3, 14195 Berlin, Germany. E-mail: bin.jiang@fu-berlin.de

21099. Jiang, B. (2018): Predators promote trait diversification in prey. Ph.D. thesis, Dept of Biology, Chemistry and Pharmacy of Freie Universität Berlin: III, 132 pp. (in English) ["Predator-prey interactions have a major influence on species diversification. The performance and fitness of prey species are heavily dependent on their antipredator responses to specific predators. In nature, predators are distributed heterogeneously across different habitats. Because different predators vary in their predation strategies, a change in the top predators can dramatically alter preys' defensive traits. Larval Leucorrhinia ancestrally came from lakes dominate with predatory fish (fish lakes). However, they shifted their habitats from fish lakes into lakes with only large invertebrate predators (dragonfly lakes) several times. In this thesis, I examined a series of antipredator traits (burst-escape behavior related traits, behaviour, growth rate, ontogenetic pattern and morphological traits) in order to understand how different predation regimes drive prey trait diversification in European Leucorrhinia species. We found a clear diversification pattern in most antipredator traits. However, unique pattern of traits was also found in growth rate related physiological traits. Eventually, we got a full picture of antipredator traits in Leucorrhinia system. These research I have presented is critical for improving our understanding of adaptive trait plasticity and its widespread occurrence across species and community types. Moreover, the facts that the larval stage is restricted in its distribution and that the adults have a high dispersal ability make odonates as an important model bridging ecology and evolution. My results indicate that it might be possible to disentangle the forces behind natural selection (e.g. directional selection, stabilizing selection) by using Leucorrhinia species." (Author)] Address: Jiang, B., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Street 1–3, 14195 Berlin, Germany. E-mail: bin.jiang@fu-berlin.de

21100. Kaulfuss, U.; Lee, D.E.; Wartho, J.-A.; Bowie, E.; Lindqvist, J.K.; Conran, J.C.; Bannister, J.M.; Mildenhall, D.C.; Kennedy, E.M.; Gorman, A.R. (2018): Geology and palaeontology of the Hindon Maar Complex: A Miocene terrestrial fossil Lagerstätte in southern New Zealand. Palaeogeography, Palaeoclimatology, Palaeoecology 500(1): 52-68. (in English) ["Highlights: • Hindon Maar Complex is a new mid-Miocene Fossil-Lagerstätte in New Zealand. • Anoxia in maar lakes allowed exquisite preservation of plant and animal fossils. • The biota is from a lake and Nothofagus/podocarp/mixed broadleaf forest ecosystem. • Fossils record high diversity at humid, warm Southern Hemisphere mid-latitudes. Abstract: This paper highlights the geology, biodiversity and palaeoecology of the Hindon Maar Complex, the second Miocene Konservat-Lagerstätte to be described from New Zealand. The Lagerstätte comprises four partly eroded maar-diatreme volcanoes, with three craters filled by biogenic and highly fossiliferous lacustrine sediments. The exceptionally well-preserved and diverse biota from the site is derived from a mid-latitude Southern Hemisphere lake-forest palaeoecosystem, including many fossil taxa not previously reported from the Southern Hemisphere. The most common macrofossils are leaves of Nothofagus, but the flora also includes conifers, cycads, monocots (such as Ripogonum and palms), together with Lauraceae, Myrtaceae and Araliaceae leaves and flowers. The small maar lakes were surrounded by Nothofagus/podocarp/mixed broadleaf forest growing under humid, warm temperate to subtropical conditions. The fossil fauna comprises insects in the orders Odonata, Hemiptera, Thysanoptera, Coleoptera, Diptera, Hymenoptera and Trichoptera, and the fish assemblage includes a non-migratory species of the Southern Hemisphere Galaxias (Galaxiidae) and a significant new record of the freshwater eel Anguilla (Anguillidae). The fossil assemblage also includes the first pre-Quaternary bird feathers from New Zealand and abundant coprolites derived from fish and volant birds, presumably waterfowl. Palynomorph analysis and a 40Ar/39Ar age of 14.6 Ma obtained from basanite associated with the maar complex indicate that the Hindon Maar Complex is of mid-Miocene age (Langhian; New Zealand local stage: Lillburnian). It thus provides a new and unique perspective on Neogene terrestrial biodiversity and biogeography in the Australasian region, around the end of the mid-Miocene thermal optimum and prior to late Miocene–Pleistocene climate cooling episodes when many warm-temperate and subtropical forest components became extinct in New Zealand." (Authors)] Address: Kaulfuss, U., Dept of Geology, Univ. of Otago, PO Box 56, Dunedin 9054, New Zealand. Email: uwe.kaulfuss@otago.ac.nz

21101. Kim, J.-S.; Lee, S.-D.; Kim, D.-P. (2018): The relationship between the dragonfly diversity and the environmental factors in the Juam wetland. Korean Journal of Environment and Ecology 32(1): 66-76. (in Korean, with English) ["This study surveyed the species and population of dragonflies in 20 study sites in the Junam wetland in May and July 2015 to investigate the relationship between the dragonflies and the inhabited environment. We measured the environmental factors such as the area of emergent plants, the area of floating and floating-leaved plants, the area of water surface, the area of water plants, and the nearby land-use type and analyzed the relationship to the dragonfly species, population, and diversity index. We found 757 dragonflies belonging to 21 species of 6 families. The area of floating and floating-leaved plants and the area of water surface affected the species diversity. The area of floating and floating-leaved plants and the area of surface water, in particular, showed the positive correlation with the species richness and the dominance value, respectively. The area of water surface showed the negative correlations with Shannon's diversity index and evenness. Among the type of surrounding land-uses, the dry fields and orchards showed significantly lower average species richness than wetlands. Among the species, Cercion calamorum and Crocothemis

servilia were positively correlated with floating and floating-leaved plants. Cercion v-nigrum and Epophthalmia elegans were positively correlated with the area of water surface, and Ischnura asiatica and Ceriagrion nipponicum were negatively correlated. The recent uncontrolled proliferation of lotus colony in the Junam wetland is likely to affect greatly the species composition of dragonflies which have a close relationship with plant species." (Authors)] Address: Lee, S.-D., Dept. of Landscape Architecture, Gyeongnam National Univ. of Science & Technology, 52725, Korea. E-mail: ecoplan@gntech.ac.kr

21102. Martínez Saura, C.M.; López Barquero, P.; Henarejos Gonzálvez, J.M.; Ibarra Marinas, D.; Sánchez Balibrea, J.; Fernández Sempere, M.; Jiménez Montero, J.; López Espinosa, F.J.; Martínez López, P.; Murcia Abellán, J.L.; Ramos, J.; Requena Aznar, C.; Terrer, P.; López Cañizares, C.; Arnaldos Giner, I.; Ballesteros, G.A. (2018): Primeros datos y expansión de Trithemis kirbyi Selys, 1891 (Odonata: Libellulidae) en la provincia de Murcia (SE España). Boletín Rola nº 12, segundo semestre 2018: 29-36. (in Spanish, with English summary) ["The colonization of the territory of Murcia by T. kirbyi between the years 2012 and 2017 is reported." (Authors)] Address: Martínez Saura, Carmen M., ANSE (Asociación de Naturalistas del Sureste), Plaza Pintor José María Párraga, 11, bajo, Spain. Email: c.martinez@asociacionanse.org

21103. Martínez-Lendech, N.; Golab, M.J.; Osorio-Beristain, M.; Contreras-Garduño, J. (2018): Sexual signals reveal males' oxidative stress defenses: testing this hypothesis in an invertebrate. Functional Ecology 32(4): 937-947. (in English) ["1.The hypothesis that sexual traits reveal the oxidative stress resistance of their bearers has been widely tested in vertebrates but remains unexplored in invertebrates. Here, Hetaerina americana was used to test whether oxidative stress defenses are advertised by male wing spot size and color (a male sexual trait). To this end we asked (1) whether oxidative stress reduced survival, (2) whether wing spot size revealed males' antioxidant defenses, and (3) how wing spot size and color were affected by oxidative stress. 2.We elevated oxidative stress by injecting adult males with paraquat (a compound that favors the production of free radicals) and then examined how this affected male survival and wing spot size. We then related the expression of wing spot size to indicators of oxidative stress – H2O2 and total Antioxidant Capacity (TAC), Super Oxide Dismutase (SOD) and Catalase (CAT) – in adult males (whose wing spot is fixed) injected with Paraquat (PQ). In teneral males, whose wing-spots are still forming, we compared wing-spot size, color (red and yellow chroma) and brightness in individuals injected with paraquat, or water as a control. 3.Oxidative stress reduced the survival of adult and teneral males. While the H2O2 and TAC markers of antioxidant defenses were positively correlated with wing spot size, there was no correlation with CAT and a negative correlation with SOD. In teneral males, PQ increased the yellow chroma and brightness of wing spots, but did not affect spot size or red chroma. 4.Our results highlight the importance of measuring different markers as indicators of male oxidative stress defenses, and that the sexual signals of invertebrates may reveal the oxidative stress status of their bearers." (Authors)] Address: Martínez-Lendech, Norma, Centro de Investigación en Biodiversidad y Conservación, Universidad Autónoma del Estado de Morelos, Cuernavaca, Mexico

21104. Nurminen, L.; Hellén, N.; Olin, M.; Tiainen, J.; Vinni, M.; Grönroos, M.; Estlander, S.; Horppila, J.; Rask, M. Lehtonen, H. (2018): Fishing-induced changes in predation pressure by perch (Perca fluviatilis) regulate littoral benthic macroinvertebrate biomass, density, and community structure. Aquatic Ecology 52: 1-16. (in English) ["We aimed to study whether the varying changes in predation pressure by perch (Perca fluviatilis) reflect the biomass, density, and community structure of the benthic macroinvertebrates. Prey preference is size-dependent, and overall predation pressure is density dependent, and thus the size structure of the P. fluviatilis population should affect the structure of the macroinvertebrate community, and the population density of P. fluviatilis should reflect the overall density of benthic macroinvertebrates. We sampled the littoral benthic community in a boreal lake that had been divided into two parts that were subjected to two different fishing procedures during 2007–2012 period and analyzed the macroinvertebrate diet of fish. The benthic macroinvertebrate community reflected the predation pressure. Total macroinvertebrate biomass increased during the study period in the lake division with a non-size-selective fishing procedure (NSF), i.e., all invertivorous perch size-classes targeted, but decreased in the section with negatively size-selective fishing procedure (SSF), i.e., large invertivorous individuals = 16 cm were not targeted. This difference was a result of the increase in large-sized species, such as Odonata, for the NSF procedure and decrease in the SSF procedure. In contrast to total biomass, total macroinvertebrate density did not show a response to predator size structure but rather total macroinvertebrate density decreased with increasing fish density. The study demonstrates the effect of predation pressure of P. fluviatilis on benthic communities, thus highlighting the keystone predator role of the species in boreal lakes and gives more insight on the multiple effects of fish predation on littoral benthic communities." (Authors)] Address: Nurminen, L., Dept of Environmental Sciences, Univ. of Helsinki, Helsinki, Finland. E-mail: leena.nurminen@helsinki.fi

21105. Olsen, K.M. (2018): Søk etter storblålibelle Orthetrum cancellatum i Grenland, Telemark i 2018. BioFokus-notat 2018-50. ISBN 978-82-8209-686-7. Stiftelsen BioFokus. Oslo: 18 pp. (in Norwegian) [Google Translate: Summary / conclusion. (1) Gårdemma nature reserve, where O. cancellatum was first discovered in Telemark, together with the nearby Hytterdøbukta, most likely constitutes a habitat with a stable population of the species. The stock in both bays seemed to be good at the time of the survey in 2018. (2) Other parts of Vollsfjorden / Frierfjorden seem to be less suitable for O. cancellatum, possibly with the exception of the areas adjacent to Røraelva's outlet on the north side of Vollfjorden (but the species was not registered here on a slightly windy day in 2018). (3) Other investigated localities in both brackish water and fresh water seem to be unsuitable as breeding sites for the species, possibly with the exception of the groundwater areas in the innermost part of Fjærekilen. There is great uncertainty as to whether the two inland localities where the species has been proven may be relevant as breeding sites (only one of these was assessed in the field in 2018, as the other was not published at that time).] Address: BioFokus: Gaustadalléen 21, 0349 Oslo, Norway. Email: post@biofokus.no

21106. Pereira, J.M.; Otero, J.C. (2018): Nuevas citas de Coenagrion mercuriale (Charpentier, 1840) (Odonata, Coenagrionidae) en la Comunidad de Cantabria (norte de España) - New records of Coenagrion mercuriale (Charpentier, 1840) (Odonata, Coenagrionidae) in the Community of Cantabria (north of Spain). Boletín de la Asociación española de Entomología 42(1/2): 147-152. (in Spanish, with English caption)

["The selection of these localities is intended, on the one hand, to reach the greatest number of areas where the species is present and, on the other hand, to cover as representative a sample as possible of all the habitats favourable to the species. Eight localities have been selected, distributed among the Sites of Community Importance (SCI): Río Miera, Montaña Oriental, Dunas del Puntal and Estuario. Dunas del Puntal and Estuario del Miera, or in areas close to them. Sampling began in April and ended in August to cover most of their flight cycle. The methodology used is that proposed by TORRALBA-BURRIAL et al. (2012), consisting of 100 m longitudinal routes along the banks of the stream, pond, lagoon or river. The number of adults, pairs and clutches observed at a distance of up to 5 m along the sides of the route is assessed (15 min). (15 min). The visits were carried out on favourable days (sunny, temperature > 20 ºC and between 11:00 h and 16:00 h) with a minimum fortnightly frequency, as weekly surveys can be complicated due to the long flight period of the species (TORRALBA-BURRIAL et al., 2012), which could generate errors in the census when counting the same individuals in different surveys. In addition, the average longevity of adults is usually 6-7 days (CORDERO-RIVERA & STOKS, 2008), which may also contribute to counting the same individuals. A total of 186 specimens of C. mercuriale were found in six of the eight localities sampled, representing six new populations for the Community of Cantabria. The localities with presence of the species were the following: (a) La Regata (huso 30T, 441510E-4803365N, Ceceñas, Medio Cudeyo, 39 m): 25.IV.2016, 3 ej.; 09.V.2016, 14 ej.; 25.V.2016, 7 ej.; 07.VI.2016, 8 ej.; 22.VI.2016, 8 ej.; 06.VII.2016, 3 ej. (b) Fuente del Francés (huso 30T, 442971E-4804658N, Entrambasaguas, 38 m): 25.IV.2016, 7 ej.; 09.V.2016, 14 ej.; 25.V.2016, 12 ej.; 07.VI.2016, 10 ej.; 22.VI.2016, 1 ej. (c) Molinos río Pontones (huso 30T, 443947E-4806607N, Ribamontán al Monte, 18 m): 25.IV.2016, 1 ej. (d) Arroyo Bucarrón (huso 30T, 444209E-4802042N, Entrambasaguas, 52 m): 28.IV.2016, 9 ej.; 10.V.2016, 14 ej.; 24.V.2016, 17 ej.; 07.VI.2016, 20 ej.; 21.VI.2016, 11 ej.; 04.VII.2016, 4 ej.; 21.VII.2016, 2 ej. (e) Palacio de Elsedo (huso 30T, 435442E-4800812N, Liérganes, 90 m): 11.V.2016, 5 ej.; 08.VI.2016, 3 ej.; 22.VI.2016, 2 ej.; 04.VII.2016, 3 ej. (f) Bucarrero (huso 30T, 438879E-4800384N, Liérganes, 84 m): 11.V.2016, 4 ej.; 25.V.2016, 3 ej.; 08.VI.2016, 3 ej.

21107. La Regata Park is made up of a shallow spring with a shallow depth and flow, with lentic waters and flowing, with lentic waters that tend to puddle and with a large with extensive emergent vegetation on the sides. The area in which the The area where the population was observed is practically free of arboreal vegetation, although with a high density of emergent macrophytes." (Authors/Deepl)] Address: Otero, J.C., Depto de Zoología y Antropología Física. Fac. de Biología. Universidad de Santiago de Compostela (USC), A Coruña (España). Email: josecarlos.otero@usc.es

21108. Sribal, U.; Paweenpermsuk, Y.; Thitiarchagul, T.; Atdhabhan, S.; Saengamron, C.; Thepphibalsathit, N.; Chaychum, S.; Behrstock, R.A.; Jadoonkittinan, P.; Ruangrong, R.; Ruangrong, J.; Thammasangwan, N.; Tersing, S.; Changong, S.; Makbun, N. (2018): New national records of Odonata from Thailand based mostly on photographs (Odonata: Argiolestidae, Philosinidae, Aeshnidae, Libellulidae). Agrion 22(1): 30-36. (in English) [Seven species of Odonata are recorded from Thailand for the first time from records mostly based on credible and authoritative photographs: Podolestes orientalis, Rhinagrion hainanense, Heliaeschna simplicia, Atratothemis reelsi, Nannophyopsis clara, Risiophlebia guentheri, and Zyxomma breviventre. Biology and habitat of some species are briefly noted." (Authors)] Address: Makbun, N., 2211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

21109. Tüzün, N.; Op de Beeck, L.; Oliarinony, R.; Van Dievel, M.; Stoks, R. (2018): Warming under seminatural outdoor conditions in the larval stage negatively affects insect flight performance. Biology Letters 14: 20180121. http://dx.doi.org/10.1098/rsbl.2018.0121: 5 pp. (in English) ["Laboratory studies indicate global warming may cause changes in locomotor performance directly relevant for fitness and dispersal. Yet, this remains to be tested under seminatural settings, and the connection with warming-induced alterations in the underlying traits has been rarely studied. In an outdoor mesocosm experiment with the damselfly Ischnura elegans, 4°C warming in the larval stage decreased the flight muscle mass, which correlated with a lower flight endurance. Warming did not affect body mass, size or wing morphology. This illustrates how carry-over effects of warming under seminatural conditions during early development bridge metamorphosis and negatively impact locomotor performance through changes in a key flight-related trait." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

21110. Wang, S.C.; Liu, X.; Liu, Y.; Wang, H. (2018): Contrasting patterns of macroinvertebrates inshore vs. offshore in a plateau eutrophic lake: Implications for lake management. Limnologica 70: 10-19. (in English) ["Worldwide there has been deterioration of lakeshore habitat and increasing eutrophication. These stresses have impacted littoral macroinvertebrate communities. However, bioassessment and rehabilitation have been largely carried out offshore, and the inshore macroinvertebrates have received less attention especially in shallow plateau lakes. In this study, we compared inshore and offshore macroinvertebrate communities in a shallow plateau lake, Lake Dianchi, China. The environmental parameters determining the distribution of macroinvertebrates were analyzed with partial redundancy analysis. Our results showed that macroinvertebrate communities differed significantly between inshore and offshore. Taxonomic richness was much higher inshore than offshore, due to higher habitat heterogeneity. By contrast, both density and biomass inshore were significantly lower than those of offshore. Generally, vegetation and substrate type were the key environmental parameters shaping macroinvertebrate communities. Eutrophication exerted great effect on offshore communities, while its impacts on inshore communities varied spatially. Shoreline degradation and seasonal eutrophication effects resulted in the limited density and biomass of inshore communities. Our results emphasized the significance of inshore habitats for macroinvertebrates in Lake Dianchi, and provided important implications for bioassessment and ecological rehabilitation in shallow lakes." (Authors) Megalestes sp., Megapodagrionidae] Address: Wang, Shuran Cindy, State Key Lab. of Freshwater Ecology & Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, 430072, China. Email: shuran.w@gmail.com

21111. Zhang, H.-m.; Hämäläinen, M.; Wang, W.-z. (2018): Indocypha cyanicauda sp. nov. from southern Yunnan, China (Odonata: Chlorocyphidae). International Journal of Odonatology 21(1): 1-10. (in English) ["Indocypha cyanicauda Zhang & Hämäläinen, spec. nov. (holotype male from Xishuangbanna, Yunnan, China; deposited at the Kunming Natural History Museum of Zoology) is described and illustrated

from both sexes and compared with its congener I. vittata. Brief notes on the ecology and behaviour of the new species are provided." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, Netherlands. E-mail: libellago@gmail.com

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21112. Patten, M.A.; Hjalmarson, E.A.; Smith-Patten, B.D.; Bried, J.T. (2019): Breeding thresholds in opportunistic Odonata records. Ecological Indicators 106, November 2019, 105460: 6 pp. (in English) ["Highlights: • Breeding status can be deduced from opportunistic data, including from citizen science efforts. • Predictors of breeding vary across taxonomic groups—one size does not fit all. • Female counts, as opposed to unsexed adults only, greatly reduces threshold estimates. • Recording behavior also tends to reduces thresholds. Abstract: Numerous interacting abiotic and biotic factors shape an organism's spatial distribution, and these factors vary spatially and temporally, such that habitat used for breeding may differ from habitat used at other times of the life cycle. We address this complex issue in the context of citizen science and opportunistic species occurrence records, a valuable data source for biogeography and conservation. We focus on the insect order Odonata, the dragonflies and damselflies, which as adults are popular in citizen science programs. Our goal was to devise a means to estimate with high confidence whether a site supports a breeding population if only opportunistic data are available. Our approach fitted logistic curves from occupancy models of observations of tenerals (newly emerged adults that cannot yet disperse from a natal site) against counts of all adults, adult females only, and incidence of breeding behaviors (ovipositing, mate guarding, tandem pairs). Models included median body size and abundance class as covariates of detectability. We subjected logistic curves to a Bayesian two-segment piecewise regression to obtain best estimates of the threshold (with associated credible intervals as an estimate of uncertainty) to assess if a given predictor (e.g., adult count) or combination of predictors was associated with breeding occurrence. We found that no single threshold fit all odonates: thresholds of varying precision were identified for the suborders (dragonflies, damselflies) and for families and select genera in each suborder. Counts of females greatly reduced the required threshold, whereas breeding behavior data reduced the threshold in some cases. Our study shows it is possible to identify breeding occurrences in opportunistic adult Odonata records. It also highlights how citizen scientists should record not only a sound species list with rudimentary counts of adults but also note the sex and breeding behavior. The identification of breeding occurrences in extensive opportunistic data is pertinent to understanding species' distributions and habitat requirements along with their ecological sensitivity and value as bioindicators." (Authors)] Address: Smith-Patten, Brenda, Sam Noble Oklahoma Mus. Natural History, Univ. Oklahoma, Norman, Oklahoma 73072, USA. E-mail: argia@ou.edu

21113. Pranoto, M.D.P.; Mardiono, D.; Widiyani, T.; Pertiwi, R.A.P.; Az Zhara, F.; Izzati, N. (2019): Diversity of dragonflies (Ordo: Odonata) on the natural reserve areas of Mt. Sigogor and Mt. Picis, Ponorogo District, Indonesia. Bonorowo Wetlands 9(1): 27-31. (in English) ["The Mount Sigogor and Picis Natural Reserves are the conservation areas in Ponorogo, East Java. Mount Sigogor and Picis nature reserves have an ecosystem of tropical rain forests that are naturally protected, providing the reserve with a high potential for biodiversity. The preserved ecosystem conditions are a good habitat for the dragonfly since some dragonfly species require a clean habitat and are sensitive to pollutants. The study was conducted from January to February 2019. The research site was carried out at 7 points, covering 5 points in the reserve and 2 points around Mount Sigogor Nature Reserve. Data retrieval was done using the explorative method. Qualitative and quantitative descriptions were used to analyze the results of dragonflies' biodiversity. The results have found 18 species of dragonflies with details of 6 species as Zygoptera and 12 species of common Anisoptera. There are 5 species of endemic dragonflies from Java Island, i.e., Drepanosticta sundana, Euphaea variegata, Heliogomphus drescheri, Heliocypha fenestrata, and Vestalis luctuosa. From the Shannon-Wiener discounting index, the value of index diversity on the entire research site is 1.466. The highest diversity value lies in the river's location leading to Toyo Marto's waterfall with a 2.02 diversity-index value. Obtained results that the Euphaea variegata has the most abundant with a 40.23% value." (Authors)] Address: Dept of Biol., Fac. Mathematics & Natural Scien., Universitas Sebelas Maret. Ir. Sutami 36 A, Surakarta 57126, Central Java, Indonesia. Email: malindaduta98@gmail.com

21114. Sage, W.; Blaschke, R. (2019): Die Libellen (Odonata) im Inn-Salzach-Gebiet, Südostbayern. Mitteilungen der zoologischen Gesellschaft Braunau 13(1): 1-43. (in German) [59 localities were studied. The distribution of 54 species is mapped.] Address: Sage, W., Seiberdorfer Str. 88a, 84375 Kirchdorf am Inn, Germany. E-mail: WSLep@gmx.de

21115. Staentzel, C.; Combroux, I.; Barillier, A.; Grac, C.; Chanez, E.; Beisel, J.-N. (2019): Effects of a river restoration project along the Old Rhine River (France-Germany): Response of macroinvertebrate communities. Ecological Engineering 127: 114-124. (in English) ["Highlights: •New mesohabitats were characterized by low flow velocity and fine substrates. •The gain observed on the whole study site favoured burrowing taxa. •Inter-annual analysis showed a decrease in invasive populations, across all sections. •The sustainability of ecological effects is highly dependent of groynes maintenance. The rise of restoration projects on large rivers is a response to the increasing human-induced pressures on these ecosystems. Despite this, there is a relative lack of data documenting restoration success using macroinvertebrate communities in such environments, with those existing frequently producing contrasting results. Here, we examined post-restoration responses of macroinvertebrates following a unique experimental restoration approach based on controlled bank erosion and artificial groyne implementation, initiated in 2013 on the Old Rhine River (France-Germany). We investigated how macroinvertebrate communities have responded to restoration-induced variations in three main abiotic parameters, i.e. water depth, flow velocity and substrate type, by comparing the restored section with unrestored ones. The Eco-hydro-morphological index (EHMID), a modified version of a hydro-morphological diversity index, showed a gain in mesohabitat heterogeneity along the whole site. Newly created mesohabitats with low flow velocity and finer substrate were dissimilar to those along the rest of the Old Rhine channel, favouring burrowing taxa such as Odonata. The presence of such insect larvae was related to the post-restoration emergence of typical alluvial terrestrial-aquatic border connectivity, and the rise in macrophytes over time. On the whole site, changes in composition or in functional profile diversity were highly related to the high degree of mesohabitat heterogeneity from the restored section, which would persist as long as groynes remain. The main inter-annual effect concerned the decrease in invasive

taxa abundance that also varied according to any changes in fluvial forms. Our findings confirmed that macroinvertebrate responses are highly influenced by hydrological events and are dependent on the study-scale monitoring, clearly putting forward fine-scale hydromorphological gradients. Biological results from this restoration project should approach those obtained in smaller rivers restored using deflectors, suggesting a potential application of the hydraulic law of similarities. However, the accuracy of biological prediction using said application is limited by the distance from source populations, biological invasions and internal river dynamics.... Among new taxa observed in the restored section, we observed Calopteryx splendens, G. vulgatissimus, Onychogomphus sp., Platycnemis sp., and Pyrrhosoma nymphula. However, only a weak correlation was observed between richness in Odonata (R^2=0.22, p = 0.005) and the first NMDS axis, though just a few individuals (n < 10) were recorded during campains apart from 2017 where 73 individuals were found in the restored section compared to UP (n=30) and DOWN (n=31) sections." (Authors)] Address: Staentzel, Cybill, Univ. de Strasbourg, UMR 7362 CNRS LIVE, 3, rue de l'Argonne, 67000 Strasbourg, France. E-mail: cybill.staentzel@live-cnrs.unistra.fr

2020

21116. Cranston, J. (2020): Drivers, consequences and perceptions of newly arriving range-shifters in the United Kingdom. PhD thesis, Dept Biological Sciences: 216 pp. (in English) ["Species distributions are rapidly altering in the 21st century. Climate change and other anthropogenic effects threaten historic ranges but also open up new regions for expansion. Distributional changes will create novel biotic interactions that may significantly affect ecosystems, and humanity, both positively and negatively. Range-shifters create conservation conundrums, which may require us to balance the conservation value of newly arriving species against their impacts on existing biodiversity. To tackle these conundrums we will have to understand why and how species are moving, be able to make predictions of what potential effects may be felt in the new range and recognise how species are perceived when they arrive there. APPROACHES: I explore three aspects of species redistribution: processes, consequences, and perceptions. To better understand the redistribution process, I investigate the importance of climate, habitat, and proximity to source populations in predicting 14 range-shifting birds' distributions in Britain. I explore consequences by estimating effects of a range-shifting damselfly on UK Odonata with dynamic multispecies occupancy (DMSO) models. Finally, I explore perceptions by surveying UK wildlife recorders' attitudes towards range-shifting species and their management. RESULTS: I found that climate did not predict most analysed range-shifters' British distributions effectively. Despite being comparatively better, neither habitat nor distance from European breeding sites were good absolute predictors. Counter-intuitively, our DMSO model predicted that 15/17 resident dragonflies were more likely to persist at sites where the range-shifting damselfly established. Survey responses revealed that recorders opposed efforts to either control or support range-shifters, instead favouring non-intervention. IMPLICATIONS: The poor predictive power of climate suggests that we should explicitly study the full potential suite of range-shift processes, including biotic interactions and constraints on species movement. The absence of a negative association between the range-shifting damselfly and most Odonata species should be welcomed, but cautiously as other factors (e.g. habitat) may confound the range-shifters' effect. Recorders' averseness to interventions suggests that ecological research focused on the feasibility of both assisted colonisation and range-shifter threat should also seek to understand social contexts for successful conservation. Integrating these findings, I argue that we should use rapidly growing ecological datasets to not just detect but to test and refine theories of range-shift. Future model refinement alongside fuller understanding of stakeholder perspectives will help enable equitable – and ecologically beneficial – range-shift management." (Author)] Address: Cranston, J., Centre for Ecology & Conservation, Univ. of Exeter, Penryn Campus, Penryn, UK. https://ore.exeter.ac.uk/repository/bitstream/handle/10871/126808/CranstonJ.pdf?sequence=2&isAllowed=y

21117. de Pennart, A.; Matthews, P.G.D. (2020): The bimodal gas exchange strategies of dragonfly nymphs across development. Journal of Insect Physiology 120, January 2020, 103982: (in English) ["Highlights: • Aeshnid and libellulid dragonfly nymphs can breathe both water and air as late final instars. • They develop functional mesothoracic spiracles preceding metamorphosis. • Gas exchange is partitioned between air and water simultaneously when the nymph is half submerged. • Aeshnid nymphs of all instars use their rectal gill to breathe air in response to aquatic hypoxia. Abstract: Dragonfly nymphs are aquatic and breathe water using a rectal gill. However, it has long been known that the nymphs of many species appear to possess the ability to breathe air, either during their final instar when they leave the water prior to metamorphosis, or during periods of aquatic hypoxia. The aerial gas exchange associated with these activities has not been quantified. This study used flow-through respirometry to measure the rate of aerial CO2 release (VCO2) of dragonfly nymphs as a proxy for their aerial gas exchange, both across development and in response to progressive aquatic hypoxia. It examined a total of four species from two families (Libellulidae, Aeshnidae). In both families, the late-final instar nymphs developed functional mesothoracic spiracles, allowing them to breathe air by positioning their head and thorax above the water's surface. While breathing air in this position, the nymphs could also ventilate their submerged rectal gill. Thus, during bimodal gas exchange in normoxic water, it was calculated that aeshnid nymphs expelled 39 % of their respiratory CO_2 into the air through their spiracles, while libellulid nymphs expelled 56 % into the air. Decreasing the aquatic PO_2 to 2.5 kPa and then below 1 kPa increased the proportion of respiratory CO_2 expelled into the air from 69 % to ~100 %, respectively. Thus, bimodally breathing late-final nymphs can vary how they partition gas exchange between their spiracles and their gill depending on aquatic PO_2. Aeshnid nymphs of all developmental stages were also found to use their rectal gill as an air-breathing organ; pre-final nymphs performing 'surface skimming' while late final nymphs aspirated air bubbles directly into their gill's branchial basket. Mass-specific rates of aerial V CO_2 also increased as the nymphs approached metamorphosis. These findings indicate that aeshnid nymphs are capable of accessing aerial O_2 across development using their rectal gill as an air breathing organ, while the aquatic nymphs of both aeshnid and libellulid dragonflies undergo a progressive shift towards using the atmosphere for respiration as they approach metamorphosis." (Authors)] Address: Matthews, P.G.D., Dept Zool., Univ. British Columbia, Vancouver, BC V6T 1Z4, Canada. Email: pmatthews@zoology.ubc.ca

21118. Góral, N. (2020): Odonata in an human-engineered world: Potential and threats. In: H.A. KRETEK (red). [Implementation of the idea of the European Green Deal on the

basis of the social market economy as a determinant of management in the implementation of the assumptions of sustainable development]. Pañstwowa Wy¿sza Szkola Zawodowa w Raciborzu, Racibórz: 151-160. (in English, with Polish summary) ["The article summarizes the role and status of Odonata in the world of growing anthropopressure. Human activity contributes to degradation of habitats, posing a threat for some Odonata species. Some artificial elements in environment and anthropogenic water reservoirs might act like ecological traps. Natural water bodies often vanish or periodically dry out due to climate change. Many restoration methods are designed to bring back the environment to its natural state. On the other hands, artificial and astatic water bodies may create refugees for pioneer species occurring on highly-disturbed sites. Some forms of human activity (like traditional fish farming) may be good for maintenance of mosaic of diverse microhabitats supporting species with different ecological niches. New restoration methods should therefore rely on thorough examination of ecological requirements of a target species." (Authors)] Address: Góral, Nikola, Uniwersytet Marii Curie-Sklodowskiej w Lublinie, Poland. E-mail: goral.nikola@gmail.com

21119. Kuznetsova, V.G.; Golub, N.V. (2020): A checklist of chromosome numbers and a review of karyotype variation in Odonata of the world. CompCytogen 14(4): 501-540. (in English) ["The ancient insect order Odonata is divided into three suborders: Anisoptera and Zygoptera with approximately 3000 species worldwide each, and Anisozygoptera with only four extant species in the relict family Epiophlebiidae. An updated list of Odonata species studied regarding chromosome number, sex chromosome mechanism and the occurrence of m-chromosomes (= microchromosomes) is given. Karyotypes of 607 species (198 genera, 23 families), covering approximately 10% of described species, are reported: 423 species (125 genera, 8 families) of the Anisoptera, 184 species (72 genera, 14 families) of the Zygoptera, and one species of the Anisozygoptera. Among the Odonata, sex determination mechanisms in males can be of X(0), XY and X1X2Y types, and diploid chromosome numbers can vary from 6 to 41, with a clear mode at 2n = 25(60%) and two more local modes at 2n = 27(21%) and 2n = 23(13%). The karyotype 2n = 25(24A + X) is found in each of the three suborders and is the most typical (modal) in many families, including the best-covered Libellulidae, Corduliidae (Anisoptera), Lestidae, Calopterygidae, and Platycnemididae (Zygoptera). This chromosome set is considered ancestral for the Odonata in general. Chromosome rearrangements, among which fusions and fissions most likely predominated, led to independent origins of similar karyotypes within different phylogenetic lineages of the order. The karyotype 2n = 27(26A + X) prevails in Aeshnidae and Coenagrionidae, whereas the karyotype 2n = 23(22A + X) is modal in Gomphidae and Chlorocyphidae, in both pairs of families ..." (Authors)] Address: Kuznetsova, Valentina, Dept of Karyosystematics, Zool. Inst., Russian Acad. Sci., Universitetskaya emb. 1, St. Petersburg 199034, Russia. E-mail: valentina_kuznetsova@yahoo.com

21120. Nel, A.; Poschmann, M.; Wedmann, S. (2020): New dragonflies and damselflies (Odonata) from the late Oligocene of Enspel (Rhineland-Palatinate, SW Germany). Palaeontologia Electronica, 23(3): a59. https://doi.org/10.-26879/1126

21121. palaeo-electronica.org/content/2020/3250-odonata-from-enspel: 24 pp. (in English) ["We describe 10 fossils of dragonfly wings and one damselfly from bituminous pelites of the late Oligocene crater lake of Enspel/Westerwald. These represent two species of Aeshnidae, one species of Gomphidae, one possible stem Libellulidae, and one species of stem Sieblosiidae. The presence of one further undetermined species of crown Libellulidae can be inferred from a well-preserved naiad. Together with an earlier described wing of Macromiidae and a naiad figured herein and possibly attributable to the family Lestidae, the Enspel biota at least comprised eight different morphotypes of Odonata. We propose three new species, Epiaeschna wisseri sp. nov. (Aeshnidae), Ictinogomphus engelorum sp. nov. (Gomphidae), and Oligolestes stoeffelensis sp. nov. (Sieblosiidae), based on wing venation. The lateral position of the body and the rotated head of the holotype of Oligolestes stoeffelensis sp. nov. confirm that the Sieblosiidae had zygopteran hammer-shaped heads. This quite diverse odonate fauna is typical of Oligocene European paleolakes and suggests a water oxygenation suitable for the development of the aquatic naiads that lasted for longer periods and niche partitioning among the adult animals in a well-structured palaeo-ecosystem." (Authors)] Address: Wedmann, Sonja, Forschungsstation Grube Messel, Forschungsinstitut Senckenberg, Markstr. 35, 64409 Messel, Germany. E-mail: Sonja.Wedmann@senckenberg.de

21122. O'Malley, Z.G.; Compson, Z.G.; Orlofske, J.M.; Baird, D.J.; Curry, R.A.; Monk, W.A. (2020): Riparian and in-channel habitat properties linked to dragonfly emergence. Scientific Reports 10:17665: 12 pp. (in English) ["In freshwater ecosystems, habitat alteration contributes directly to biodiversity loss. Dragonflies are sentinel species that are key invertebrate predators in both aquatic (as larvae) and terrestrial ecosystems (as adults). Understanding the habitat factors affecting dragonfly emergence can inform management practices to conserve habitats supporting these species and the functions they perform. Transitioning from larvae to adults, dragonflies leave behind larval exoskeletons (exuviae), which reveal information about the emergent population without the need for sacrificing living organisms. Capitalizing on Atlantic Canada's largest freshwater wetland, the Grand Lake Meadows (GLM) and the associated Saint John/Wolastoq River (SJWR), we studied the spatial (i.e., across the mainstem, tributary, and wetland sites) and temporal (across 3 years) variation in assemblages of emergent dragonflies (Anisoptera) and assessed the relative contribution of aquatic and terrestrial factors structuring these assemblages. The GLM complex, including the lotic SJWR and its tributaries and associated lentic wetlands, provided a range of riparian and aquatic habitat variability ideal for studying dragonfly emergence patterns across a relatively homogenous climatic region. Emergent dragonfly responses were associated with spatial, but not temporal, variation. Additionally, dragonfly communities were associated with both aquatic and terrestrial factors, while diversity was primarily associated with terrestrial factors. Specific terrestrial factors associated with the emergence of the dragonfly community included canopy cover and slope, while aquatic factors included water temperature, dissolved oxygen, and baseflow. Our results indicate that management of river habitats for dragonfly conservation should incorporate riparian habitat protection while maintaining aquatic habitat and habitat quality." (Authors)] Address: O'Malley, Z.G., Dept of Biology, Canadian Rivers Institute, University of New Brunswick, 10 Bailey Dr., P.O. Box 4400, Fredericton, NB E3B 5A3, Canada. Email: zacchaeus.greg.compson@gmail.com

21123. Rebecca, G.W. (2020): Merlin breeding season diet on Deeside, North-east Scotland, in relation to area and land-use change. Scottish Birds 40(3): 195-205. (in English)

["As part of a study of Merlin breeding ecology in North-east Scotland, diet was assessed from prey remains found at occupied breeding areas during 1980–2003. Small birds weighing 20–80 grams predominated, with five species - Meadow Pipit, Wheatear, Starling, Chaffinch and Skylark - making up around 80% of numbers and biomass (collective weight) from 10,657 bird items. A further nine bird species each accounted for at least 1% of numbers or biomass. In total, 59 bird species were recorded as prey, … In addition, 547 moths and 21 other items were found, but these were unimportant in biomass terms. ... A total of 11,225 prey items was recorded during 1980–2003 (Table 2). This comprised 10,657 birds of 59 species, 547 moths, almost all from two species, and 21 other items covering small mammals, butterflies, dragonflies, ground beetles and a frog." (Author)] Address: Rebecca, G.W., RSPB, 10 Albyn Terrace, Aberdeen AB10 1YP, UK. Email: graham.rebecca@rspb.org.uk

21124. Saxton, N.A.; Powell, G.S.; Bybee, S.M. (2020): Prevalence of leg regeneration in damselflies reevaluated: A case study in Coenagrionidae. Arthropod Structure & Development Volume 59, November 2020, 100995: 6 pp. (in English) ["Highlights: • Odonates exhibit effective leg regeneration abilities that result in a fully functional limb. Prevalence of leg regeneration in Vanuatubasisis reported as much higher than previously understood. Sex and species do not explain the extent of regeneration suggesting environmental factors may play a larger role. Abstract: The leg regeneration capabilities of damselflies are understudied. Here we present the first data of regenerated limbs across a genus of damselfly based on adult specimens collected in the field to illustrate the prevalence of limb loss among nymphs. We show that this phenomenon is much more prevalent than previously thought, as 42% of individuals were found with regenerated limbs. Furthermore, we test for patterns within these data to begin to unravel the potential causes of limb loss in nymphal damselflies, showing that intrinsic factors such as sex and species cannot explain the patterns of limb loss pointing to environmental factors as the probable cause. We argue that Odonata limb regeneration provides a potentially unique perspective into the nymphal stage of these organisms." (Authors)] Address: Saxton, N.A., Dept Biology, Brigham Young University, 4102 LSB, Provo, UT 84602, USA. Email: nsaxton55@gmail.com

21125. Souza, Y. C.Mossioli de (2020): Influência do predador sobre o uso do espaço e a atividade por girinos bentônicos e nectônicos - Predator influence over space use and activity by benthic and nektonic tadpoles. MSc. thesis, Universidade Estadual Paulista (UNESP): 66 pp. (in Portuguese, with English summary) ["Interactions between species influence community structure, population dynamics, morphology, physiology and species' behavior. Mortality is a direct effect caused by the interaction with a predator, but even the simple presence of predators can lead to other indirect effects such as alterations on prey's behavior. In aquatic environments, prey may detect predation risk by visual, mechanical, and chemical cues. When detecting a predator, the prey can use strategies to escape predation such as shoal formation, changes on habitat use pattern, and reduction on swimming activity. Despite decreasing predation rates, the antipredatory strategies have costs for the prey and set up a trade-off. For example, the same behavior that raises the prey's chance to escape from a predator, decreases its foraging activity, leading thus to a reduction in the prey's growth and survivorship. Among tadpoles, morphological and physiological aspects are important to determine water column occupation. But could predation also be an important pressure that determines the way tadpoles occupy the water column? Understanding how predation influences tadpoles' behavior may elucidate populational dynamics and community structuring aspects, as well as the mechanisms that regulate anuran evolutionary patterns. In this sense, this dissertation presents a study, in a manuscript form, that tested experimentally the influence of an aquatic predator (Odonata water nymph; Micrathyria sp.) on the use of space, activity and foraging behavior of benthic (Physalaemus nattereri) and nektonic (Scinax fuscovarius) tadpoles." (Author)] Address: not stated

21126. Tysoe, M.; Rebassa, M. (2020): Observacions d'odonates a le Illes Baleares 2019. Es Busqueret 50: 48-60. (in Catalan) ["It is clear that the observation of odonates is becoming popular. Although until recently it was considered an exclusive activity of great specialists in this group of insects, in recent years both the observation of their behavior and their photography have been spreading among an ever-increasing number of fans. For this first issue, we have had the collaboration of 37 people, who have provided photographs or observations made in the different places of our Islands, and it is to be expected that this number will grow very noticeably in the coming years. Especially from islands where no (or very little) data was received in 2019, such as Ibiza or Formentera. This first issue, therefore, has possibly still partial information, both in the territorial and specific areas, but it is no less interesting for that. Of the 24 species that can be observed at some point in the year on one of our Islands, data has been received on 20. All we have to do is thank you for all the collaborations received!" (Authors /Google translate)] Address: Rebassa, M., Societat d'Història Natural de les Balears, carrer Margalida Xirgu, 16, baixos, 07011, Palma, Spain. Email: escarabatdaurat@gmail.com

21127. Wilk, T. (2020): New records of Subarctic Darner Aeshna subarctica Walker, 1908 and Pygmy Damselfly Nehalennia speciosa (Charpentier, 1840) (Odonata) in southern Poland. Przeglad Przyrodniczy XXXI, 3 (2020): 91-97. (in Polish, with English summary) ["… During the investigations carried out in 2020 in western part of Sandomierz Forest new localities of those species were found – in Konskie Blota reserve and peatland excavations near Niwiska. These are just fourth known population of Subarctic Darner and ninth and tenth population of Pygmy Damselfly in Podkarpackie Province. Central part of Sandomierz Basin is very poorly investigated in terms of dragonfly diversity. The findings of this study prove that this region is inhabited by rare and threatened dragonflies species and complex odonatological survey should be carried out here, especially in peatland habitats." (Author)] Address: Wilk, T., Ogólnopolskie Towarzystwo Ochrony Ptaków, ul. Odrowąża 24, 05-270 Marki, Poland. E-mail: tomaszwilk3@gmail.com

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21128. Arimoro, F.O.; Abubakar, M.D.; Obi-Iyeke, G.E.; Keke, U.N. (2021): Achieving sustainable river water quality for rural dwellers by prioritizing the conservation of macroinvertebrates biodiversity in two Afrotropical streams. Environmental and Sustainability Indicators 28: 53444-53457. (in English) ["Motivated by the UN Global Sustainable Development Goals on achieving sustainable freshwater ecosystem, this study was undertaken to examine two important water bodies in north central Nigeria (Baka Jeba and Penyan Rivers) protected locally by the rural community and serving as sources of water supply, for biodiversity

conservation and protection. The status of macroinvertebrate biodiversity as important variable in assessing the environmental health and suitability of the water quality of the rivers was evaluated for a period of 8 months, between February and September, 2017 using standard methods. The mean values of Physicochemical variables recorded during the study period revealed that the nutrient loads (nitrites and phosphates levels) was relatively low for both streams as well as conductivity levels (<82µS/cm). Dissolved oxygen values indicated that the water bodies were well aerated with values ranging between 5.21 and 7.83mg/l in both the dry and wet seasons. A total of 65 invertebrate taxa from 34 families in 10 orders were recorded during the study, dominated by aquatic insects with a few representation of decapods and gastropods, and Arachnids were sporadically present. The overall abundance of macroinvertebrates was not significantly different ($p > 0.05$) among the sampling stations with number of individuals caught ranging between 1208 and 1728 per station. Of the major faunal groups, Ephemeroptera contributed the highest percentage of individuals (>29%) in both streams. Generally, Beka Jeba Stream contained more diverse taxa of macroinvertebrates compared to Penyan Stream. The Ephemeroptera- Trichoptera-Odonata (ETO) were the dominant groups collected in the river systems indicating fairly good water quality conditions. The Chironomids and other tolerant macroinvertebrate larvae were only sporadically present. Overall, the values of the physical and chemical parameters (low BOD, low nutrient levels and high dissolved oxygen) obtained for the two rivers and the wide diversity of sensitive macroinvertebrates portends the water body to be of good quality. Therefore utmost care should be taken to conserve and preserve these species as indicators of water quality by reducing the impact of key drivers of declines in macroinvertebrate biodiversity, including habitat degradation and pollution." (Authors) Taxa are treated at genus levels, and for Odonata some taxa are questionable (eg. Cordulia sp., Calopteryx sp.).] Address: Arimoro, F.O., Applied Hydrobiology Unit, Dept Animal Biol., Federal Univ. Tech., P.M.B, Minna 65, Nigeria. Email: francisarimoro@gmail.com

21129. Bertoli, M.; Piazza, G.; Pastorino, P.; Prearo, M.; Cozzoli, F.; Vignes, F.; Basset, A.; Pizzul, E. (2021): Macrobenthic invertebrate energy densities and ecological status in freshwater watercourses (Friuli Venezia-Giulia, Northeast Italy). Aquatic Ecology 55: 501-518. (in English) ["The present study provides energy density (ED) data and models for four macrobenthic invertebrate genera inhabiting freshwater lotic environments (Baetis, Hydropsyche, Rhyacophila, and Onychogomphus). Samples were collected in the hydrological freshwater network of the Region Friuli Venezia Giulia within different watercourse types (creeks, streams, rivers channels, and ditches), and energy density was directly measured using an adiabatic bomb calorimeter. Measured ED expressed in Joule g^{-1} wet weight was strongly and positively correlated with percentage of dry weight (DW%) for all genera investigated ($r^2 > 0.9504$), allowing to obtain genus-specific predictive models based on the relationship between ED and DW%. Models were validated and showed good predictive power, as 90th percentile of observed percentage errors ranged between 4.23% and 5.18% while medians ranged between 1.32% and 2.83%. ANCOVA disclosed significant differences between the models, as those for Rhyacophila and Onychogomphus differed significantly from the others. The empirical models were used to build a dataset of estimated energy density, to assess the relationship between energy density and ecological status of the monitored riverine systems, assessed in compliance with European and Italian law by the application of four different ecological indices (ICMi, RQE_IBMR, STAR_ICMi, and LIMeco). Information regarding ED levels for freshwater macrobenthic invertebrates is still neglected in biomonitoring programs, but it could be useful to interpret some ecological situations in the context of ecological status assessment, especially in relation to the trophic condition of the investigated riverine systems." (Authors)] Address: Pastorino, P., The Veterinary Medical Research Institute for Piemonte, Liguria and Valle d'Aosta, via Bologna 148, 10154 Torino, Italy. Email: paolo.pastorino@izsto.it

21130. Borges, L.R.; Barbosa, M.S.; Alves Carneiro, M.A.; Santos, J.C. (2021): Habitat integrity drives Odonata diversity in Eucalyptus-dominate. Environmental Monitoring and Assessment volume 193, Article number: 12 (2021): 14 pp. (in English) ["Silviculture can be considered a sustainable alternative to the extraction of wood from natural forests in Brazil. However, the high demand for wood products has decreased the area of natural Cerrado due to land transformation for forestry activities. This transformation could lead to the loss of species, including insects that cannot tolerate the new environment dominated by exotic plant species. This study aims to evaluate whether the presence of an extensive Eucalyptus silviculture in the Brazilian Cerrado decreases the integrity of nearby riparian environments and, consequently, decreases odonate diversity. Thirteen ponds were selected in patches of Cerrado embedded within a matrix of Eucalyptus silviculture in order to assess habitat integrity of ponds and their riparian zones and collect adult odonates. The physical integrity of the study sites was measured using a Habitat Integrity Index (HII) designed to determine the degree of conservation of aquatic environments. The HII of the study sites varied between 0.44 and 0.80, indicating differences in the degree of conservation. Therefore, a positive relationship was found between odonate richness and abundance and HII, and between the abundance of zygopterans and anisopterans and HII. These findings may be due to the fact that these insects are adapted to the natural resources maintained at the most conserved habitats, and which were lost in degraded riparian zones, such as the presence of aquatic vegetation and a diversity of organic debris on pond banks. We conclude that the conversion of natural areas to Eucalyptus silviculture can alter the integrity of nearby riparian zones and, consequently, odonate diversity. ... The collected odonates represented six families, 21 genera and 36 species. Some species with restricted distributions were found at study sites with higher HII values (S3, S5, S8, and S9), such as Erythrodiplax ana, Acanthagrion gracile, Cyanallagma nigrinuchale, Oxyagrion santosi, Oxyagrion terminale, and Tigriagrion sp. nov (Table 2). Others only appeared at areas with lower HII values (S4, S11, and S13), as Ischnura fluviatilis, Homeoura chelifera, and Mnesarete pudica showing that habitats with different degrees of conservation can present different species composition." (Authors)] Address: Santos, J.C., Depto de Ecologia, Universidade Federal de Sergipe, Campus São Cristóvão, Av. Marechal Rondon, s/n, Bairro Jardim Rosa Elze, São Cristóvão, Sergipe 49100-000, Brazil. E-mail: jcsantosbio@gmail.com

21131. Bos, G. (2021): Een boekje open over libellen herkennen. Vlinders 1/2021: 8-9. (in Dutch) [Brief introduction in anatomy of a dragonfly.] Address: not stated

21132. Chauhan, P.; Swaegers, J.; Sanchez-Guillen, R.A.; Svensson, E.I.; Wellenreuther, M.; Hansson, B. (2021): Genome

assembly, sex-biased gene expression and dosage compensation in the damselfly Ischnura elegans. Genomics 113(4): 1828-1837. (in English) ["The evolution of sex chromosomes, and patterns of sex-biased gene expression and dosage compensation, are poorly known among early winged insects such as odonates. We assembled and annotated the genome of Ischnura elegans (blue-tailed damselfly), which, like other odonates, has a male-hemigametic sex-determining system (X0 males, XX females). By identifying X-linked genes in I. elegans and their orthologs in other insect genomes, we found homologies between the X chromosome in odonates and chromosomes of other orders, including the X chromosome in Coleoptera. Next, we showed balanced expression of X-linked genes between sexes in adult I. elegans, i.e. evidence of dosage compensation. Finally, among the genes in the sex-determining pathway only fruitless was found to be X-linked, while only doublesex showed sex-biased expression. This study reveals partly conserved sex chromosome synteny and independent evolution of dosage compensation among insect orders separated by several hundred million years of evolutionary history." (Authors)] Address: Chauhan, P., Dept of Biology, Lund University, Ecology Building, 223 62 Lund, Sweden. Email: pallavi.chauhan@biol.lu.se

21133. Danflous, S. (2021): Rapport d'étude Inventaire & Suivi des Odonates d'intérêt communautaire sur le Barrage du Pinet – résultats 2021. EDF, voie du TOEC BP 57611 - 31076 - Toulouse cedex 3, France: 57 pp. (in French) ["5. Conclusion: Estimated impact of work on odonates: A lowering of the water level by 3 metres is planned as part of the work scheduled for 2023 on the Pinet reservoir. The targeted period would be weeks 21 to 23, i.e. between 23 May and 12 June. In the continuity of the previous report (Danflous, 2020), the above discussion elements aimed to try to understand the link between the local stationary conditions, the hydroelectric dam and the state of the current populations of Macromia splendens. The elements discussed above seem important for the understanding of the expected impact of the planned emptying of the dam in 2023. Macromia splendens: The inventories carried out in 2020 and 2021 on the Pinet dam show that the emptying of the dam by 7m in 2019 did not have a significant impact on M. splendens, which is the main local issue still present. This lowering took place at the same time as the one planned for 2023. It therefore appears that the works planned for 2023 should not have a massive impact on the population of M. splendens at the dam. This seems consistent with the late cycle of emergence at the site. However, precautions are necessary in view of the strong responsibility of this population, whose numbers are very important at the Deptal level, if not more. Monitoring The monitoring of this species begun in 2020 should be continued in order to specify the population numbers, its local dynamics and phenology in particular. This monitoring should therefore be repeated in 2022 (before the works), as well as in 2023 (year of the works) and in 2024 (post works). In view of the phenology observed on the site, it seems important to carry out three passes in June, July and August. The June pass during the 2022 campaign will be important for estimating the proportion of the population potentially more directly impacted by the works. The issues mentioned above (p.49) will have to be taken into account during the monitoring in order to improve our local and global understanding of the biology of this protected dragonfly. Sensitivity zone A mapping of the sensitivity zones on the reservoir was envisaged before the works, in order to put in place targeted measures to mitigate the effects of the lowering of the levels. This mapping is superfluous following the results of the 2021 inventory. The protected species M. splendens breeds throughout the reservoir area. Only global reduction measures can therefore be considered. Reduction of the impact of the works Concerning the emptying in 2023, we recommend the following measures: * a slow lowering of the water level, as slow as possible. This will facilitate the displacement of Macromia larvae, which would then be in the water level when the lowering takes place. * Regular passages along the banks between the lowering phases to carry out "safeguard fishing" seems to be the most effective way of reducing possible larval mortality induced by the emptying. This action would consist of releasing directly into the water on the spot the dragonfly larvae, in particular Macromia, which would have been surprised by the lowering of the water and would have remained dry on the banks/partitions. This intervention would be superfluous if the larvae were observed descending to take refuge in the water or rising to emerge. Given the vast area to be covered for this action, it is recommended that priority be given to the known areas of highest density, i.e. Bouchouns, Grès and Nauq, as well as the left bank. We now consider that Oxygastra curtisii and Gomphus graslinii have disappeared from the same site, probably due to the cumulative effect of hydroelectric activity on the Tarn valley. This does not appear to be reversible in the present state of knowledge." (Author/DeepL) https://www.occitanie.developpement-durable.gouv.fr/IMG/pdf/annexe3_rapport_cen_odonates_pinet_2021.pdf] Address: Danflous, S., Office pour les insectes et leur environnement-Midi-Pyrénées, France. Email: opiemp.insecte@gmail.com

21134. Ebert, G.; Trusch, R. (2021): Harald Heidemann † 1. September 1935 bis 8. Oktober 2021. Carolinea 79: 163-170. (in German) [Obituary for a well-known German odonatologist.] Address: Ebert, G., Hohe Eich 2, D-76297 Stutensee, Germany. E-Mail: guenter-stutensee@web.de

21135. Gao, Y.; Shi, S. (2021): Resource value of Odonata insects. Biotic Resources 43(3): 276-283. (in Chinese, with English summary) ["The resource value of Odonata was summarized and discussed from four levels of intrinsic value,ecological value,economic value and social value. Odonata insects are ancient and successfully evolved insects with rich genetic resources and indispensable consumers in the ecosystem. They are good indicators of ecological environment and suitable for water and land environmental assessment. As high-quality raw materials of edible insects, raw materials of traditional Chinese medicine, biological control resources of natural enemies and bionic objects of science and technology in the future, Odonata insects can create better economic value for human beings. Odonata insects are also closely related to the spiritual and cultural world of human beings, and gradually form a unique phenomenon of insect culture, which has realistic and potential resource value." (Authors)] Address: Gao, Y., Coll. of Plant Protection, Jilin Agricultural Univ., Changchun 130118, Jilin, China

21136. Garcia Junior, M.D.N.; Damasceno, M.; Souto, R.N.P. (2021): Levantamento de libélulas (Insecta: Odonata) associadas a tanques de Piscicultura no Amapá, Brasil - Survey dragonfly (Insecta: Odonata) associated with ponds in pisciculture in Amapá, Brazil. Nature and Conservation 14(3): 66-71. (in Portuguese, with English summary) ["The order Odonata comprises the insects commonly called dragonfly, which can be found all over the world. In Brazil, the odonatafauna has just over 900 species, dragonflies occupy a wide range of water bodies eg fish ponds, where they are often seen as causing harm to producers. Thereby,

the present study aimed to carry out a survey of odonatas associated with fish farming ponds located in the municipality of Macapá, Amapá. A total of 195 individuals were collected, representing 17 species inserted in two families. Libellulidae had the highest diversity with 16 identified species, Erythemis peruviana was the species with the highest frequency and abundance during the study. The diversity of Odonata found associated with fish ponds deserves more attention, especially in the state of Amapá, and the establishment of new collection points should further expand the list of species associated with these water bodies in the state." (Authors)] Address: Garcia Junior, M.D.N., Univde Federal do Amapá, Programa de Pós-Graduação em Biodiversidade Tropical, Macapá, AP, Brasil. E-mail: m.d.juniorbio@gmail.com

21137. Grunsven, R. van (2021): Het vangmasker: de katapult van de libellenlarf. Vlinders 2/2021: 10-11. (in Dutch) [labium of dragonfly larvae; "Dragonflies are fascinating and often beautifully coloured animals; the larvae are less colourful, but no less interesting. Dragonfly larvae can do some very special things. They have jet propulsion, but also a unique fold-out catching mask. We have only recently begun to understand how that catch mask actually works." (Author/DeepL)] Address: De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands

21138. Khelifa, R. (2021): When sex becomes a wrestling game in a dragonfly: female refusal behavior to male harassers. Ecology 102(10), e03435 & Bull. Ecol. Soc. Am. 102(4): e01916. https://doi.org/10.1002/bes2.1916: 4 pp. (in English) ["In dragonflies, males typically harass females and force copulation, particularly when the female is not guarded by a male. In these species, females usually develop refusal displays and tactics to reduce the impact of coercion on their fitness. Here, we show in Rhionaeschna multicolor, that females use a series of behavioral displays, which include highjacking the pair on the water surface to break the copulatory wheel and stop male harassment. This highlights the role of the arms race between male–male competition for access to females and coercion avoidance by females to reduce fitness costs." (Author)] Address: Khelifa, R., Biodiversity Res. Center, Univ. British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

21139. Kohli, M.; Letsch, H.; Greve, C.; Béthoux, O.; Deregnaucourt, I.; Liu, S.; Zhou, X.; Donath, A.; Mayer, C.; Podsiadlowski, L.; Gunkel, S.; Machida, R.; Niehuis, O.; Rust, J.; Wappler, T.; Yu, X.; Misof, B.; Ware, J. (2021): Evolutionary history and divergence times of Odonata (dragonflies and damselflies) revealed through transcriptomics. iScience iScience 24(11), 103324: 34 pp. (in English) ["Highlights: • Evolutionary relationships of Odonata are unraveled using transcriptomes. Earliest flying insects – dragonflies, damselflies, and their extinct ancient relatives – date back to Permian period. Both extant Odonata started diverging in the Triassic period. Summary: Odonata are among the earliest flying insects with extant representatives. However, unravelling details of their long evolutionary history, such as egg laying (oviposition) strategies, is impeded by unresolved phylogenetic relationships particularly in damselflies. Here we present a transcriptome-based phylogenetic reconstruction of Odonata, analyzing 2,980 protein-coding genes in 105 species representing nearly all the order's families. All damselfly and most dragonfly families are recovered as monophyletic. Our data suggest a sister relationship between dragonfly families of Gomphidae and Petaluridae. According to our divergence times estimates, both crown-Zygoptera and –Anisoptera arose during the late Triassic. Egg laying with a reduced ovipositor apparently evolved in dragonflies during the late Jurassic/early Cretaceous. Lastly, we also test the impact of fossil choice and placement particularly of the extinct fossil species, †Triassolestodes asiaticus, and †Proterogomphus renateae on divergence time estimates. We find placement of †Proterogomphus renateae to be much more impactful than †Triassolestodes asiaticus." (Authors)] Address: Kohli, M., Dept Invertebrate Zool., American Mus. Natural History, New York, New York, USA. Email: mkohli@amnh.org

21140. Kranželic, D.; Schmidt, B. (2021): Pracenje stanja velikog vodenjaka, Triturus carnifex (Laurenti, 1768) na podrucju Ekološke mreže Natura 2000 - Krbavsko polje (HR2000632) [Monitoring the condition of Triturus carnifex (Laurenti, 1768) in the area of the Natura 2000 ecological network - Krbavsko polje (HR2000632)]. Krbavsko polje (HR2000632). Završni izvještaj. Udruga Hyla. Zagreb, str. 26: 30 pp. ["In May 2021, the employees of the Hyla Association made two field trips to conduct monitoring and additional mapping of the Italian crested newts, Triturus carnifex (Laurenti, 1768), in the area of Krbavsko polje. Monitoring of the population was carried out at two locations: Laudonov gaj near the settlement of Bunic and Zvijezda spring in Podlapacko polje. At the Laudonov gaj locality, 29 newt adults were recorded, and 27 at Podlapacko polje. During mapping, newts were also recorded at an additional location in the area of Krbavsko polje, in the vicinity of the Bunic settlement. Ortmann traps have proven to be appropriate method for recording the presence of large newts and their further use in monitoring is recommended. A total of seven species of amphibians and three species of reptiles were recorded during the study, as well as two species of insects that are listed on Anex II of the Habitats Directive, the Marsh Fritillary Euphydryas aurinia (Rottemburg, 1775) and Coenagrion ornatum (Selys, 1850)." (Authors) https://zop-lsz.hr/izv/Pra%C4%87enje%20stanja%20velikog%20vodenjaka%202021_Krbavsko%20polje.pdf] Address: Schmidt, B., Udruga Hyla, Association Hyla, OIB:97526280302, Lipovac I br. 7, 10 000 Zagreb, Croatia. Email: bruno.schmidt@hhdhyla.hr

21141. Kundanati, L.; Das, P.; Pugno, N.M. (2021): Prey capturing dynamics and nanomechanically graded cutting apparatus of dragonfly nymph. Materials 14(3), 559; https://doi.org/10.3390/ma14030559: 13 pp. (in English) ["Aquatic predatory insects, like the nymphs of a dragonfly, use rapid movements to catch their prey and it presents challenges in terms of movements due to drag forces. Dragonfly nymphs are known to be voracious predators with structures and movements that are yet to be fully understood. Thus, we examine two main mouthparts of Pantala flavescens that are used in prey capturing and cutting the prey. To observe and analyze the preying mechanism under water, we used high-speed photography and, electron microscopy. The morphological details suggest that the prey-capturing labium is a complex grasping mechanism with additional sensory organs that serve some functionality. The time taken for the protraction and retraction of labium during prey capture was estimated to be 187 ± 54 ms, suggesting that these nymphs have a rapid prey mechanism. The Young's modulus and hardness of the mandibles were estimated to be 9.1 ± 1.9 GPa and 0.85 ± 0.13 GPa, respectively. Such mechanical properties of the mandibles make them hard tools that can cut into the exoskeleton of the prey and also resistant to wear. Thus, studying such mechanisms with their sensory capabilities provides a unique opportunity to design and develop bioinspired underwater deployable mechanisms." (Authors)] Address: Pungo, Nicola, Lab. of Bio-Inspired, Bionic, Nano, Meta Materials and Mechanics, Dept Civil, Environmental &

Mechanical Engineering, Univ. Trento, Via Mesiano 77, 38123 Trento, Italy. E-mail: nicola.pugno@unitn.it

21142. Li, B.; Su, Q.; Yu, L.; Liu, W.; Dong, S.; Ding, S.; Zhang, M.; Du, G.; Xu, B. (2021): Biomimetic PVDF/LLTO composite polymer electrolyte enables excellent interface contact and enhanced ionic conductivity. Applied Surface Science 541 1 March 2021, 148434: (in English) ["Highlights: • The bio-inspired PVDF/LLTO-CPEs are fabricated through simple evaporation strategy. • The special design creates cellular structures on the surface of PVDF/LLTO-CPE. • The ultrathin PVDF/LLTO-CPE dhows a high mechanical strength of 10 Mpa. • The full battery delivers an excellent performance under folding and bending states. Abstract: Composite polymer electrolyte (CPE) with enhanced ionic conductivity, excellent flexibility and strong strength are urgently required for all-solid-state lithium metal batteries (LMBs). Inspired by the dragonfly wings that are super-lightweight and ultrathin but have excellent stability when subject to bending and twisting during flapping, we have constructed Li0.35La0.55TiO3 (LLTO) nanowires-filled polyvinylidene fluoride (PVDF). In our design, the PVDF is used to construct the ultrathin membrane, the 1D LLTO nanowires are acted as the veins to give rise to a high mechanical strength of 10 Mpa. The special design creates cellular surface of PVDF/LLTO-CPE, which guarantees the excellent flexibility as well as a good interface contact between CPE and Li anode. When evaluated as electrolyte for LiFePO4 | Li battery, the PVDF/LLTO-CPEs can suppress Li dendrites growth, and thus presents an excellent cycling stability of 140 mAh g-1 after 200 cycles. Moreover, the flexible LiFePO4 | PVDF/LLTO-CPE | Li4Ti5O12 pouch cell delivers a satisfactory rate performance and cycle stability under folding and bending states. The excellent performances are attributed to the unique cellular structure and super mechanical strength of biomimetic PVDF/LLTO-CPE. All results show the PVDF/LLTO-CPE is a promising solid-state electrolyte for flexible electronic devices." (Authors)] Address: Li, B., School of Materials Science & Engineering, Shaanxi Univ. Sci. & Tech., Xi'an, Shaanxi 710021, China

21143. Mafuwe, K.; Broadley, S.; Moyo, S. (2021): Use of maximum entropy (Maxent) niche modelling to predict the occurrence of threatened freshwater species in a biodiversity hotspot of Zimbabwe. African Journal of Ecology 60(3): 557-565. (in English) ["Globally, freshwater species are under threat from human mediated stressors. Therefore, there is an urgent need for methods to estimate population and species occurrences for conservation purposes. Here, we used a predictive species distribution model to determine the occurrence of three endangered species (Amietia inyangae, Chlorolestes elegans and Strongylopus rhodesianus) in Southern Africa (Eastern Highlands of Zimbabwe). The study revealed that the probability of occurrences for the three species increase with an increase in elevation and annual precipitation and decrease with an increase in annual mean temperature. Our results indicated that the highest probability of occurrences for A. inyange, C. elegans and S. rhodesianus is in the Nyanga, Stapleford and Chimanimani highland areas, with some probabilities of occurrence falling outside protected areas. Our findings suggest that the areas covered by protected areas may need to be revaluated. Our findings will be useful for managing threatened species." (Authors)] Address: Mafuwe, K., Dept Biological Sciences, University of Zimbabwe, Mt Pleasant, Harare, Zimbabwe. Email: kudzimafuwe@gmail.com

21144. Marinissen, J.; de Vries, H. (2021): Het gedrag van de groene glazenmaker. Vlinders 1/2021: 19-21. (in Dutch) [groene glazenmaker = Aeshna viridis. "Overall results Much of the behaviour observed appeared to be linked to a landscape element. Different elements were distinguished: short-cut grassland ('Mono grass'), strip with grasses and rushes ('Multi Grass'), water, reed, crabgrass, forest, bushes and maize. The frequency with which behaviour occurred at different landscape elements varied. The following were evident at all four sites: - Most observations of green glassmakers were made around ditches with crabweed, i.e. close to the breeding site (e.g. Figures 1 and 3). - The high vegetation edges and reeds along the canals were mainly used for resting (shown in figures 2 and 4 in the 'Multi Grass' category). - Hunting was mainly over the cut grasses, by both males and females. - Males seemed to have a preference for hunting outside their demarcated territory and then picking up their patrol above the crabgrass again. - Males mainly showed territorial behaviour above water and crab beds, where females could also be expected. - Females were depositing eggs on crab beds for most of the observation time. For site management, the following points seem important. Firstly, the conservation of the crab shear fields is important, given the plant's crucial role in the reproduction of this dragonfly species. Second, the high vegetation and reed edges along the ditches are frequently used by the dragonflies for resting and, in Akmarijp, even for mating. Further research could be done to verify whether the presence of this landscape element positively affects survival and reproduction rates. Thus, if this is the case, the species would benefit if the tall vegetation is not mowed or only after the flight period. Besides results focusing on landscape use, another observation was made that could help optimise site management. Namely, in the Woldlake forest, swans at the time of the study unexpectedly had a major impact on the crab shrub fields by grazing away much of the plant. This thus had a direct effect on the dragonfly's habitat. Measures could be devised for this too. Sufficient reason therefore for a follow-up survey in the coming green glazier flying season." (Authors/DeepL)] Address: not stated

21145. Meng, Y.; Wu, H.-t.; Guan, Q.; Lu, K.-l. (2021): The ecological response of Odonata larvae to hydrologic connection blocking in riverside wetlands of the Wusuli River. Chinese Journal of Ecology 40(2): 453-459. (in Chinese, with English summary) ["The composition integrity of macrobenthos community can be used to indicate and predict the health and change trend of aquatic environment, as being widely verified in literature. However, the complexity of sampling at the community level retards their convenient application. Odonata larvae, with an extraordinary amphibious life cycle, are relatively easy to be sampled and recognized among the macrobenthos. The diversity of Odonata larvae and their sensitive reaction to changes of water properties make them a very broad and appropriate bio-indicator for wetlands. We analyzed the ecological impacts of the dyke barriers on riverside wetlands and evaluated the environmental indicator role of Odonata larvae on riverside wetlands by comparing the community composition of Odonata larvae in the riverside wetlands of different reaches on both sides of the artificial embankment of the Wusuli River. The results showed that the diversity of Odonata larvae in the riverside wetlands was increasing along the Wusuli River from the upstream to the downstream. Blocking hydrologic connection had a negative effect on the survival and breeding of Odonata larvae. The closer to the downstream, the more significantly the Odonata larvae were affected by artificial dykes. The density of different species on both sides of the dyke had limited variation, while the main difference existed in the

relatively large fluctuation range of diversity index value in the sampling sites directly connected with the river hydrology." (Authors)] Address: Wu, H.-t., Northeast Institute of Geography & Agroecology, Chinese Academy of Sciences, Changchun 130102, China. Email: wuhaitao@iga.ac.cn

21146. Misak, K. (2021): Faunistic study of the dragonfly fauna of Nagydobrony (Ungvár district). MSc. thsis, Transcarpathian Hungarian Institute named after Ferenpl Rakopy P, Dept of Biology and Chemistry, Berehovo: 47 pp. (in Hungarian, with Ukrainian summary) ["The following conclusions can be drawn from the summary of the faunistic data. Our field collections were carried out in the area of the Great Dobronyi Game Reserve in the autumn of 2019 and summer of 2020. A total of 10 collection areas were designated following the field survey. Two collection areas were located in the area of a lake (Lake 1 and Lake 2), which is sometimes filled by the Latorca River, while eight additional collection areas were designated along the channels built during the draining of the Szernye marsh (Cs1, Cs2, Cs3, Cs4, Cs5, Cs6, Cs7, Cs8). During our work we collected 264 dragonfly larvae and 32 exuviae (296 specimens in total). The larvae were collected using a hand scraper net. The collected specimens were stored in bottles containing 70% ethyl alcohol until identification. Exuviae were collected from vegetation along the water's edge. Species identification was carried out using a stereomicroscope according to the determination manuals BROCHARD (BROCHARD et al. 2012) et al., CHAM (CHAM, 2012) and GRAND (GRANd et al. 2014) et al. Reviewing the complete faunistic list, we can see that 15 dragonfly species were found as a result of our collection efforts in 2019-20. These species are Ischnura elegans, Calopteryx splendens, Anax imperator, A. parthenope, Libellula quadrimaculata, Sympetrum sanguineum, S. vulgatum, Platycnemis pennipes, Lestes virens, L. sponsa, L. barbarus, L. viridis, Aeshna mixta, Coenagrion puella, Crocothemis erythraea). The species are members of 6 different families, which are Coenagrionidae (31 specimens), Calopterygidae (57 specimens), Aeshnidae (86 specimens), Libellulidae (40 specimens), Platycnemididae (1 specimen), Lestidae (45 specimens). During the exuvium collection we added 2 new species to our species list, including Aeshna cyanea and Hemianax ephippiger. Previous surveys had been carried out in the Great Dobrony Game Reserve in 1997. In their work VIZSLÁN and HUBER described 17 species of dragonflies from the whole area of Great Dobrona, of which 10 species (6 Zygoptera, 4 Anisoptera) were found in the area of the Great Dobrona Game Reserve. During my work, I was able to detect 7 dragonfly species (4 Zygoptera, 3 Anisoptera). A further 8 species were detected in the reserve (L. viridis, A. mixta, A. parthenope, L. barbarus, L. virens, S. sanguineum, P. pennipes, C. erythraea). Of the 15 species described by me, the following species have also been described in the area of Kisdobrony: L. virens, C. puella, A. imperator, S. sanguineum. In the course of my research, I was the first to describe Anax parthenope. It was detected in the first section of the canal (Cs1) (1 specimen), but we also found specimens of it in exuviae (2 specimens). During our exuvium collection work, 32 specimens were found, including Hemianax ephipigger, A. cyanea, A. mixta, A. imperator, and A. parthenope. Hemianax ephipigger and Aeshna cyanea were the only species collected as exuvium only, not as larvae. No previous exuvium surveys have been conducted in the areas. Based on the ISOI index, a high habitat classification category (high) was defined based on the odonatological survey of the Great Draky Game Reserve, which indicates the species richness and habitat importance of the area. URl] Address: not stated

21147. Morra, T.; Bence, S.; Kapfer, G.; Delauge, T. (2021): Etude des zones humides littorales continentales du territoire élargi du Parc national de Port-Cros (Provence, France). Volet entomologique. Sci. Rep. Port-Cros Natl. Park, 35: 363-381. (in French, with English summary) ["Study of the mainland coastal wetlands of the enlarged territory of the Port-Cros National Park (Provence, France). Entomological aspects. An entomological study of the continental coastal wetlands of the Parc national de PortCros (Provence, France) territory was carried out. During the spring, summer and autumn 2019, inventory campaigns were conducted on 11 wetlands. Surveys were carried out, primarily targeted at wetland indicator species, taking into account mainly Orthoptera, but also Odonata and Heteroptera Hemiptera.

21148. Overall, the inventories revealed a low number of indicator species and a low gamma diversity. An exception is the Garonne/Bistagne sector in the commune of Ramatuelle, a rare sector that still presents true and extensive hygromesophile meadows as well as a beach and back-dune with some patches of preserved habitats. Similarly, several new stations of the sword-tail cricket Trigonidium cicindeloides, a species in danger of extinction (EN) on the Provence-Alpes-Cote d'Azur Orthoptera red list, were discovered. Some proposals aimed at ecological improvement of entomofauna environments are being put forward by simple management and consultation measures." (Authors) The following odonate species are listed: Aeshna affinis, Aeshna isoceles, Aeshna mixta, Anax parthenope, Hemianax ephippiger, Lestes barbarus, Lestes virens virens, Ischnura pumilio, Coenagrion scitulum, Sympetrum meridionalis, Trithemis annulata.] Address: CEN PACA, Pôle Biodiversité Régionale, 888 chemin des Costettes, 83340 Le Cannetdes-Maures, France. Email: thibault.morra@cen-paca.org

21149. Mubarak, Z. (2021): The diversity of dragonfly (Ordo: Odonata) various type, of habitat in Karangrejo village, Garum district, Blitar regency. Program studi biologi jurusan sains fakultas sains dan teknologi Universitas Islam Negeri Sunan Ampel Ssrabaya: 85 pp. (in Indonesian, with English summary) [oas 68 "Indonesia is a tropical country with megabiodiversity because it has a very high diversity of flora and fauna. The ecosystem that is widely studied and researched is the river water ecosystem area. The river water ecosystem contains various types of vegetation and biota, one of which is insects in the Order Odonata which can be used as bioindicators. The purpose of this study was to determine the Index of Biodiversity, Evenness and Dominance in Karangrejo Village, Garum District, Blitar Regency. The study was conducted in December 2020 - January 2021 by dividing the location into six plots with various habitat types, the data obtained were then analyzed and analyzed using the Shannon-Wiener index, evenness index (E) and dominance (D) using the Simpson formula. Based on observations, there were 29 species of Odonata with the three most species being Pantala flavescens, Orthetrum sabina, and Vestalis luctuosa. The highest level of odonata diversity was found in plot 3 of H' = 2.26. The highest dominance index in plot 3 is D=0.85; and the highest evenness index in plot 5 is E = 0.36." (Authors)] Address: not stated

21150. Nair, V.P.; Samuel, K.A.; Palot, M.J.; Sadasivan, K. (2021): The dragonflies and damselflies (Odonata) of Kerala – Status and distribution. Entomon 46 (3): 185-238. (in English) ["The odonate fauna of Kerala, their status and distribution are reviewed. Based on personal records from field work since 2010 and published literature, all the recent additions and range extensions to the region are critically

analyzed and a revised checklist of odonates of Western Ghats and Kerala is provided. The current checklist of odonates of the Western Ghats stands at 207 species, including 80 endemics. A total of 181 species of Odonates, including 68 Western Ghats endemics, belonging to 87 genera under two suborders and 14 families were recorded from the geographical boundary of Kerala. The suborder Zygoptera comprises 74 species of damselflies (30 genera in seven families) and the suborder Anisoptera has 107 species (57 genera in seven families). Endemic species and those in IUCN Red List categories are enlisted. None of the odonate species from the region are protected under the Indian Wildlife Protection Act (WPA) 1972. A detailed discussion on odonates occurring in Kerala has been provided in the systematic part." (Authors)] Address: Nair, V.P., 1XV/446 A1, Nethaji Housing Colony, Trichambaram, Taliparamba P.O, Kannur, Kerala, India. Email: vinayanpnair@gmail.com

21151. Nazari, V. (2021): Taxonomy at face value: An assessment of entomological postage stamps as effective teaching aids for science educators. Research Ideas and Outcomes 7: e68056: 12 pp. (in English) ["Entomological postage stamps are unique means of communication of science with the public and have been suggested as effective teaching tools in primary and secondary education. A survey of the taxonomic and other information contained on insect- and arachnid-themed stamps issued globally from 1891 to 2020 reveals that 30% of these stamps contain various errors and are scientifically unreliable. In addition, representations of insects are highly biased towards only two orders (Lepidoptera and Odonata), while other mega-diverse orders (e.g. Coleoptera, Diptera, Hymenoptera) are poorly represented or not represented at all. This phenomenon can negatively affect public perception of priorities in biodiversity and conservation. Standardization of taxonomic information on entomological stamps and implementation of rigorous quality control measures are encouraged to assure dissemination of accurate scientific information." (Author)] Address: Nazari, V., Independent Researcher, Ottawa, Ontario, Canada. Email: nvazrick@yahoo.com

21152. Nisar, M.M.; Muhammad, K.; Mehmood, S.A.; Ahmed, S.; Murtaza, B.N.; Nadeem, M.S. (2021): Morphological and phylogenetic evaluation of Libellulidae dragonflies from district Attock, Punjab, Pakistan. International Journal of Agruculture & Biology 26: 393-400. (in English) ["Dragonflies under the family Libellulidae and order Odonata have included among the ecosystem friendly insects. In the present study, we aimed to evaluate the phylogenetics and evolutionary history of dragonflies at the cross junction of Punjab and Khyber Pakhtunkhwa provinces of Pakistan. The studies were principally based on the morphological characters of head and wing venation and phylogenetic analysis based on the nucleotide sequence of 12S rRNA gene. DNA was extracted using phenol-chloroform method and the DNA fragment was amplified through Polymerase Chain Reaction using 12S rRNA primers. A total of 233 collected specimens were identified into ten species from four genera (Crocothemis, Orthetrum, Sympetrum and Zygonyx) according to their morphological and morphometric characterization. The nucleotide sequence analysis of 12S rRNA gene had shown genetic affinities among the subject genera. The phylogenetic tree constructed by morphological data and 12S rRNA revolved two clades and supported the grouping of collected specimens. Further phylogenetic analysis based on nucleotide sequences of 12S rRNA from GenBank generated the phylogenetic tree with four clades of related species. On the basis of our findings, Crocothemis erythraea were placed phylogenetically adjacent to Orthetrum cancellatum, O. sabina to Libellula nodistica (EF640400.1), O. glaucum to Libellula saturate (EU054935.1), O. brunneum to O. brunneum (DQ021416.1), Sympetrum fonscolombii to Orthemis ferruginea (EF640402.1), and Zygonyx torridus to O. pruinosum (EF640403.1) with minute differences in bootstrap values. The present report describes an aspect to record and catalogue the ecosystem friendly insects mostly being threatened." (Authors)] Address: Muhammad, K., Dept of Biotechnology and Genetic Engineering, Hazara University Mansehra 21300 Khyber Pakhtunkhwa, Pakistan. E-mail: Khushisbs@yahoo.com;

21153. Nogueira, J. G.; Sousa, R.; Benaissa, H.; De Knijf, G.; Ferreira, S.; Ghamizi, M.; Gonçalves, D.; Lansdown, R.; Numa, C.; Prié, V.; Riccardi, N.; Seddon, M.; Urbánska, M.; Valentini, A.; Vikhrev, I.; Varandas, S.; Teixeira, A.; & Lopes-Lima, M. (2021): Alarming decline of freshwater trigger species in western Mediterranean key biodiversity areas. Conservation Biology 35: 1367-1379. (in English) ["The identification of key biodiversity areas (KBA) was initiated by the International Union for Conservation of Nature in 2004 to overcome taxonomic biases in the selection of important areas for conservation, including freshwater ecosystems. Since then, several KBAs have been identified mainly based on the presence of trigger species (i.e., species that trigger either the vulnerability and or the irreplaceability criterion and thus identify a site as a KBA). However, to our knowledge, many of these KBAs have not been validated. Therefore, classical surveys of the taxa used to identify freshwater KBAs (fishes, molluscs, odonates, and aquatic plants) were conducted in Douro (Iberian Peninsula) and Sebou (Morocco) River basins in the Mediterranean Biodiversity Hotspot. Environmental DNA analyses were undertaken in the Moroccan KBAs. There was a mismatch between the supposed and actual presence of trigger species. None of the trigger species were found in 43% and 50% of all KBAs surveyed in the Douro and Sebou basins, respectively. Shortcomings of freshwater KBA identification relate to flawed or lack of distribution data for trigger species. This situation results from a misleading initial identification of KBAs based on poor (or even inaccurate) ecological information or due to increased human disturbance between initial KBA identification and the present. To improve identification of future freshwater KBAs, we suggest selecting trigger species with a more conservative approach; use of local expert knowledge and digital data (to assess habitat quality, species distribution, and potential threats); consideration of the subcatchment when delineating KBAs boundaries; thoughtful consideration of terrestrial special areas for conservation limits; and periodic field validation." (Authors)] Address: Nogueira, Joann, CIBIO/InBIO – Res. Center in Biodiversity & Genetic Resources, Univ. Porto, Campus Agrário deVairão, Vairão, Portugal. Email: joanafgnogueira93@gmail.com

21154. Paparisto, A.; Shkëmbi, E.; Halimi, E.; Pepa, B.; Qirinxhi, X.; Misja, K. (2021): Odonatat e Shqipërisë. Shtypur në Republikën e Shqipërisë Shtypshkronja, Tiranë: 163 pp. (in Albanian, with English summary) ["The aim of this study, undertaken in entomology and extended from 2013-2018, has been the identification and updating of taxonomic data and ecological estimation of odonatofauna spread throughout the territory of Albania. Dragonflies are an important connecting link between freshwater and terrestrial habitats. These organisms play an important ecological role. The members of this group of insects are known as indicator of the status of biodiversity in freshwater ecosystems. The result of this study is the updated list of species of Odonata

Order for Albania, Insecta Class, Arthropoda Phylum. An important contribution of this work is also the first electronic database in Albania for Odonata Order, and the Key of Determination. These will serve as instruments to support further studies at the taxonomic level of Albania's odonatofauna, but also ecological and environmental studies. The study has enriched the National Museum of Natural Sciences with a 1000 new individuals' collection." (Authors)] Address: Paparisto, Anila, Dept of Biology, Fac. Natural Sciences, Tirana Univ., Bulevardi Zogu i Parë, Tiranë, AL-1001, Albania. Email: anila.paparisto@yahoo.com

21155. Roy, G.C.; Chakraborty, K.; Banerjee, S. (2021): A study on the guild Interaction of predator natural enemies in a rice field. Eco. Env. & Cons. 27 (February Suppl. Issue): S35-S39. (in English) ["The present study make known that intraguild and interguild antagonism have a number of baneful sound effects in moribund the major pest density in rice field. Study design: Random quadrate sampling was performed at the peak season (October 2016-December 2016 and October 2017-December 2017) for two successive kharif crop year (2016-2017) in the insecticide unprocessed regions of rice field for surveillance and assortment of samples. Results: Agriocnemis pygmaea (Rambur) is the leading species out of all Odonata samples. Three distinguished spider guilds were observed namely, orb-weaver, space-weber and hunting spider. Orb-weavers, Tetragnatha mandibulata Walck are especially copious. Most prevalency (21.78%) of Lycosa pseudoannulata Boes was observed. This was followed by Atypena formosana Oi (16.33%) and Argiope catenulata Dole (14.56%) in descending order. Quite a lot of predators are also usually found like, Coccinella septempuntata, Menochilus sexmaculata and Micrapsis discolor etc. Conclusion: Fortification of omnivore's results due to affluence of predator population in the rice field as bio-control agents." (Authors)] Address: Banerjee, S., Dept of Zoology, Burdwan Raj College, Purba Bardhaman 713 104, West Bengal, India

21156. Soares, D.M.; Borges, L.R.; Falcão da Silva, M.F.; Luche, L.D. (2021): Effect of substrates of native and exotic plant species on the initial period of colonization of benthic macroinvertebrates in the Cerrado biome. Community Ecology 22(2): 127-134. (in English) ["The introduction of exotic species can generate changes in the composition of organic debris of alien origin in aquatic ecosystems close to the places of introduction. This new debris can cause impacts at the level of communities and ecosystems. Therefore, the present work aims to answer the following question: are the macroinvertebrate communities present in substrates formed by leaves of the exotic species Pinus caribaea Morelet (Pinaceae) and Eucalyptus grandis Hill ex Maiden (Myrtaceae) similar to those found in substrates composed by the mix of these two species and substrates composed by a mix of native species? For the collection of macroinvertebrates, sets of four types of artificial substrates were submerged in a stream inside the Ecological Station of Panga (Uberlândia—MG, Brazil). The treatments were: leaves of P. caribaea, leaves of E. grandis, leaves of both exotic species and leaves of two native species. In the 20 sample units, about 250 individuals were found, belonging to the orders Coleoptera, Diptera, Ephemeroptera, Heteroptera, Megaloptera, Odonata, Plecoptera and Trichoptera. The effects of the treatments were observed in the exponential decay of the substrate mass and in the structure of the benthic macroinvertebrates communities. The composition of these communities differed among treatments, with high dissimilarity observed between P. caribaea treatments and the mix of exotic species. Therefore, the results demonstrate the importance of substrate complexity for benthic macroinvertebrates, as well as the possible effects of biological invasion and co-invasion by species widely used in silviculture activities." (Authors)] Address: Soares, Danúbia, Laboratório de Restauração Ecológica, Instituto de Biologia, Univde Federal de Uberlândia, Campus Umuarama, Rua Ceará s/n, Bloco 2D, Sala 16, Uberlândia, Brazil

21157. Stand-Perez, M.A.; Montes-Fontalvo, J.; Pérez-Gutiérrez, L.A. (2021): Libélulas comunes del departamento del Atlántico, Colombia. Hetaerina 3(2): 25-29. (in Spanish) ["The Dept of Atlántico is located on the north coast of Colombia, in the Caribbean region, and has an area of 3,386 km², which represents 0.29% of the country's surface. In the Dept, low and flat lands, swamps, mountain ranges and a coastal strip of desert and savanna areas predominate, with an average annual temperature of 26 °C, maximum recorded averages of 29.9 °C and minimum averages of 25 °C. C; Lastly, it presents a bimodal rainfall regime, with a rain peak between the months of April and June and a second rainfall peak between the months of September and November (Oyaga, 2013). For the Atlantic, a total of 52 species of odonates have been reported to date (Table 1) (Pérez-Gutiérrez & Palacino-Rodríguez, 2011), 15.5 % of the diversity of Colombia. With the aim of stimulating citizen science, as a fundamental tool to generate community support for conservation efforts of natural spaces, including urban ones, here is a photographic catalogue that can function as an introductory guide to the diversity of the most common species that inhabit wetlands and urban areas of the Dept of Atlántico (Fig. 1-3), highlighting the importance that these ecosystems represent in the conservation of the diversity of dragonflies and damselflies, and the habitats that these organisms occupy. In addition, we extend the invitation to share sightings, as well as comments and doubts with the Systematics and Autoecology of Aquatic Insects (SAIA) seedbed of the Universidad del Atlántico, a group with a long history in the study of odonates in the Dept of Atlántico and the rest of Colombia." (Authors)] Address: Stand-Pérez, M.A., Red de Biología Evolutiva, Instituto de Ecología, A.C., Xalapa, México. Sistemática y Autoecología de Insectos Acuáticos (SAIA), Universidad del Atlántico, Barranquilla, Colombia. E-mail: mstand20@gmail.com

21158. Yu, C.; Qin, H.; Shen, Q.; Yu, K.; Chen, C.; Wang, H.; Bai, Y. (2021): Effects of wetland environmental diversity on Odonata species diversity. Journal of Taizhou University 43(3): 42-47. (in Chinese, with English summary) ["In order to explore the impact of wetland environmental diversity on the species diversity of Odonata insects, the species diversity of Odonata in different wetland environments of Taizhou [Zhejiang province, China] was investigated from July to August in 2020. The dragonflies were collected by scanning net method, and the Shannon-Wiener Diversity Index and Correlation Index were used for the analysis. The results showed that the species of Odonata were the most abundant in all the plots. Among them, the Pantala flavescens had a large number of individuals in wetland environments with low vegetation, and the Crocothemis servilia was found in reservoirs and streams with more ponds. There were quantities of Pseudothemis zonata in the wetland environment with tall trees and intertwined ponds, and there were plenty of Deielia phaon in places with better environments around the reservoir. Correlation analysis showed that there was a negative correlation between the species diversity of Odonata and the ratio of water area to land area. With the increase of water area, the species diversity of Odonata showed a

downward trend. However, as the proportion of land and water area ranging from 9% to 12%, the species diversity index of Odonata was the highest. The results provided biodiversity data support for wetland environmental protection and water quality assessment." (Authors)] Address: Yu, C., School of Life Science, Taizhou University, School of Teacher Education, Taizhou University, China

21159. Zhang, H.-m.; Cai, Q.-h. (2021): Biodiversity and fauna study of Odonata from Shennongjia Mountains. Resources and Environment in the Yangtze Basin 30(6): 1393-1399. (in Chinese, with English summary) ["From 2012 to 2015 surveys, 39 locations of dragonflies were investigated in Shennongjia mountains. 88 species of dragonflies belonging to 55 genera, 15 families and 2 suborders were obtained. Anisoptera species are dominant, with 34 genera and 61 species, occupied 61.82% and 69.32% of the total respectively. Libellulidae is the most abundant family, with 25 species, occupied 28.41% of the total species. Zygoptera with 21 genera and 27 species, occupied 38.18% and 30.68% of the total respectively, Calopterygidae, Platycnemididae and Coenagrionidae are dominant groups with 5 species each, occupied 5.68% of the total. The main characteristic of Shennongjia dragonfly fauna is the oriental species are dominant, with 49 species recorded, occupied 55.68% of the total species, including 4 distribution types; 39 species are the Palaearctic-Oriental distribution type, occupied 44.32% of the total species, including 9 distribution types. The results show that Shennongjia mountains is an important dragonfly habitat, and dragonfly resources have significant regional characteristics. In order to further protect the diversity of dragonflies, effective conservation strategies should be taken." (Authors)] Address: Zhang, H.-m., Kunming Natural History Museum of Zoology, Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, Yunnan 650223, China. Email: zhanghaomiao@mail.kiz.ac.cn

2022

21160. Adu, B.W. (2022): Assessment and inventory of Odonata (Insecta) and water quality parameters of the Abaa, Malaika, and Isokun rivers in south-western Nigeria. Biologia 77: 2563-2570. (in English) ["Odonata can be found in most inland waters except in Antarctica. Some species of this insect are habitat-specific partly due to their sensitivity and tolerance to changes in the environment. This study evaluated dragonflies and damselflies composition, and physico-chemical characteristics of three water bodies (Abaa, Malaika, and Isokun rivers) in Ondo State, Nigeria. The study span through a period of six months. Specimens of Odonata and water samples were collected at the three rivers for analyses once a month for six months (April-September, 2019). The mean values for the physicochemical parameters and diversity of species of Odonata were calculated. Analysis of data revealed that ambient temperature, water temperature, and flow rate were not significantly different ($p > 0.05$) between the study sites. The pH value of the water sample from the three sites were fairly alkaline with mean values ranging from 8.65 ± 0.34 to 9.10 ± 0.88. The dissolved oxygen (DO) values of the three study sites ranged from 5.13 ± 1.02 to 6.95 ± 0.88, indicating little variability in the DO content of the water. The lowest values for Shannon-Weiner H` (2.247) and Simpson 1-D (0.8794) were recorded at Abaa, while the highest values for both indices (2.729 and 0.9191, respectively) were recorded for Isokun. The dominant dragonflies and damselflies at the three sites are the ubiquitous type associated with the disturbed environment, they include Trithemis kirbyi, Palpopleura lucia, Pseudagrion kersteni, P. melanicterum and Trithemis arteriosa. This study revealed that the three water bodies investigated inhabited ubiquitous odonate fauna linked with both disturbed and moderately polluted environments. The Abaa River was the most disturbed with the least number of species due to the high rate of anthropogenic activities, the presence of some sensitive species at the Isokun River, and the outcome of biodiversity indices analysis revealed that the Isokun River was the most stable odonate community among the three rivers." (Author)] Address: Williams Adu, B., Dept of Biology, School of Life Sciences, Federal University of Technology, Akure, Ondo State, Nigeria

21161. Agdamar, S.; Sac, G. (2022): Growth and feeding ecology of a small-bodied freshwater fish species Petroleuciscus borysthenicus (Kessler, 1859) in an artificial water body of an island ecosystem (Gökçeada, Turkey). Journal of Advanced Research in Natural and Applied Sciences 8(1): 76-85. (in English) ["Bio-ecological studies and life-history traits of small-bodied fishes are critical for the understanding of their ecological role as well as the assessment of their position and continuity in the ecosystems. This study aims to present initial data on the growth and feeding habit of small-bodied Petroleuciscus borysthenicus inhabited in an island ecosystem (Gökçeada, Turkey). During the seasonally sampling surveys from May 2020 to January 2021, a total of 163 specimens were collected from Sahinkaya Reservoir using electrofishing. Standard length and body weight of fish samples varied between 2.6–10.0 cm and 0.32–25.68 g, respectively. Length-weight relationship and condition factor were calculated for all specimens as $W=0.017\times SL3.114$ ($r=0.988$) and 2.04 (±0.28), respectively. F:M sex ratio was found to be 1:1.33 with no significant difference from the ratio of 1:1 ($X^2=0.02$; $p>0.05$). Diet of the species comprised of ten different food items. Plant (63.6%) was the most preferred food item in terms of frequency of occurrence (F%), followed by Diptera (31.8%) and Odonata (12.7%). According to the index of relative importance IRI (%) values of food items, Diptera was the dominant food item in all seasons. Levins' measure of niche breadth (B) and standardised niche breadth (BA) values were estimated as 3.18 and 0.24, respectively. The results showed that P. borysthenicus was more selective on conveniently accessible food materials in the environment and its food preference was affected by seasonal food supply." (Author)] Address: Saç, G., Gökçeada School of Applied Sciences, Çanakkale Onsekiz Mart University, Çanakkale, Turkey. Email: gulsahsac@gmail.com

21162. Augusto, F.G.; Graça, M.A.S.; Martinelli, L.A.; Caçador, I.; Arce-Funck, J. (2022): Do aquatic insects disperse metals from contaminated streams to land? Hydrobiologia 849: 1437-1451. (in English) ["Mining activities often produce large amounts of pollutants that lead to streams affecting aquatic biota. Aquatic insects have a key role in energy transference from streams to terrestrial systems since emergent insects contribute to the diet of riparian predators. If streams are polluted, emergent insects may act as pollutant conveyors from water to land. Our objective was to investigate if insects inhabiting streams contaminated by heavy metals accumulate, biomagnify, and transfer metals to land. We selected eight streams with different levels of pollution and three metallic pollutants: copper (Cu), manganese (Mn), and zinc (Zn). We sampled (i) water and sediments, (ii) organic matter, macrophytes, and biofilm, (iii) aquatic insects [including "Anisoptera, Zygoptera"], and (iv) riparian spiders (land predators). We classified the organisms in functional feeding groups (FFG) and used the nitrogen stable isotope ($d^{15}N$) to determine the position of organisms in the food

web. We found that contaminants in the sediments, but not in the water, were related to contaminant concentrations in biological samples. Biomagnification processes were metal dependent: Cu was biomagnified, Mn underwent biodilution, and no tendency was observed for Zn. The emergence of aquatic insects from metal-polluted rivers is a potential way of Cu, not Mn or Zn, flux to land." (Authors)] Address: Augusto, F.G., Lab. Isotope Ecology, Center for Nuclear Energy in Agriculture, Univ. of São Paulo, Av. Pádua Dias, 330, São Dimas, Piracicaba, SP, CEP 13416-000, Brazil

21163. Balázs, A.; Šipoš, J-: Matúšová, Z.; Hamerlík, L.; Novikmec, M.; Svitok, M. (2022): Comparison of conservation values among man-made aquatic habitats using Odonata communities in Slovakia. Biologia 77: 2549-2561. (in English) ["Odonates are one of the best-known aquatic insect groups, with the renowned ability to reflect the quality of freshwater ecosystems. In the last few decades, major emphasis has been placed on the importance of secondary aquatic habitats as refugia for odonates. Biota of man-made habitats, especially dams, are burdened by countless negative anthropogenic impacts. Nevertheless, some habitat types appear to be able to support species with high conservation value. Here, we used generalised linear models to analyse the effects of several environmental characteristics, such as pH, conductivity, water area and perimeter of selected sites, to clarify the effects of drivers in terms of species richness of odonates. Water dams, flooded quarries, flooded gravel quarries and flooded sandpits have been compared based on the Dragonfly Biotic Index (DBI). We recorded 44 odonate species, including several red-listed ones, such as Epitheca bimaculata, Leucorrhinia caudalis and L. pectoralis. Although the highest numbers of species were found at water dams, at such habitats, the lowest values of DBI were revealed. The fractional effect of habitat types on DBI was also proven to be significant. Increased conductivity resulted in a decrease of species richness. The positive correlation between habitat area and DBI was also proven to be significant. Our results indicate a high conservation value of different types of flooded quarries counter to water dams, based on the presence of several nationally threatened species with high values of DBI." (Authors)] Address: Balázs, A., Dept Zool., Fac. AgriSciences, Mendel Univ. Brno, Zemedelská 1, 613 00, Brno, Czech Republic

21164. Berlov, O.E.; Berlov, E.Ya.; Berlov, N.O.; Olovyannikova, N.M. (2022): First record of rare Damselfly Calopteryx japonica (Odonata, Calopterygidae) in the Baikal-Lena Nature Reserve. Baikal Zoological Journal 33(1): 145-146. (in Russian, with English summary) ["C. japonica altaica Belyshev, 1955. Material 1 ♀. Russia: Irkutsk Region, Olkhonsky District, Baikal-Lensky Nature Reserve, Cape Tyteri [53°59'55"N, E108°12'35"E], specimen found drowned in water of Lake Baikal, July 21, 2003 (leg. O.E. Berlov). Several speimens of ♂♂ and ♀♀. Russia: Irkutsk oblast, Olkhonsky district, Baikal-Lena Reserve, Cape Onkholoy [53°47'33"N, 107°57'22"E], July 5–17, 2003, dragonflies were catching mosquitoes in the coastal meadow, 10–50 m from the shore of Lake Baikal (observer O.E. Berlov). 1 ♀. Russia: Irkutsk Region, Olkhonsky District, Baikal-Lensky Nature Reserve, Pokoiniki Cape [54°01'02"N, 108°14'47"E], Lake Baikal shore, July 19, 2005 (leg. N.M. Olovyannikova) 1 ♂. Russia: Irkutsk Region, Olkhonsky District, Baikal-Lensky Nature Reserve, Pokoiniki Cape [54°01'02"N, 108°14'47"E], Lake Baikal shore, July 10, 2017 (observer N.M. Olovyannikova), a photograph of this specimen is available on the Internet - https://nature.baikal.ru/phs/ph.shtml?id=97388." (Authors/-Google translate)] Address: Berlov, O.E., Irkutsk Anti-Plague Research Institute of Siberia and Far East, Irkutsk, Russia. Email: blgz@mail.ru

i.Bertoli, M.; Pastorino, P.; Lesa, D.; Renzi, M.; Anselmi, S.; Prearo, M.; Pizzula, E. (2022): Microplastics accumulation in functional feeding guilds and functional habit groups of freshwater macrobenthic invertebrates: Novel insights in a riverine ecosystem. Science of The Total Environment 804, 15 January 2022, 150207: 10 pp. (in English) ["Highlights: • Microplastics contamination was assessed in a macrobenthic invertebrate community. • Cellulosic fibers associated to polyester were found in 48.5% of the taxa. • The highest microplastics amount was detected in the collector-gatherers. • There was no difference in microplastics amount among the functional habit groups. Abstract: Microplastics pose a major threat for aquatic ecosystems, but the contamination dynamics in organisms inhabiting freshwater ecosystems is still little studied. Largely used for biomonitoring, macrobenthic invertebrates provide a pivotal trophic resource for many fish and bird species. In this study, we investigated the microplastics contamination in a macrobenthic invertebrate community (2772 individuals belonging to 33 taxa identified) in a high-plain riverine ecosystem (Vipacco River, northeast Italy) and compared the amount of microplastics accumulated in functional feeding guilds/functional habit groups. Microplastics (cellulosic fibers associated with polyester) were found in 48.5% of the taxa, with the highest amount detected in the collector-gatherers, followed by predators. The collector-gatherers showed a significantly higher microplastic accumulation than the other functional feeding guilds, whereas there was no difference among the functional habit groups. The main source of microplastics pollution was most likely urban wastewater discharge points located along the river. Our study reports a novel approach about microplastic pollution assessment in lotic environments, as it focuses into the microplastic contamination dynamics in an entire macrobenthic invertebrate community perspective and underlines the need for further study." (Authors) Gomphidae, Calopteryx, Coenagrionidae] Address: Pastorino, P., The Veterinary Medical Research Institute for Piemonte, Liguria & Valle d'Aosta, via Bologna 148, 10154 Torino, Italy. Email: paolo.pastorino@izsto.it

21165. Brenkman, A.B. (2022): After 112 years, again an observation of an imago of Zygonyx torridus on Gran Canaria (Spain). Brachytron23(1/2): 48-52. (in Dutch, with English summary) ["Ringed Cascader (Zygonyx torridus) has been reported from the Canary Islands from the islands of La Palma, La Gomera, Tenerife and Gran Canaria. On 11 August 2018 I observed an imago in the Barranco de Azuaje, in the north of Gran Canaria. This is the first observation of an imago in more than 100 years for Gran Canaria. A short description of the habitat is provided." (Author)]

21166. Buczyñski, P.; Piwowarczyk, A.; Tañczuk, A.; Bojar, P.; Mikolajczuk, P.; Góral, N. (2022): Dragonflies (Odonata) of the Lake Orchowe Nature Reserve (Western Polesie). Przeglad Przyrodniczy XXXIII(2): 79-93. (in Polish, with English summary) ["In 2021 the fauna of dragonflies was studied in the Lake Orchowe Nature Reserve (Leczynsko-Wlodawska Plain, Western Polesie, eastern Poland). Four sites were surveyed: the dystrophic Lake Orchowe (No. 2), a fen with a permanent water body (No. 4) and two peat bogs of a mainly transitional nature: open and permanently hydrated (No. 3) and overgrowing with young forest and mostly drying up in the summer season (No. 1). 40 species were recorded (54% of the national fauna). The most interesting were: Nehalennia speciosa, Aeshna juncea, A. subarctica,

Orthetrum coerulescens, Leucorrhinia pectoralis. Between 9 and 27 species occurred at particular sites. The fauna of Lake Orchowe was the richest, while the fauna of peatlands was moderately rich or poor. The lake was characterized by fauna of an intermediate nature between lake and peatland, indicating its low productivity. The fauna of peatlands was typical of these habitats, but on one site the impact of drying-up was noticeable. Six “special concern” species were recorded: three legally protected species in Poland; one from the IUCN Red List, one from the Red List of Europe, one from the Red List of the European Union, two from the Red List of dragonflies of Poland and four umbrella species for the studied habitats. Their occurrence and abundance as well as good preservation of the peatland fauna at most sites confirm the high natural value of the Lake Orchowe Nature Reserve for the protection of dragonflies and – indirectly – also for the protection of peatland habitats and their biota. There were no significant changes of the fauna, related to climate warming. The new data of Nehalennia speciosa and Aeshna subarctica is significant to the knowledge on their distribution in the Leczynsko-Wlodawska Plain and its vicinity. It is worth mentioning that individuals of Nehalennia speciosa were found not only in reedbeds with the domination of Carex lasiocarpa, but also C. elata, which is a more regular case now in Poland, yet still scarce. Both species have isolated distribution areas here, with 7 localities of Nehalennia speciosa and 4 of Aeshna subarctica known today. Due to this isolation, each population is important as part of a metapopulation within such an area." (Authors) Nehalennia speciosa, Aeshna juncea, A. subarctica, Anax parthenope, Orthetrum coerulescens, Leucorrhinia pectoralis] Address: Buczynski, P., Dept Zool., Maria Curie-Sklodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

21167. Cezario, R.R.; Therezio, E.M.; Marletta, A.; Gorb, S.N.; Guillermo-Ferreira, R. (2022): Ontogenetic colour change of a sexual ornament in males of a damselfly: female mimicry, crypsis or both? Die Naturwissenschaften 109(1):2: 9 pp. (in English) ["Female mimicry by males is a widespread phenomenon in several taxa and may be involved in aggression avoidance or facilitated access to resources. In early developmental stages, female mimicry may be a mechanism involved in signalling sexual immaturity or, when coupled with strategies related to visual camouflage, may be involved in the avoidance of male-male agonistic interactions. Here, we addressed whether the delayed colour maturation of a sexual ornament in males of Mnesarete pudica damselflies might be a case of crypsis, female mimicry or both. We analysed how conspecifics and predators perceive the pigmented wings of juvenile males by contrasting the wing spectra against a savannah background and the wings of both juvenile and sexually mature males and females. Our results based on the modelled visual system of conspecifics and predators suggest that the colour maturation of juvenile males may function as both crypsis and female mimicry. We discuss whether these results related to age- and sexual-dichromatism might be a mechanism to avoid unwanted intraspecific interactions or to avoid territorial and aggressive males. We conclude that the female mimicry and crypsis in juvenile males of M. pudica are mechanisms involved in avoidance of predators and unwanted intraspecific interactions, and the signalling of sexual maturity." (Authors)] Address: Guillermo.Ferreira, R., Lestes Lab, Univ. Federal do Triangulo Mineiro, Uberaba, MG, Brazil. Email: rhainerguillermo@gmail.com

21168. Chacko, S.; Kandambeth, P.P. (2022): Studies on trematode metacercariae infecting libellulid larvae from the Western Ghats, Wayanad region. Parasit. Dis. 46(1): 159-165. (in English) ["Understanding the host specificity of trematode larvae is vital in predicting the mode of trophic level transfer of trematode parasites and their evolution. In this study, six species of trematode metacercariae, Eumegacetes sp., Orthetrotrema monostomum, Ganeo tigrinus, Mehraorchis sp., Pleurogenoides sp. and Phyllodistomum sp. infecting the larvae of the odonate family Libellulidae from the water bodies in the Wayanad region of the Western Ghats are recorded. ... A total of 198 anisopteran larvae were subjected for study of which the most abundant was that of the family Libellulidae (154). Family Gomphidae was represented by 24 larvae, Macromiidae with 10 and Aeshnidae with 10 larvae. Five species of libellulid larvae under three genera, Orthetrum, Pantala and Trithemis were recorded as second intermediate hosts, in the present study. The larvae of the family Libellulidae were infected with six species of trematode metacercariae: Eumegacetes sp., Orthetrotrema monostomum, Ganeo tigrinus, Mehraorchis sp., Pleurogenoides sp. and Phyllodistomum sp. (Table 1). Out of 154 libellulid larvae examined, 53 were infected with trematode metacercariae. The prevalence of infection were 5.8%, 2.0%, 10.4%, 9.1%, 2.6% & 1.3%, the mean intensity of infection 4.44, 1.67, 5.38, 6.21, 6.00 & 17.50 and the mean abundance were 0.26, 0.03, 0.56, 0.56, 0.16 & 0.23, respectively (Table 2). Of the 24 larvae under Gomphidae two were found infected with Eumegacetes sp. (prevalence 8.3%, mean intensity 6.5 and mean abundance 0.54) and one with Phyllodistomum sp. (prevalence 4.2%, mean intensity 12 and mean abundance 0.5). No metacercarial larvae were recorded from other two families of the insect larvae." (Authors)] Address: Kandambeth, P.P., Ecological Parasitology & Tropical Biodiversity Laboratory, Dept Zoology, Kannur Univ., Mananthavady Campus, Wayanad, Kerala 670645, India. mail: prasadanpk@kannuruniv.ac.in

21169. Choong, C.Y. (2022): Perkembangan larva Tramea transmarina euryale Selys, 1878 (Insecta: Odonata) - Larval development Tramea transmarina euryale Selys, 1878 (Insecta: Odonata). Serangga 27(3): 54-65. (in Malaysian, with English summary) ["The objective of the study was to record the larval development of Tramea transmarina euryale. The eggs of T. transmarina euryale were incubated until larval emergence in the laboratory. The eggs were collected from an egg-laying female at a pond in Universiti Kebangsaan Malaysia, Bangi Campus, Selangor, Malaysia. The fresh eggs were in yellow colour with a mean length of 0.46±0.01 mm and mean width of 0.37±0.01 mm. The egg incubation period needed at least seven days. The larval development of T. transmarina euryale consisted of 12–14 stadia. The rudimentary wing sheaths appeared at the 7th instar. The larvae turned into a greenish yellow colour in the last few instar stages. The whole larval development took 50–62 days to complete. The duration of larval development in T. transmarina euryale is generally short if compared to the other Libellulidae species. The information of larval development until adult stage of T. transmarina euryale is important for the breeding and conservation purposes, as well as its potential to be applied as biological control agent." (Author)] Address: Choong, C.Y., Pusat Sistematik Serangga, Fakulti Sains dan Teknologi, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor. Email: cychoong@ukm.edu.my

21170. Chovanec, A. (2022): Erstmalige Dokumentation eines Paarungsversuches zwischen einem Männchen von Orthetrum brunneum und einem Weibchen von Orthetrum albistylum (Odonata: Libellulidae). Mercuriale 22: 71-82.

["First record of a tandem linkage between a male Orthetrum brunneum and a female O. albistylum (Odonata: Libellulidae). – A heterospecific tandem between a male Orthetrum brunneum and a female O. albistylum was documented photographically at a stagnant water body in Lower Austria on 04th August 2022. The linkage lasted for about three minutes. Invitation movements to form a pairing wheel were carried out by the male during flights over short distances from one perching site to another situated on reed stems. The female's behaviour seemed a little "ambiguous": She refused to flex the abdomen in order to form the wheel, but she was not completely passive, grasping the male's abdomen throughout the duration of the linkage." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

21171. Chovanec, A. (2022): The assessment of the dragonfly fauna (Insecta: Odonata) as a tool for the detailed typological characterisation of running waters. Acta ZooBot Austria 158: 129-147. (in English, with German summary) ["Odonata play an increasing role as indicators in the assessment of the ecological status of running water systems in modern water management. In this connection, the application of the Rhithron-Potamon Concept dealing with the longitudinal distribution patterns of aquatic communities along biocoenotic regions has proven to be a sound approach. Central aspect of the assessment procedure is the comparison of the odonatological status quo with a river type-specific reference state, which focuses on the potential dragonfly community at the (near-)pristine character of the water body investigated. A more detailed method of defining reference species is required particularly with regard to special river types, as the exclusive assignment of the biocoenotic region may cause misleading results. This present paper deals with one of the last near-natural hyporhithron river sections in Austria, the lower course of the Antiesen. Taking into account the Antiesen's canyon-like geologic features with reduced availability of different habitat types for dragonflies in the riparian ecotones, the predetermined spectrum of hyporhithron reference Odonata species was adapted by discussing autecological requirements and river-morphology and revealed two river type-specific core reference species (Calopteryx virgo and Onychogomphus forcipatus) and five river type-specific accompanying reference species. The comparison of these reference species with the results of a comprehensive field study carried out in 2020 at the Antiesen confirmed the unique features of this river type and the dominating hyporhithron characteristics. It also revealed, however, a slight epipotamon influence indicated by the high abundance of Calopteryx splendens, one of the river type-specific accompanying reference species, probably due to increased water temperatures." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

21172. Delsinne, T. (2022): Amphibiens et libellules de l'évacuateur de crues du barrage de Pirot (Forêt domaniale de Tronçais, Isle-et-Bardais, 03). Etude réalisée par la Société d'Histoire Naturelle Alcide-d'Orbigny pour l'Office National des Forêts: 24 pp. (in French) ["France, Département Allier, Auvergne-Rhône-Alpes. 15 odonate species are documented: Anax imperator, Libellula depressa, L. fulva, Orthetrum brunneum, O. coerulescens, Sympetrum striolatum, Calopteryx splendens, C. virgo, Ceriagrion tenellum, Coenagrion puella, Coenagrion scitulum, Ischnura elegans, Ischnura pumilio, Pyrrhosoma nymphula, Platycnemis pennipes] Address: Société d'Histoire Naturelle Alcide-d'Orbigny, 57 rue de Gergovie, F-63170 Aubiere, France

21173. Dilushika, P. (2022): Effects of neonicotinoid exposure on anti-predator behaviour and learned recognition of novel predator odour of larvae Lestes spp. (Odonata: Zygoptera). MSc thesis, Dept of Biology, University of Saskatchewan: X + 69 pp. (in English) ["Neonicotinoids are widely used water-soluble neurotoxic insecticides. The effects of these insecticides on non-target aquatic organisms have become a major environmental concern since they affect both pests and non-target insects. Along with lethal effects, these insecticides could cause visual and chemoreception impairment. This can lead to behavioural alterations in aquatic organisms by disrupting the sensory systems used for detecting predators, thereby affecting anti-predator behaviours. Therefore, in this thesis, I investigated the effect of imidacloprid, a neonicotinoid insecticide, on the anti-predator response and learned recognition of novel predator odour in damselfly larvae (Lestes sp). In the first experiment (chapter 2), damselfly larvae were exposed to water contaminated with a series of concentrations (0.0µg/L, 0.1µg/L, 1.0µg/L, and 10.0µg/L) of imidacloprid and the change in number of feeding bites performed after injecting a conspecific damage-released alarm cue solution and a predator kairomone solution was observed and recorded on day 2, 5, and 10. On days 2 and 5, both the control and 0.1µg/L groups showed appropriate anti-predator behaviour to alarm cues and predator odour, but this was not the case for damselflies exposed to 1.0µg/L. By day 10, larvae in the 1.0 and 10.0µg/L groups no longer responded to alarm cues and all exposure groups ceased responding to predator odour. In the second experiment (chapter 3), I investigated the effect of exposure to a series of concentrations of imidacloprid on learned recognition of predatory stimuli by damselfly larvae. Damselflies were conditioned to recognize risk by exposing them to zebrafish odour (a novel odour) combined with conspecific damage-released alarm cues or control of dechlorinated water. Larvae in the control group learned to respond to the predator odour based on their prior conditioning with alarm cues but not water. Learning of predator odour also occurred for larvae in the 0.1µg/L treatment group but failed for individuals exposed to the higher concentrations of 1.0µg/Land 10.0µg/L. In the third experiment (chapter 4), I exposed damselfly larvae to imidacloprid (at an initial pulse solution of 3.0µg/L and reaching a final concentration of 0.01µg/L) during the conditioning period and evaluated the effect on learned recognition of novel predatory stimuli. Damselflies were conditioned to recognize risk by exposing them to zebrafish odour with true conditioning (alarm cue + predator odour) with or without imidacloprid and another group was given sham conditioning (water + predator odour) with or without imidacloprid exposure. Larvae given true conditioning without imidacloprid exposure correctly learned to recognize the predator odour as a threat, while larvae given sham conditioning, and those exposed to imidacloprid, failed to learn to respond to the predator odour. Overall, this study highlights that acute and chronic exposure to imidacloprid at both environmental relevant and higher concentrations impairs the anti-predator response to conspecific alarm cues and predator odour by damselfly larvae. Further, this study demonstrates that imidacloprid affects learned recognition of novel predator odour by damselfly larvae with the interaction between chemical cues and imidacloprid potentially playing a key role in this impairment." (Author)] Address: not stated

21174. Ertas, A.; Yorulmaz, B.; Sukatar, A. (2022): Comparative analysis of biotic indices for assessment of water quality of Balaban Stream in West Anatolia, Turkey. Biologia 77: 721-730. (in English) ["Drinking water basins are freshwater

resources that need to be protected and sustained of water quality. However, these areas are lately facing pressures such as agricultural, industrial and urbanization activities. This study was carried out to determine water quality of Balaban Stream and to compare the performance of the indices. Five sampling stations were determined and the samplings were carried out seasonally. Biotic and diversity indices based on benthic macroinvertebrates have been applied using Asterics software. By using UPGMA analysis, the similarities between the stations were clustered based on benthic macroinvertebrates. Pearson's based correlations were applied to the indices in order to determine the proper biotic indices. A total of 62 taxa which belong to Ephemeroptera, Plecoptera, Trichoptera, Diptera, Odonata, Coleoptera, Arhynchobdellida, Haplotaxida, Basommatophora and Amphipoda were detected. The most dominant group between the benthic macroinvertebrates (51 taxa) was found among Insecta. The 4th and 5th stations were the most similar according to the benthic macroinvertebrates assemblages. As a result of this research, the water quality of Balaban Stream was determined as unpolluted-slightly polluted. BMWP- O, BMWP- S, BMWP- H, ASPT- O, ASPT- H and ASPT- C indices were more proper than SI, FBI and BBI indices to determine the water quality of Balaban stream." (Authors)] Address: Ertas, A., Fac. Science, Dept Biology, Ege Univ., Bornova, 35100, Izmir, Turkey

21175. Feenstra, M.; van Rhijn, F. (2022): Speared dragonflies by Juncus. Brachytron 23(1/2): 58-60. (in Dutch, with English summary) ["In 2021 in the Weerribben-Wieden, we found both Cordulia aenea and Aeshna isoceles speared by the sharp points of Juncus conglomeratus and Juncus effusus. Most probably both individuals ended up there when flying or because of a sudden gust of wind." (Authors)] Address: Email: m.feenstra@protonmail.com

21176. Frank, K.D. (2022): 7. Dragonflies and Praying Mantises. In: Sex in City Plants, Animals, Fungi, and More: A Guide to Reproductive Diversity, New York Chichester, West Sussex: Columbia University Press. https://doi.org/10.7312/fran20606-011: 57-64. (in English) ["Philadelphia has four species of praying mantis, including three introduced from abroad. It has 46 species of Odonata. Each species courts its own kind. Despite their success in recognizing mates, they exploit deception during sexual conflict. This chapter examines how female dragonflies and female mantises apply sexual mimicry both defensively and offensively. Sexual mimicry may benefit females, especially in cities." (Author)] Address: unknown

21177. García-Pozuelo-Ramos, C. (2022): Odonatofauna de La Sagra (norte de Toledo, Castilla-La Mancha, España central) Odonatofauna of La Sagra (north of Toledo, Castilla-La Mancha, central Spain). Boln. Asoc. esp. Ent. 46(3-4): 263-282. (in Spanish, with English summary) ["We present here the results of the odonate surveys carried out in the region of La Sagra (Toledo, Spain) between 2018 and 2021. The total number of records amounted to 832. The number of recognised species was 36. The 33 species seen more than once belong 57.58% to Anisoptera and 42.4% to Zygoptera. The most abundant chorotypes are European-Ethiopian (18.18%) and Western Pan-Palaearctic (18.18%). Three species are classified as vulnerable: Coenagrion scitulum, C. mercuriale and Onychogomphus costae. Biodiversity hotspots are squares 30SVK22, 30TVK23 and 30TVK24. The species Ischnura graellsii and Ischnura elegans are found syntopic in La Sagra. Hybridisation between the two is possible." (Author)] Address: García-Pozuelo-Ramos, C., Sociedad Entomológica y Ambiental de Castilla-La Mancha, Spain. Email: pkymp@yahoo.es

21178. Gauci, C. (2022): An exceptional influx and successful breeding of Pantala flavescens on the Island of Malta (Maltese Archipelago) (Odonata: Libellulidae). Fragmenta entomologica 54(2): 247-256. (in English) ["Pantala flavescens (Fabricius 1798) appeared in unprecedented numbers in summer and autumn 2020 on the island of Malta. Several males were observed holding territory over largely bare, small bodies of water, mostly at Chadwick Lakes and Fiddien. Breeding activity was witnessed several times and 128 exuviae were found of which 124 were collected." (Author)] Address: Gauci, C., 28 Triq il-Kissier, Mosta, Malta. Email: cjgauci48@yahoo.com

21179. Grace, M.K.; Akçakaya, H.R.; Bennett, E.L. et al., (2022): Testing a global standard for quantifying species recovery and assessing conservation impact. Conservation Biology 35(6): 1833-1849. (in English, with Spanish summary) ["Recognizing the imperative to evaluate species recovery and conservation impact, in 2012 the International Union for Conservation of Nature (IUCN) called for development of a "Green List of Species" (now the IUCN Green Status of Species). A draft Green Status framework for assessing species' progress toward recovery, published in 2018, proposed 2 separate but interlinked components: a standardized method (i.e., measurement against benchmarks of species' viability, functionality, and preimpact distribution) to determine current species recovery status (herein species recovery score) and application of that method to estimate past and potential future impacts of conservation based on 4 metrics (conservation legacy, conservation dependence, conservation gain, and recovery potential). We tested the framework with 181 species representing diverse taxa, life histories, biomes, and IUCN Red List categories (extinction risk). Based on the observed distribution of species' recovery scores, we propose the following species recovery categories: fully recovered, slightly depleted, moderately depleted, largely depleted, critically depleted, extinct in the wild, and indeterminate. Fifty-nine percent of tested species were considered largely or critically depleted. Although there was a negative relationship between extinction risk and species recovery score, variation was considerable. Some species in lower risk categories were assessed as farther from recovery than those at higher risk. This emphasizes that species recovery is conceptually different from extinction risk and reinforces the utility of the IUCN Green Status of Species to more fully understand species conservation status. Although extinction risk did not predict conservation legacy, conservation dependence, or conservation gain, it was positively correlated with recovery potential. Only 1.7% of tested species were categorized as zero across all 4 of these conservation impact metrics, indicating that conservation has, or will, play a role in improving or maintaining species status for the vast majority of these species. Based on our results, we devised an updated assessment framework that introduces the option of using a dynamic baseline to assess future impacts of conservation over the short term to avoid misleading results which were generated in a small number of cases, and redefines short term as 10 years to better align with conservation planning. These changes are reflected in the IUCN Green Status of Species Standard." (Authors)] Address: Grace, Molly, Dept Zool., Univ. Oxford, Oxford, OX1 3SZ, UK. E-mail: molly.grace@zoo.ox.ac.uk

21180. Graham, Z.A.; Diehl, K.M.; Davis, D.; Loughman, Z.J. (2022): Death from below: Sit-and-wait predatory behavior

in a burrowing crayfish (Lacunicambarus thomai). Food Webs 31, e00225: 4 pp. (in English) ["The biology of burrowing crayfishes remains elusive to biologists, primarily because these animals spend a majority of their lives within the confines of their burrow. Scattered observations of burrowing crayfishes have suggested that burrowing crayfish may exhibit a greater degree of surface activity than previously thought. Surface behavior may be related to social interactions, predator defense, or prey capture. But documentation of these behaviors is rare, and few studies have been conducted on the predatory behaviors of burrowing crayfishes. Here, we report the findings of 24-h video recording surveys conducted on a burrowing crayfish species, the Little Brown Mudbug (Lacunicambarus thomai). In total, we recorded and watched 633 h of video. We observed L. thomai sitting atop their burrow engaging in sit-and-wait predatory behavior. This ambush predatory behavior was used on several different animal prey items, including spiders (Lycosidae), slugs (Philomycidae), and dragonfly nymphs (Aeshnidae). We also recorded crayfish cutting terrestrial vegetation near their burrow entrance and pulling it down into their burrow. Additionally, we analyzed the gut contents of 23 L. thomai from 4 populations to understand the generality of our foraging observations. Indeed, gut content analyses confirmed that all populations consumed both animal prey and vegetation. Overall, our recordings demonstrate that sit-and-wait predatory behavior may be a common foraging behavior among burrowing crayfishes. Further, our observations highlight the trophic role of burrowing crayfish species and emphasizes how these animals forage on both animal and plant communities in terrestrial habitats." (Authors)] Address: Graham, Z.A., West Liberty Univ., Dept Natural Sci. & Mathematics, 208 University Drive, West Liberty, WV 26074, USA. Email: Zackary.graham@westliberty.edu

21181. Grieve, A.; Broom, J. (2022): Range extension of an endangered Sydney Hawk Dragonfly Austrocordulia leonardi (Anisoptera, Libelluloidea incertae sedis) population in the Nepean River, near Sydney, Australia. Agrion 26(2): 49-53. (in English) ["A targeted survey for exuviae of the Sydney Hawk Dragonfly Austrocordulia leonardi Theischinger, 1973 was undertaken along the Nepean River and Cataract River in the Sydney basin, over four days in December 2021. The aim of the survey was to determine if the population of A. leonardi occupied riverine habitats upstream from its known location at Maldon Bridge and downstream to Menangle weir. Where accessible, riverine emergence structures were inspected using an inflatable boat as transport. However due to instream barriers several sections of river and habitats were navigable only by foot. A total of 324 A. leonardi exuviae were recovered from emergence habitats spanning 26km of the Nepean River, and seven A. leonardi exuviae were recovered from the lower reaches of the Cataract River, representing a new river system in which the species resides. Additional inspections undertaken in Kangaroo Creek in December 2019, 2020 and 2021, and the Woronora River in December 2019 indicate that the species is either present in other previously known locations in very small numbers or not at all." (Authors)] Address: Grieve, A., Marine Pollution Research Pty Ltd, PO Box 279 Church Pt, NSW, 2105, Australia. Email: adriangrieve@ozemail.com.au

21182. Hallan, H.K,; Walia, G.K; Dhillon, G.K. (2022): A review on cytogenetically studied species of family Coenagrionidae (Odonata: Zygoptera). Biosciences Biotechnology Research Asia 19(4): 827-842. (in English) ["Cytotaxonomy is useful for separating sister and cryptic species as well as for figuring out the evolutionary relationship between taxa. Family Coenagrionidae is considered as one of the largest zygopteran families under order Odonata. Globally, a lot of investigation has been undertaken on the family Coenagrionidae and significantly contributed by biologists throughout the world. Type number of the family Coenagrionidae is n=14 with XO-XX type of sex determining mechanism. Karyotypic variations within and between species are observed due to chromosome breaks and fusions, absence/presence of m chromosomes because of the holokinetic nature of chromosomes. Cytogenetically, 107 coenagrionid species have been studied all over the world which also includes 37 species from India. Among these, most of the species possesses n=14 haploid complement, while variation in chromosome number has been observed in 25% species." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi Univ. Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

21183. Hoppenbrouwers, P. (2022): Ovipositing and larval development of Vagrant Emperor (Anax ephippiger) in the region of Nijmegen in 2019. Brachytron 23(1/2): 22-27. (in Dutch, with English summary) ["In 2019 an influx of A. ephippiger was observed in the Netherlands. This resulted in the first reproduction of the species at a few locations. In the area around Nijmegen, we found the species ovipositing at five localities, but reproduction was only successful at the Millingerwaard. At least 1098 exuviae were collected between 25 VIII and 28 IX. At the four other localities reproduction failed due to drying out of the habitat." (Author)] Address: Email: peter.hoppenbrouwers@planet.nl

21184. Hou, D.; Zhong, Z. (2022): Comparative analysis of deformation behaviors of dragonfly wing under aerodynamic and inertial forces. Computers in Biology and Medicine 145, June 2022, 105421: (in English) ["Highlights: • Aerodynamic and inertial forces on flapping dragonfly wing are computed and compared. • Dynamic responses of dragonfly wing under flapping and rotation velocities are simulated. • Passive deformation mechanisms of dragonfly wing are revealed. Abstract: Insect wings are typically deformed under aerodynamic and inertial forces. Both the forces are related to kinematic and morphology parameters of the wing. However, how the insects utilize complex wing morphologies and kinematics to generate the forces, and what the exact contributions of the two forces in wing deformation are still unclear. In the study, the aerodynamic and inertial forces produced by a dragonfly forewing are compared quantitively. Then the dynamic deformation behaviors are studied with a three-dimensional finite element model. Finally, roles of the two forces in wing deformation are fully discussed. The two forces increase along the wingspan every moment and they reach maximal consistently near the pterostigma. Because of the asymmetry of angle of attack, the maximal resultant aerodynamic force is about 4 times of that in upstroke. By comparison, the normal component of aerodynamic force plays the leading role in downstroke while the inertial force works mainly in tangential in upstroke. The finite element simulation demonstrates the bending and twisting deformation behaviors of the wing considering both flapping and rotation. The average strain energy in one flapping cycle is 1.23×10^{-3} mJ under inertial force and 0.43×10^{-3} mJ under aerodynamics respectively. In addition, the rapid rotation can enhance inertial deformation by 6 times. As a result, deformation of dragonfly wing is dominated by its own inertia in flight. The deformation mechanism addressed could inspire the design of flexible flapping airfoils in morphology and kinematics." (Authors)] Address: Zhong, Z.,

School of Science, Harbin Institute of Technology, Shenzhen, 518055, PR China. Email: zhongzheng@hit.edu.cn

21185. Infante Álvarez, C. (2022): Las comunidades de odonatos y su relación con el hidroperiodo en lagunas temporales del LIC de Lagunas de los Oteros en la provincia de León. Trabajo de fin de Grado, Universidad de León: 32 pp. (in Spanish, with English summary) ["The odonate communities and their relationship with the hydroperiod in temporary ponds of the LIC of Lagunas de los Oteros in the province of León: It is intended to describe the odonate communities in the temporary ponds of the LIC of Lagunas de los Oteros in the Province of León. The study was based on two independently obtained data sets: exuviae and imagines. From a sampling of exuviae, an attempt was made to elucidate whether the hydroperiod is a determining factor for these communities, for which classification and correlation analyzes were used with the collected exuviae. The richness obtained for all the study ponds was twenty-one species, ten from the exuviae and nineteen in the case of adults, with Lestes barbarus, Lestes dryas, Sympetrum sanguineum and Sympetrum striolatum being the dominant species of the community. Using Whittaker's ß diversity, it was found that the differences in taxonomic composition between hydroperiods were greater in the juvenile stages (exuviae) than in the imagines, something that is not surprising given the high dispersal capacity of the imagines. Finally, from the correlation analysis it was determined that there is a positive relationship between the increase in the hydroperiod and the increase in species richness, both exuviae and imagines." (Author)] Address: not stated

21186. Johansson, F.; Kollberg Hedström, T.; Anderson, R.C.; Divakaran, P.K.; Kakkassery, F.K. (2022): Wing shape differences along a migration route of the long-distance migrant Globe Skimmer Dragonfly Pantala flavescens. Journal of Tropical Ecology 38: 17-24. (in English) ["Animals which migrate by flying should be subject to selection for optimal wing characteristics that maximize energy efficiency during migration. We investigated wing shape and wing area variation in the Globe Skimmer Dragonfly Pantala flavescens, which has the longest known migration of any insect. Wing shape and wing area differences between individuals in southern Peninsular India, and migrating individuals at a stop-over site on the Maldives, were compared. Results suggest that individuals which successfully reached the Maldives, on their way from India to Africa, had a broader wing base and an overall more slender wing shape than individuals in southern India. Contrary to our expectations, wing area did not differ significantly in most of our comparisons between southern India and the Maldives, suggesting that wing shape is more important than wing area for successful migration in P. flavescens. The results provide indirect evidence of natural selection on wing shape in a migrating dragonfly." (Authors)] Address: Frank Johansson: Email: frank.johansson@ebc.uu.se

21187. Kalkman, V.J.; Boudot, J.-P.; Futahashi, R.; Abbott, J.C.; Bota-Sierra, C.A.; Guralnick, R.; Bybee, S.M.; Ware, J.; Belitz, M.W. (2022): Diversity of Palaearctic dragonflies and damselflies (Odonata). Diversity 2022, 14, 966. https://-doi.: 15 pp. (in English) ["More than 1.2 million distribution records were used to create species distribution models for 402 Palaearctic species of dragonflies and damselflies. On the basis of these diversity maps of total, lentic and lotic diversity for the whole of the Palaearctic (excluding China and the Himalayan region) are presented. These maps show a clear pattern of decreasing diversity longitudinally, with species numbers dropping in the eastern half of Europe and remaining low throughout a large part of Russia, then increasing again towards Russia's Far East and Korea. There are clear differences in diversity patterns of lentic and lotic species, with lentic species being dominant in colder and more arid areas. Areas with a high diversity of species assessed as threatened on the IUCN red list are largely restricted to the Mediterranean, Southwest Asia, and Japan, with clear hotspots found in the Levant and the southern half of Japan. The diversity at species, generic, and family level is higher in the south of Japan than in areas at a similar latitude in the western Mediterranean. This is likely to be the result of the more humid climate of Japan resulting in a higher diversity of freshwater habitats and the stronger impact of the glacial periods in the Western Palaearctic in combination with the Sahara, preventing tropical African lineages dispersing northwards." (Authors)] Address: Kalkman, V.J, Naturalis Biodiversity Center, 2300 RA Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

21188. Karunaratne, S.; Surendran, S.N. (2022): Mosquito control: A review on the past, present and future strategies. Journal of the National Science Foundation of Sri Lanka 2022 50 (Special): 277-292. (in English) ["Nearly half a million deaths occur worldwide annually due to mosquito-borne diseases. Mosquito control has become the major strategy in controlling these diseases, especially in the absence of effective vaccines for disease prevention. At the beginning of the last century, mosquito control was mainly done by personal protection methods and larval control by application of petroleum oil and Paris green powder to water bodies. A breakthrough in mosquito control came in the 1940s with the introduction of synthetic neurotoxic insecticides which could suppress mosquito populations rapidly throughout the globe. However, a resurgence of populations with resistance to these insecticides was witnessed within a decade after their introduction. Environmental pollution caused by synthetic insecticides also became a major concern. Novel personal protection methods, community-level operations on source reduction, insect growth regulators and polystyrene beads for larval control, and biological control were introduced as alternatives. Biological control was mainly by larval predators such as fish, dragonfly nymphs, microcrustaceans and Toxorhynchites larvae; bacterial larvicides such as Bti; plant-based mosquitocides; and green-fabricated nanoparticles. However, even today, mosquito control programmes heavily depend on synthetic neurotoxic insecticides applied through insecticide residual spraying (IRS), fogging, larviciding and impregnated bed nets. Increased detoxification and target site insensitivity, developed as major insecticide resistance mechanisms, have been extensively studied in mosquitoes assisting proper management of available insecticides for which not many alternatives are available. Despite all our efforts, an unprecedented global emergence of mosquito-borne diseases is evident demanding novel strategies for mosquito control. The introduction of transgenic strains of mosquitoes to suppress or replace mosquito populations reducing disease transmission has become the latest effort. Population reduction has been achieved via releasing mosquitoes with a dominant lethal gene (RIDL) and by combining the conventional sterile insect technique (SIT) with Wolbachia mediated incompatible insect technique (IIT). Population replacement has been successful via releasing Wolbachia infected mosquitoes that are refractory to pathogen development and transmission. Advancement of gene- and allelic- drive systems will soon allow us to effectively spread refractory genes and insecticide susceptible alleles into mosquito populations overriding normal inheritance." (Authors)] Address: Karunaratne,

S., Dept Zool., Fac. Science, Univ. of Peradeniya, Peradeniya, Sri Lanka. Email: shppk@pdn.ac.lk

21189. Katsman, J. (2022): Ten years of dragonfly monitoring in Leersumse veld. Brachytron 23(1/2): 33-47. (in Dutch, with English summary) ["During 2012-2021 dragonflies were monitored conform the monitoring protocol in Leersumse Veld, Utrecht, the Netherlands. A total number of 38 species was found during this period, of which 20 were present in eight out of ten years. In addition all available Odonata observations in the National Databank Flora and Fauna (NDFF) for the four decades in 1982-2021 were analysed. During this period 44 Odonata species were observed in Leersumse Veld. Aeshna juncea and Coenagrion lunulatum disappeared after the first two decades. During the monitoring period 2012-2021 Enallagma cyathigerum, Lestes virens, Libellula quadrimaculata and Sympetrum striolatum were the most numerous species. Species typical of fens strongly decreased during the monitoring period, Leucorrhinia rubicunda, Leucorrhinia dubia, Sympetrum danae and Enallagma cyathigerum. Sympetrum vulgatum also decreased, while Sympetrum striolatum and Lestes virens increased strongly. These two species probably benefit from the dry and warm weather in the last years of the monitoring period. A few southern species increased or appeared, such as Crocothemis erythraea, Sympetrum meridionale, Anax parthenope and Aeshna affinis. These findings correspond with national trends observed in the Dutch Dragonfly Monitoring Scheme." (Author)] Address: Email: jan.katsman@planet.nl

21190. Kemal, M.; Koçak, A.Ö. (2022): Revised synonymous list of the pterygot insects in Van Province (East Turkey). Priamus 17(1): 1-112. (in English) ["Present publication deals with the updated species list of 17 pterygot orders from Van Province (East Turkey). Totally 3072 species of 209 families are listed with their synonyms. Key words: Pterygota, Ephemeroptera, Plecoptera, Odonata, Blattodea, Mantodea, Dermaptera, Phasmida, Orthoptera, Hemiptera, Homoptera, Planipennia, Trichoptera, Mecoptera, Diptera, Hymenoptera, Coleoptera, Lepidoptera, list, fauna, Van, Turkey. Six years ago, the authors published the first list of the Pterygota, recorded from Van Province as two thousand species (Koçak & Kemal, 2012). In this last period, the number of the recorded species reached to 3072. The studies on this subject are still ongoing. Below, the scientific names of the species are given alphabetically under their orders in two parts. For further information, including bibliography on the Pterygota and Lepidoptera of Van Province, see Kemal & Koçak (2013a-b, 2014, 2016a-b, 2017a-c, 2018), Koçak & Kemal (2012, 2013, 2015a-c, 2016, 2018), and Koçak (2014)." (Author)] Address: Koçak, A.Ö., c/o Van Yüzüncü Yýl University, Faculty of Science, Dept. of Biology, Turkey. Email: cesa_tr@yahoo.com.tr

21191. Ketelaar, R. (2022): Atlas der Libeller) in Niedersachsen/Bremen. K. Baumann, R. Jodicke, F. Kastner, A. Borkenstein, W. Burkart, U. Quante & T. Spengler (Red.). 2021. NIBUK, Ruppichteroth. Mitteilungen der Arbeitsgemeinschaft Libellen in Niedersachsen und Bremen, Sonderband. 383 p. ISSN 2366-9764. Prijs 30 euro. Brachytron23(1/2): 61-62. (in Dutch) [Book review] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

21192. Kim, H.G.; Jang, R.H.; Kim, S.; Tho, J.-H.; Jung, J.-W.; Cheong, S.; Yoon, Y.-J. (2022): Developing habitat suitability index for habitat evaluation of Nannophya koreana Bae (Odonata: Libellulidae). Journal of Ecology and Environment 46:33: 10 pp. (in English) ["Background: N. koreana, is an endangered dragonfly with an increasing risk of extinction owing to rapid climate changes and human activities. To prevent extinction, the N. koreana population and their habitat should be protected. Therefore, suitable habitat evaluation is important to build the N. koreana restoration project. The habitat suitability index model (HSI) has been widely used for habitat evaluation in diverse organisms. Results: To build a suitable HSI model for N. koreana, 16 factors were examined by seven experienced researchers. A field survey for N. koreana observed sites and spatial analysis were conducted to improve the model. Five factors were finally selected by this procedure (crown density, open water surface, water depth, pioneer plant cover, and type of water source). Finally, the N. koreana HSI model was generated with the five adjusted factors based on interview, field survey, and spatial analysis. This model was validated by a current N. koreana habitat in 2021. With this model, 46 sites in Uljin-gun, Korea, were surveyed for N. koreana habitats; five sites were identified as core habitats and seven as potential core habitats. Conclusions: This model will serve as a strong foundation for the N. koreana restoration project and as a reference for future studies on N. koreana and other endangered insect populations. Further analysis and long-term data will improve the efficacy of this model and restore endangered wildlife." (Authors)] Address: Yoon, Y.-J., Res. center for Endangered Species, National Inst. Ecology, Yeongyang 36531, Rep. of Korea. E-mail yjyoon@nie.re.kr

21193. Koroiva, R.; Nóbrega Gomes, V.G.; Vilela, D.S. (2022): DNA barcoding and new records of Odonates (Insecta: Odonata) from Paraíba State, Brazil. Diversity 2022, 14(3), 203: 14 pp. (in English) ["Odonates are important insects in the food chains of freshwater environments around the world, being used as a model species for areas of behavior and analysis of environmental quality. In Brazil, especially in the Northeastern region, both knowledge about the distribution and molecular information of odonate species found in the two main biomes of the region is still limited. Aiming to improve these issues, here, we carried out an Odonata survey in two locations and built a DNA barcode database for species from the state of Paraíba. In total, 15 first records were reported for this Brazilian state and 142 specimens from 27 genera and 45 species had their 'Folmer' cytochrome c oxidase subunit I (COI) fragment evaluated. The database we generated includes data for 70% of the Odonata species found in Paraíba state. For 16 species, this is the first DNA barcode available in public sequence repositories. Our results demonstrate that using the COI in the regional scale can help identify and delimit those evaluated. Eight species (17%) showed a low percentage of differentiation (<2%) compared to other species currently deposited in the GenBank or BOLD System; nevertheless, we present morphological traits that reaffirm our identifications. Barcode data provide new insights into Neotropical diversity and deliver basic information for taxonomic analyses... 3.1. Sampling: Our samples added 15 new species records to the odonatofauna of Paraíba: Dasythemis venosa (Burmeister, 1839), Dythemis nigra Martin, 1897, Epipleoneura metallica Rácenis, 1955, Erythrodiplax cf. fervida (Erichson in Schomburgk, 1848), Idioneura ancilla Selys, 1860, Macrothemis imitans Karsch, 1890, Metaleptobasis bicornis (Selys, 1877), Micrathyria didyma (Selys in Sagra, 1857), Micrathyria mengeri Ris, 1919, Nephepeltia berlai Santos, 1950, Orthemis flavopicta Kirby, 1889, Perithemis lais (Perty, 1834), Tauriphila australis (Hagen, 1867), Telebasis griffinii (Martin, 1896) and Triacanthagyna septima (Selys in Sagra, 1857).

After performing the morphological analysis, all specimens (including those deposited in the DSEC/UFPB) that had previously been identified as Anatya guttata (Erichson in Schomburgk, 1848) were now identified as Anatya januaria Ris, 1911." (Authors)] Address: Koroiva, R., Dept Sistemática e Ecol., Univ. Federal da Paraíba, João Pessoa 58051-900, Paraíba, Brazil. Email: ricardo.koroiva@insa.gov.br

21194. Kovacs, T.; Olajos, P.; Murányi, D.; Juhász, P. (2022): Contribution to the Odonata fauna of the Balkan Peninsula. Folia historica naturalia musei Matraensis 27: 11-22. ["The article contains Balkanian data for 47 Odonata species, their distribution by country: Albania 26, Bosnia and Herzegovina 4, Bulgaria 2, Croatia 2, Greece 11, Montenegro 5, North Macedonia 16, and Serbia 35 species. Larval data of Epallage fatime from southeastern North Macedonia and Caliaeschna microstigma from southern Serbia are the most remarkable. The following species are important from a nature conservation point of view at European and/or Mediterranean level: Vulnerable – Cordulegaster heros, Lindenia tetraphylla; Near Threatened – Brachytron pratense, Caliaeschna microstigma, Coenagrion ornatum, C. pulchellum, Cordulegaster bidentata, C. heros, Cordulia aenea, Epallage fatime, Gomphus flavipes, Lindenia tetraphylla." (Authors)] Address: Kovács, T., Mátra Museum of the Hungarian Natural History Museum, Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. Email: koati1965@gmail.com

21195. Krieg-Jacquier, R.; Schaming, Q. (2022): Reproduction d'Oxygastra curtisii (Odonata: incertae sedis) sur un étang de pêche de loisir en Bresse (Ain – France). Martinia 36(4): 34-38. (in French, with English summary) ["Evidence of reproduction of Oxygastra curtisii (Odonata: incertae sedis) on a fishing pond in Bresse (Ain - France). L'étang des Benonnières se situe sur la commune de Jasseron à l'est de Bourg-en-Bresse (Ain) (lat. 46,224905, long. 5,31638; 269 m.a.s.l.)] Address: Schaming, Q., Groupe de recherche et de protection des libellules Sympetrum, 39 rue du Château 01000 Saint-Denis-Lès-Bourg

21196. Laciak, M.; Zajac, T.; Adamski, P.; Bielanski, W.; Cmiel, A.; Laciak, T.; Lipinska, A. (2022): Small monsters: Insect predation limits reproduction of yellow-bellied toad Bombina variegata to ponds in their earliest successional stage. Aquatic Conservation: Marine and Freshwater Ecosystems 32(5): 817-831. (in English) ["The disappearance and deterioration of amphibian breeding habitats is a major cause of their global extinction. In Europe, this problem affects the yellow-bellied toad Bombina variegata, which inhabits small ponds in the early stages of succession, where no predatory invertebrate species normally occur. Nonetheless, as habitats, small temporary ponds are highly endangered, a situation that is intensifying with urban spread. A system of 13 pairs of artificial ponds was constructed in 2012 for the breeding of B. variegata with the aim of reconnecting disjunct populations. During the 2 years of the study, one of the twin ponds was regularly cleared of emergent vegetation and invertebrates. The survival rates of the tadpoles released in the cleared and uncleared ponds were analysed. The survival rate of the tadpoles released into the cleared ponds was higher than of those introduced into the uncleared ones. Tadpole survival rates were also higher in new, single ponds, constructed in 2013. The lower survival rates of the introduced tadpoles are best explained by the presence of predatory aquatic invertebrates, particularly the large diving beetle Dytiscus marginalis. Experimentally obtained consumption rates indicate that one Dytiscus larva is capable of destroying a typical clutch of B. variegata tadpoles within a few hours, much faster than any of the other insect predators tested. The impact of freshwater invertebrates on tadpoles is frequently studied but rarely quantified. For conservation measures to be effective, quantitative standards need to be applied that describe the impact of predation in a predictable manner. Construction of artificial small ponds is broadly accepted as an important conservation measure compensating for the disappearance of natural amphibian breeding sites. This function of artificial ponds may be substantially enhanced by the periodic removal of invertebrate predators. ... The experiment was carried out in May–August 2015 and June–August 2016 in the laboratory. Specimens of presumed insect predators were collected from 39 ponds. They belonged to three orders: dragonflies (Odonata – Anisoptera: Aeshna cyanea (larvae), Cordulia aenea (larvae); Zygoptera: Coenagrionidae (larvae)); bugs (Hemiptera – Heteroptera: Notonecta glauca (imagines), Nepa cinerea (imagines), Corixidae sp. (imagines); and beetles (Coleoptera – Dytiscidae: Dytiscus marginalis (larvae, imagines), Ilybius sp. (larvae, imagines))." (Authors)] Address: Laciak, Malgorzata, IOP PAN, Mickiewicza 33, 31-120 Kraków, Poland. Email: laciak@iop.krakow.pl

21197. Li, F.; Zhang, Y.; Altermatt, F.; Zhang, X.; Cai, Y.; Yang, Z. (2022): Gap analysis for DNA-based biomonitoring of aquatic ecosystems in China. Ecological Indicators 137, April 2022, 108732: 11 pp. (in English) ["Highlights: • COI records of freshwater fish, aquatic insects and molluscs in Chinese rivers are analyzed. • Gaps in barcode coverage of species in three aquatic animal groups of China is 40–70%. • Nearly 90% of the COI sequences of aquatic species in China come from other countries. • The pairwise genetic distance of local barcodes is 3 to 5 times lower than non-local barcodes. • Nearly 60% of aquatic species in each catchment in China have at least one barcode. Abstract: DNA-based taxon identification is improving the assessment and management of biodiversity in rivers. However, the lack of comprehensive DNA barcode reference libraries and globally highly unequal coverage are still hindering the application prospects of this method worldwide. Here, we analyzed the COI barcode gap in two reference libraries, Barcode of Life Data Systems (BOLD) and NCBI GenBank, with a focus on three aquatic animal groups (freshwater fish, aquatic insects and molluscs) in Chinese rivers. Our data show gaps in barcode coverage (e.g., organisms without barcodes) of ca. 40–70% of taxa in these groups in the BOLD or NCBI GenBank database, respectively. These gaps can rise even further if the barcode thresholds are set to contain at least five reference sequences per taxon. Furthermore, most barcodes are from non-local samples, and only 14.4% (BOLD) and 28.8% (NCBI GenBank) of reference sequences were from organisms sampled in China, respectively. The pairwise genetic distance of local barcodes is 3 to 5 times lower than non-local barcodes, indicating that the latter may not be a good substitute. When looking at individual catchments, ca. 60% of the potentially occurring aquatic species have one or more barcodes, yet the barcode coverage varies slightly across ten major river catchments, ranging from 54.3% (Liao River basin) to 68.2% (Huai River basin). The taxa Salmoniformes and Perciformes in freshwater fish, Odonata and Diptera in aquatic insects, and Bivalvia in molluscs have the best barcode coverage in most catchments (mean coverage >70%). This study gives the first overview and current status of barcode reference libraries of three major aquatic animal groups in Chinese rivers. Our results will help to better interpret current metabarcoding studies from China, and also provide a basis to develop a strategy of filling the gaps

in the reference libraries of aquatic species in China." (Authors)] Address: Zhang, Y., Institute of Environmental & Ecological Engineering, Guangdong Univ. Technology, Guangzhou 510006, China. E-mail: zhang.yuan@gdut.edu.cn

21198. Lienard, M.A.; Valencia-Montoya, W.A.; Pierce, N.E. (2022): Molecular advances to study the function, evolution and spectral tuning of arthropod visual opsins. Philosophical Transactions B 3772021027920210279 http://-doi.org/10.1098/rstb.2021.0279: 14 pp. (in English) ["Visual opsins of vertebrates and invertebrates diversified independently and converged to detect ultraviolet to long wavelengths (LW) of green or red light. In both groups, colour vision largely derives from opsin number, expression patterns, and changes in amino acids interacting with the chromophore. Functional insights regarding invertebrate opsin evolution have lagged behind those for vertebrates because of the disparity in genomic resources and the lack of robust in vitro systems to characterize spectral sensitivities. Here we review bioinformatic approaches to identify and model functional variation in opsins as well as recently developed assays to measure spectral phenotypes. In particular, we discuss how transgenic lines, cAMP-spectroscopy, and sensitive heterologous expression platforms are starting to decouple genotype-phenotype relationships of LW opsins to complement the classical physiological-behavioral-phylogenetic toolbox of invertebrate visual sensory studies. We illustrate the utility of one heterologous method by characterizing novel LW Gq opsins from 10 species, including diurnal and nocturnal Lepidoptera, a terrestrial dragonfly and an aquatic crustacean, expressing them in HEK293T cells, and showing that their maximum absorbance spectra (ëmax) range from 518 to 611 nm. We discuss the advantages of molecular approaches for arthropods with complications such as restricted availability, lateral filters, specialized photochemistry and/or electrophysiological constraints." (Authors)] Address: Liénard, Marjorie, Dept Biol., Lund Univ., 22362 Lund, Sweden. Email: marjorie.lienard@biol.lu.se

21199. Louboutin, B. (2022): Plus de 72 minutes: à propos d'une durée record de ponte immergée chez Coenagrion mercuriale (Odonata: Coenagrionidae). Martinia 36(5): 39-43. (in French, with English summary) [More than 72 minutes: About a record duration of underwater oviposition in Coenagrion mercuriale (Odonata: Coenagrionidae). "The site is a back channel ("contre-canal") located at Donzère, on the banks of the Rhône (44.41431°N, 4.70648°E, 54 m altitude). On this section (Fig. 1), the water is running, permanent and clear, mainly fed by phreatic resurgences. Observation: A male floating on the surface of the water spotted a female laying eggs just below (at 13 h 46' (t0)). The male quickly flew away and a female was discovered at a depth of 5 cm already laying eggs in a large foot of Iris pseudacorus (Fig. 2). She was therefore already immersed before the observation started, probably for several minutes. The observation continued to find out if she was really using the Iris as an oviposition support and then to time her immersion time. For more than an hour, she progressively descended along the stem to about 15 cm under water, the bottom being at a depth of 20 cm. At 14 h 58' (t + 72min) it suddenly rose like an air bubble to the surface (Fig. 3). At 15 h 00' (t + 74min) it flew away easily to land nearby on a leaf in the sun and clean its head. She appeared to be little harassed by males, perhaps because she was andromorphic. She was lost to view at 15 h 04' (t +78 min) when she flew away again." Translated with www.DeepL.com/Translator (free version).] Address: Louboutin, B., Office pour les insectes et leur environnement, antenne en Occitanie, CBGP - 755, avenue du campus Agropolis - CS 30 016, F-34988 Montferrier-sur-Lez Cedex, France. Email: bastien.louboutin@insectes.org

21200. Mahfoufi, N.; Saib, C. (2022): La biodiversité des Odonates du sous-bassin versant de l'Oued Boubhir dans la région de Tizi-Ouzou. MSc. thesis, Université Mouloud Mammeri de Tizi-Ouzou, Faculté des sciences Biologiques et des sciences Agronomiques, Département de Biologie, En vue de l'obtention du diplôme de Master en Ecologie et Environnement. Spécialité: Biodiversité et Environnement: 90 pp. (in French, with English summary) ["The aim of this study is to determine the structure and composition of the odonatological fauna of wetlands in a lotic ecosystem in the Oued Boubhir sub-watershed (Tizi-Ouzou region) from March to June 2022. The results obtained identified a rate of 350 individuals captured, belonging to 15 species of odonates distributed over two suborders, including 11 species of Anisoptera and 4 of Zygoptera. The Anisoptera dominate in number of individuals and in number of species, particularly the family Gomphidae is the most represented with 4 species, that is to say more than 41% of the whole. The aim of this study is to determine the structure and composition of the odonatological fauna of the wetlands in a lotic ecosystem in the sub-catchment of the Oued Boubhir (Tizi-Ouzou region) from March to June 2022 The results obtained identified a rate of 350 individuals captured, belonging to 15 species of odonates distributed over two suborders, including 11 species of Anisoptera and 4 of Zygoptera. The Anisoptera dominate in number of individuals and in number of species, particularly the family Gomphidae is the most represented with 4 species, i.e. more than 41% of all the odonates recorded. The inventory of larvae and exuviae confirms the autochthony of species such as Calopteryx haemorrhoidalis, Boyeria irene, Onychogomphus forcipatus, O. costae, O. uncatus, Gomphus lucasii and Orthetrum coerulescens. Two Maghribian endemic species, Platycnemis subdilatata and Gomphus lucasii were recorded. June seems to be the richest and most favourable month for the development of dragonflies. We also studied the phenology of these odonatological species with a comparison with the model of Samraoui & Corbet (2000) and we thus carried out a study on their ecology." (Authors/DeepL)] Address: not stated

21201. Mandape, S.M.; Kamdi, R.R. (2022): Diversity of aquatic insect as a bioindicator with water quality parameters of selected Wainganga River basin area of Pauni, district Bhandara, (M.S.). International Journal of Researches in Biosciences, Agriculture and Technology (X) Vol (II) May 2022: 80-86. (in English) ["A study was conducted on the diversity of aquatic insects in the area of Pauni which is the Kashi of Vidarbha (Latitude 20° 48' 17" and Longitude 79° 37' 51") is located in Maharashtra. This study is a part of biomonitoring research programme of the basin areas of Pauni using entomological indicator of lotic ecosystem during January-2021 to December-2021. The current study revelated 25 species of aquatic insect belonging to 5 different orders were recorded. At order level highest species of Hemiptera (7) were recorded Similarly, Coleoptera (5), Odonata (6), Diptera (4), Ephemeroptera (3) aquatic insect species was found in basin water ecosystem. Different diversity indices were recorded out in all seasons. Thus, water quality parameter included viz. Water temperature, Water pH, Dissolve oxygen, Biochemical oxygen demand, Water turbidity, and Total dissolve solid. Physiochemical data and biological data showed in the paper." (Authors) Brachythemis contaminata, Crocothemis servilia, Ceriagrion coromandelianum, Ischnura heterostricta, Acisoma sp., Pseudagrion

sp.] Address: Mandape, S.M., Dept of Zoology, Institutions of Higher Learning Research & Specialized Studies, Anand Niketan College, Anandwan, Warora, Dist. Chandrapur (M.S.), India. Email: mandapeswapnil8@gmail.com

21202. Manger, R. (2022): Foraging swarms of Spotted darter (Sympetrum depressiusculum) in 2018 and 2019. Brachytron 23: 53-57. (in Dutch, with English summary) ["On three evenings of extremely hot days in July of 2018 and 2019 large groups of high-flying S. depressiusculum were encountered in the Woldlakebos in the northwest of Overijssel. These swarms were not migrating but stationary. They were foraging on little insects that under these weather conditions were able to fly high." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

21203. Manger, R.; De Knijf G. (2022): Mass reproduction of the Vagrant Emperor (Anax ephippiger) in Belgium and the Netherlands in the summer of 2019. Brachytron23(1/2): 7-21. (in Dutch, with English summary) ["From 7 June 2019 onwards, an invasion of the Vagrant Emperor (Anax ephippiger) was observed in much of Belgium and the Netherlands with not less than 482 individuals and 1744 individuals being observed respectively. Ovipositing behavior was found at 31 locations. In August and September 2019 exuviae and freshly emerged imagoes were found at 1 site in Belgium and 6 sites in the Netherlands. More than 1000 exuviae or tenerals were found in an urban city pond of Antwerp (Belgium) and at Millingerwaard, in the river valley of the river Waal near Nijmegen (the Netherlands), being the two most important sites. First emergences of Anax ephippiger were noticed on 23 August in the Netherlands and on 29 August in Belgium, resulting in a larval development time of respectively 78 and 81 days. Reproduction habitat consisted mainly of partially drying ponds characterized by high water temperatures in the summer of 2019. Those habitats were situated in diverse landscape configurations such as an urban area, dune ecosystems, fens in heathland, and ponds in a river valley ecosystem. Emergence took place during the night and maiden flight only occurred just before the onset of the sun and lasted not much more than 10 minutes. Most of the exuviae were found on aquatic plant stems and leaves above the water. At 80% of the locations where ovipositing of Anax ephippiger was observed in June 2019, successful reproduction of Sympetrum fonscolombii was found later summer."] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

21204. Manna, S.; Manna, S.; Roy, A. (2022): Habitat specificity of phyto-diversity in semiurban lotic system: A case study. Indian Hydrobiology 21(2): 103-112. (in English) ["Biological diversity plays pivotal role in maintaining the physicochemical conditions vis-àvis homoeostasis of ecosystems. The unicellular to complex multicellular forms of different biodiversity components prove their importance by providing the security of ecological health of ecosystems especially the aquatic once. The objective of this study was to find out the habitat specificity of Phyto-diversity sustained throughout the different segments of Bariti Beel based on variation of some environmental factors. It is revealed that, there was significant alteration in planktonic population in zone-A and zone-B. The macrophyte vegetation with five distinct stands supports to sustain different insect communities especially Odonates, Hemipterans and Coleopteran beetles. Most predictable abiotic factors controlling growth and reproduction of different growth forms of algae were derived through multiple regressions along with the prediction model with high significance level (p = 0.15). Specificity in establishment and distribution of some floral species as a result of their response to the environmental factors of the habitats both in micro and macro level was noted. This study would be helpful in wetland management through biomonitoring and maintenance of water quality with necessary biotic community." (Authors)] Address: Roy, A., West Bengal Biodiversity Board, Prani Sampad Bhawan, LB-2 Block, Sector-III, Salt Lake City, Kolkata – 700 106, West Bengal, India. Email: aroy.wbbb@gmail.com

21205. Massote, C.; Almeida Pessoa, D.M.; Cardoso Peixoto, P.E. (2022): The conspicuousness contradiction: brighter males have lower mating chances in the damselfly Argia hasemani but not in Argia croceipennis. Biological Journal of the Linnean Society 137(1): 47-53. (in English) ["In odonates, male coloration is often more conspicuous than female coloration. This difference is frequently attributed to the role of male colour in male–male competition to access females. However, there are sexually dimorphic odonate species, such as the damselflies Argia hasemani and Argia croceipennis, in which male–male interactions are much less intense. In these species, it might be that male coloration affects male success directly when interacting with females. Therefore, we hypothesized that males with more intense coloration present higher copulation success. To investigate this hypothesis, we registered which males copulated in the field during 4 days and estimated the coloration of all observed males in the female visual spectrum. Surprisingly, we found that dull males had higher chances of copulation in A. hasemani, whereas in A. croceipennis male coloration did not influence the chances of copulation. Our data also indicated that brighter males of A. hasemani were also more conspicuous to potential avian predators, whereas this was not the case in A. croceipennis. We suggest that females of A. hasemani might avoid brighter males owing to increased risk of predation during copulation." (Authors)] Address: Massote, Clara, Laboratory of Agonistic Interactions and Sexual Selection, Federal University of Minas Gerais, Avenida Antônio Carlos, Belo Horizonte, MG, Brazil. E-mail: classote@gmail.com

21206. Miguel, T.B.; Calvão, L.B.; Alves-Martins, F.; Batista, J.D.; Rodrigues, M.E.; Guillermo-Ferreira, R.; De Marco Júnior, P.; Juen, L. (2022): Odonates in warm regions of south america largely do not follow Rapoport's rule. Biodiversity and Conservation 31: 565-584. (in English) ["One of the major challenges of ecologists and biogeographers is to understand how species are globally distributed. Two of the most well-studied large-scale patterns in species distributions are the Rapoport's rule and the Latitudinal Diversity Gradient (LDG). We aimed to address whether Neotropical odonates follow the Rapoport's rule and if there is a latitudinal gradient in species diversity. A total of 1076 records for 190 species, covering a large area from southeastern to the northern regions of Brazil that extends from 23°S (Cerrado) to 3°N (Amazon Rainforest). Generalized Linear Models were used to address whether Neotropical odonates follow the Rapoport's rule, and if there is a latitudinal gradient in species diversity, based on our predictions. We found a Rapoport effect in the Amazon biome and an inverse Rapoport effect in the Amazon-Cerrado Transition Forest and Cerrado biome. Regarding LDG, we found no significant effect of latitude on species richness patterns when we considered all the species, and a significant relationship between species richness and latitude for zygopterans. The spatial patterns of odonates geographic distribution may be

an outcome of geographical barriers, for instance, the continental geometry of South America, which is broader in the north and limits geographical expansion towards the south. Furthermore, species ecophysiological mechanisms may also hamper their expansion and drive the pattern observed in our study, mainly because of evolutionary thermoregulatory adaptations that each taxon exhibits along its environmental gradient." (Authors)] Address: Thiago Barros Miguel, T.B., Instituto Federal de Educação Ciência e Tecnologia de Mato Grosso - Campus Barra do Garças, Estrada de acesso a BR-158, Radial José Maurício Zampa, s/n, Bairro Industrial, Barra do Garças, MT, CEP: 78600-000, Brazil

21207. Mollier, S.; Kunstler, G.; Dupouey, J.-L.; Bergès L. (2022): Historical landscape matters for threatened species in French mountain forests. Biological Conservation 269, 109544: 19 pp. (in English) ["Ancient forests are known to host a biodiversity of high ecological distinctiveness and are likely to provide habitat for red-listed species. Yet, few studies have investigated the role of forest continuity for the conservation of threatened species. We used species-presence data on red-listed species from 12 taxonomic groups (Spermatophyta, Pteridophyta, Bryophyta, Lichens, Chiroptera, Aves, Squamata, Amphibia, Coleoptera, Lepidoptera, Odonata and Orthoptera) to ascertain if ancient forests are an important habitat for threatened species in five mountain and subalpine protected areas in France. We compared the effect of the amount of historical forest (1853–1860) with the effect of the amount of current forest on the distribution of red-listed species in six circular landscape buffers ranging in radius from 100 to 1500 m. We showed that the amount of historical forest in the landscape had a positive effect on forest Spermatophyta, Bryophyta, Coleoptera and edge forest Pteridophyta with a better predictive power than current forest area, highlighting a colonization credit in recent forests. Conversely, edge-forest lepidopterans were more negatively affected by historical than by current forest area, highlighting an extinction debt in recent forests. Our findings underline that implementing protective measures of ancient forests would be a better strategy than afforestation to preserve threatened forest species in mountain and subalpine forest landscapes." (Authors) In my opinion many of the bird and dragonfly taxa - I only checked these - are classified wrong in Appendix C to this publication. (Authors)] Address: Mollier, S., Université Grenoble Alpes, INRAE, LESSEM, 2 rue de la papeterie, F-38400 St-Martin d'Hères, France. Email: sylvain.mollier@inrae.fr

21208. Moreno-Pallares, M. I.; Lobo-Hernández, M.; Gutiérrez-Moreno, L.C.; Pérez-Gutiérrez, L. (2022): Relación de las larvas de Odonata con las raíces de Eichhornia crassipes en la ciénaga la Larga, Atlántico, Colombia. Intropica 17 (2): 10 pp. (in Spanish, with English summary) ["The purpose of this study was to evaluate the association of Odonata larvae with the roots of Eichhornia crassipes in La Larga wetland. For the capture of Odonata larvae, standardized sampling techniques for aquatic macroinvertebrates were used. Six samplings were carried out and in each sampling 100 individuals of E. crassipes were collected. The length and volume of each root were obtained. A total of 738 individuals and 10 species of Odonata were collected; Miathyria marcella presented the highest abundance, with 83 % of the total sampled. The percentage of occupation of the roots of E. crassipes by Odonata larvae was 58 % (346 of the 600 roots collected). The collected roots varied between 5 and 58 cm in length and between 5 and 450 ml in volume. Significant differences were found in the composition and structure of the larvae with respect to the volume of the roots. Larval lengths ranged from 2.4 to 24.3 mm; most of the collected individuals were found in the length range between 5.1 and 10 mm. In conclusion, the size of the root is not a determinant for the distribution of odonates in the roots of E. crassipes, while the volume of the roots of E. crassipes does influence the composition of larvae." (Authors)] Address: Monero-Pallares, Maria, Grupo de investigación Biodiversidad del Caribe colombiano, Univ. del Atlántico, Barranquilla, Colombia. Email: mariainesmoreno@mail.uniatlantico.edu.co

21209. Naeem, M.; Sattar, S.; Zia, A.; Rehman, A.; Iqbal, T.; Mehmood, S.A.; Ahmed, S.; Shahjeer, K. (2022): Odonata (Dragonflies and damselflies) naiads in sub Himalayan foothills of Pakistan. Journal of Animal & Plant Sciences 32(6): 1616-1627. (in English) ["A series of surveys were conducted during two consecutive years (2014-15) to explore the Odonata naiads from the sub- Himalaya of Pakistan and it revealed 23 species. Sub-order Anisoptera was represented by 16 species under 13 genera, and suborder Zygoptera represented 7 species under 5 genera. In Anisoptera, the family Libellulidae, followed by Aeshnidae and Gomphidae, was recorded as dominant. While in Zygoptera, the dominant family was recorded as Coenagrionidae, followed by Chlorocyphidae. For each recorded species, individual diagnosis, details like date of collection, number of male/females recorded, coordinates of locality, prevalent air temperature at localities, water body temperature, global distribution, and habitat description are provided. In Pakistan, taxonomic and faunistic studies on Odonata nymphs are highly limited and thus, it was decided to enhance knowledge over this ignored and neglected group by thoroughly surveying sub-Himalaya in Pakistan, which is less explored for biological surveys, especially for class Insecta. The manuscript brought forward a record of five naiads species for the first time from Pakistan." (Authors)] Address: Rehman, A., School of Horticulture and Plant Protection and Institute of Applied Entomology, Yangzhou University, Yangzhou 225009, China. Email: rehman.ento@aup.edu.pk

21210. Nel, A. (2022): Revision of the damselfly Hesperagrion praevolans (Odonata, Zygoptera, Coenagrionidae) from the uppermost Eocene of Florissant (Colorado, USA). Palaeoentomology 5.6.2: 517-519. (in English) ["The damselfly family Coenagrionidae is rather frequently found in the Cenozoic fossil record (Nel & Paicheler, 1993), but it remains unknown in the Mesozoic. The known fossils are generally isolated wings, very difficult to accurately attribute to precise genera, to the point that many fossils can be only considered as 'genera and species undetermined' (Nel et al., 1997). The oldest described coenagrionid fossil is the late Palaeocene Marado marado Petrulevicius, 2021 (Maíz Gordo Formation, Argentina), a genus and species based on an isolated incomplete wing. Thus, other Eocene representatives of the family are important for future accurate dating of the occurrence of the family and its subdivisions, especially those that have been attributed to extant genera; a future step after the important work of Dijkstra et al. (2014) for the understanding of the evolution of these damselflies." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

21211. Niwa, H.; Hirata, T. (2022): A new method for surveying the world's smallest class of dragonfly in wetlands using unoccupied aerial vehicles. Drones 2022, 6(12), 427; https://doi.org/10.3390/drones6120427: 6 pp. (in English) [„Field surveys in wetlands are limited by the difficulty in ac-

cessing the site, hazards during surveys, and the risk of disturbing the ecosystem. Thus, the use of unoccupied aerial vehicles (UAVs) can overcome these limiting factors and can assist in monitoring small organisms, such as plants and insects, that are unique to wetlands, aiding in wetland management and conservation. This study aimed to demonstrate the effectiveness of a survey method that uses a small drone equipped with a telephoto lens to monitor dragonflies, which are unique to wetlands and have been difficult to survey quantitatively, especially in large wetlands. In this study, the main target species of dragonflies was Nannophya pygmaea, which is the world's smallest dragonfly (about 20 mm long). The study area was Mizorogaike wetland (Kita Ward, Kyoto City, Japan). The UAV was flown at a low speed at an altitude of 4 m to 5 m, and images were taken using 7× telephoto lens on Mavic 3 (7× optical and 4× digital). A total of 107 dragonflies of seven species were identified from the photographs taken by the drone. N. pygmaea, about 20 mm long, was clearly identified. Eighty-five dragonflies belonging to N. pygmaea were identified from the images. Thus, by using a small drone equipped with a telephoto lens, the images of N. pygmaea were captured, and the effects of downwash and noise were reduced. The proposed research method can be applied to large wetlands that are difficult to survey in the field, and can thus provide new and important information pertaining to wetland management and conservation. This research method is highly useful for monitoring wetlands as it is non-invasive, does not require the surveyor to enter the wetland, requires little research effort, and can be repeated." (Authors)] Address: Niwa, H., Fac. Bioenvironmental Science, Kyoto University of Advanced Science, Kyoto 621-8555, Japan

21212. Nurmaisah; Septiawan, R.A. (2022): The diversity of insects found in polycultural land of green spinach (Amaranthus sp) in Sinar Harapan Farming Group, Tarakan. The Ist International Conference On Indigenous Knowledge For Sustainable Agriculture 2022. ISBN: 978-623-331-387-2: 1-7. (in English) ["The diversity of insect species has an important role in the ecosystem stability. The farming system in kampung enam village used a polyculture farming system. Polyculture farming can increase the ecosystem stability since providing a better environment for the predatory insects and parasitoids in controlling the natural pest population in a commodity. One horticultural commodity found in polyculture land in Sinar Harapan Farmer Group of Tarakan is spinach. The declining quality and production of spinach is caused by several plant-disturbing organisms, such as insects. This research aimed to figure out the diversity and dominance of insects in the polyculture land of green spinach (Amaranthus sp) in the Sinar Harapan Farmer Group of Tarakan. The data were collected using traps, such as yellow traps and pitfall traps. Furthermore, identification was conducted at the Plant Protection Laboratory, Faculty of Agriculture, Universitas Borneo Tarakan. The obtained data were analysed using th Shannon Wiener diversity index and Simpson dominance. The research results show that the obtained insects were included into 9 orders, 36 families, 58 species with a total number of 912 individuals. Based on the analysis results using the Shannon Wiener diversity index and Simpson dominance, the diversity of insects in polyculture land of green spinach (Amaranthus sp) was 3.12 (H') in which the diversity was categorised into high. Meanwhile, the value of insect dominance index was 0,02 with the dominant insect type of dragonfly (Pantala flavescens) with a total number of 115 individuals." (Authors) The list of odonate species includes Neurothemis terminata, Orthetrum sabina, Pantala flavescens, Rhodothemis rufa, O. glaucum, Rhyothemis phyllis, Agriocnemis pygmaea, and Ischnura senegalensis.] Address: Nurmaisah, Departement of Agrotechnology, Borneo Tarakan University, Indonesia. Email: nurmaisah626@gmail.com

21213. Oliveira, T.M.D. de; Renne, D.G.S.2; de Souza, M.M. (2022): Libélulas (Odonata) na música Brasileira. josifi JOSIFI 2022. 14a Jornada Científica e technológica, 11° Simpósio de Pós-Graduaçso Instituto Federal Sul de Minas Gerais: 4 pp. (in Portuguese) ["Odonata have several popular names in Brazil, which has the greatest wealth of dragonflies in the world, and many of them occupy anthropized environments, which explains the presence of these insects in different cultural manifestations. Thus, the objective of this work is to report Brazilian songs about dragonflies, with the purpose of demonstrating how present these insects are in our culture. The study consisted in reviewing videos and articles in several platforms using terms like "dragonflies music; dragonfly music; dragonfly music; insect music; odonata music". With this, seven works citing these insects were found. It can be considered that Odonata is little present in Brazilian music by the amount of existing works, however, these few works explore or suggest biological and behavioral characteristics directly, such as their flight, oviposition behavior, voracity, besides also using different popular names of these animals." (Authors/DeepL)] Address: Oliveira, T.M.D. de: E-mail: tomas.dias@alunos.ifsuldeminas.edu.br

21214. Pacheco, J.P.; Calvo, C.; Aznarez, C.; Barrios, M.; Meerhoff, M.; Jeppesen, E.; Baattrup-Pedersen, A. (2022): Periphyton biomass and life-form responses to a gradient of discharge in contrasting light and nutrients scenarios in experimental lowland streams. Science of the Total Environment 806 (2022) 150505: 9 pp. (in English) ["Higlights: • We tested periphyton responses to discharge and different light and nutrient availability. • Light availability modulated contrasting periphyton responses to discharge. • High light and nutrients enhanced periphyton biomass with increased discharge. • Low light, induced periphyton loss and low profile dominance with higher discharges. • Discharge and nutrients, but not light drove changes in periphyton lifeforms. Abstract: Climate-induced changes in precipitation and land-use intensification affect the discharge of streamsworldwide, which, together with eutrophication and loss of riparian canopy, can affect periphyton biomass and composition, and therefore, ultimately the stream functioning. We investigated the responses of periphyton biomass and lifeforms (i.e., high profile, low profile and motile) to these changes applying an experimental approach by modulating nutrients (nutrient diffusion substrates enriched with 0.5 M NH4NO3 + 0.031 M KH2PO4 and without nutrient enrichment) and light availability (50% shade and full light) along a gradient in discharge ranging from 0.46 to 3.89 L/s (0.7 to 6.5 cm/s) in twelve large-sized (12- m long) outdoor flumes resembling lowland streams. We also analysed the potential effects of other environmental variables including macroinvertebrates on the responses of periphyton to discharge, nutrients, and light. Light and nutrient availability drastically affected periphyton biomass and composition responses to discharge. Periphyton biomass decreased with increasing discharge when shaded but this did not happen when exposed to full light. Under full light conditions, nutrient enrichment mediated an increase in the periphyton biomass with increasing discharge, possibly reflecting an increased metabolism, but this did not happen under non-enriched conditions. Enrichment further affected the compositional responses of periphyton to discharge, with an increase in the biomass of motile, fast growing, small-sized flagellated at

low discharge conditions, and mitigating a loss of high profile periphyton under higher discharges. Light did not affect periphyton composition, and the abundance or feeding-group composition of the macroinvertebrates did not affect biomass or composition of the periphyton either. Our results suggest that nutrient enrichment and light play an important synergistic role in the responses of the periphyton biomass and composition to discharge and emphasize the relevance of riparian canopy conservation and eutrophication control to avoid periphyton growth under increased discharge scenarios in small lowland streams. ... Predator macroinvertebrates were the second most abundant group (Appendix S6), mainly represented by Coleoptera (Dytiscidae, Gyrinidae and Noteridae), Anisoptera, and Chironomidae (Tanypodinae)." (Authors)] Address: Pacheco, J.P., Dept Bioscience, Aarhus University, Silkeborg 8600, Denmark

21215. Pcola, S.; Nutil, J.; Vlasáková, M.; Štofík, J. (2022): Contribution to the dragonflies (Insecta: Odonata) acquaintance in the north–eastern part of Slovakia. Ochrana prírody, Banská Bystrica 40: 23-37. (in Slovakian, with English summary) ["The article summarizes information on 49 species of dragonflies (70% of the known species in the Slovak Republic) found at 97 locations in north–eastern Slovakia, of which 24 species are included in the national red list and 17 are protected by law. The research increased the knowledge on the species composition in this part of the country with 14 species identified for the first time in this region. The occurrence of the species of European importance (Coenagrion ornatum), was confirmed at the site Mokrad pri Ciroche." (Authors)] Address: Nutil, J., Komenského 2660/10, 069 01 Snina, Slovakia

21216. Pessacq, P.; Anjos-Santos, D.; Carvalho, F.G.; Calvao, L.B.; Memdoza-Penagos, C,C.; Juen, L. (2022): A new Epipleoneura Williamson, 1915 (Zygoptera, Coenagrionidae) from northern Brazil and notes on E. venezuelensis Rácenis, 1955. Zootaxa 5219(2): 164-153. (in English, with Portuguese summary) ["Epipleoneura lencionii sp. nov. is erected based on specimens from Acre State (holotype: 10º7'38.5"S; 67º38'6.7"W, 12.ix.2017, Miguel, T.B. leg). Additional material collected in Minas Gerais was also studied, but subsequently was lost in a fire at the National Museum of Rio de Janeiro. We compared the new species with E. venezuelensis Rácenis, 1955. Epipleoneura lencionii differs from E. venezuelensis by the orientation of the lateral lobes on the male epiproct and by the shape of the posterior lobe of the prothorax of the female. The distribution of the species is analyzed and notes on the reproductive behavior of the genus are provided." (Authors)] Address: Pessacq, P., Laboratorio de Investigaciones en Ecología y Sistemática Animal, Centro de Investigación Esquel de Montaña y Estepa Patagonica (LIESA-CIEMEP-CONICET), Chubut, Argentina. 2Facultad de Ciencias Naturales y Ciencias de la Salud, Universidad Nacional de la Patagonia “San Juan Bosco”, Chubut, Argentina.

21217. Portilla, G.; Rendón, A. (2022): Diseño de estudio del movimiento de microplásticos en la cadena trófica. Tesis de grado, Escuela Superior Politécnica del Litoral, Guayaquil: 49 pp. (in Spanish, with English summary) ["Microplastics biomagnification have been extensively studied in marine ecosystems. However, studies in freshwater ecosystems are less frequent. Many invertebrates, such as Diptera and Odonata [Erythemis vesiculosa], begin their life cycle in these ecosystems and are constantly exposed to microplastics and are constantly exposed to microplastics which facilitates MP transport to organisms at other trophic levels. This study proposes a protocol to evaluate insects as vectors of microplastics using fluorescent particles to determine the risk of biomagnification and possible adverse effects on aquatic organisms. This project collected information on the effects of microplastics of different sizes at various concentrations and exposure times on dipterans, odonates, anurans, and arachnids. To determine the accumulation of microplastics in the internal organs, dissection, extraction and chemical digestion were chosen. While visualization of fluorescent particles was performed with epifluorescence microscopy to quantify the number of particles per individual. The results showed that the most prevalent particles were the smallest and the organ with the highest accumulation was the gastrointestinal tract. Likewise, the biomagnification factor was greater than 1 in all interactions except for anurans. This study demonstrates that the use of fluorescent particles plus chemical digestion allows determining the transfer of microplastics from mosquitoes to other organisms and that the smallest particles have a greater impact on the biomagnification of these particles in the internal organs of aquatic organisms.] Address: not stated

21218. Prat, N. (2022): A case of phoresis of midges on Zygoptera. Chironomus 35: 43. (in English) [Verbatim: Several midges live phoretically on different invertebrates, as was described by Thienemann in his book Chironomus (Thienemann 1974) and may be found in many papers published since. For example, I found some time ago a Podonomus living on the gastropod Chilina dombeiana (Prat et al. 2004). This is a classic topic in midge studies; I found the first revision of the topic in White et al. (1980). Phoresis between Chironomidae and Odonata was one of the most common phoretic associations. Last year, two colleagues working on Odonata sent me several larvae of midges living on Zygoptera larvae. In the first sample (Fig. 1), tubes of Rheotanytarsus larvae were attached to Calopteryx virgo meridionalis. Larvae of the midge inside the tubes were very small. In the second sample examined, cases were simple tubes, and the midges were from the genus Paratanytarsus, and were present on Calopteryx haemorrhoidalis and Calopteryx xanthostoma (R. Martin pers. comm.). Both samples are from the River Tordera, in Catalonia (NE Spain). More details of the sites and the number of larvae found, and the instar of the Odonata may be found in Martin and Maynou (2021). Although phoresis between Chironomidae and Odonata has been frequently described over many years, the picture of this occurrence may be of interest to people working on midges.] Address: Prat, N., Freshwater Ecology, Hydrology and Management group (F.E.H.M). Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Univ. de Barcelona. Diagonal 643, 08028 Barcelona. E-mail: nprat@ub.edu

21219. Rafique, A.; Sarwar, Z.M.; Ahmad, N.; Shami, A.; Ali, R.; Mohamed, E.H.; Abd Al Galil, F.M.; Alam, P. (2022): Biodiversity and taxonomic study of order Odonata from district Multan, Punjab, Pakistan. Ann. For. Res. 65(1): 1046-1058. (in English) ["... For this purpose, the survey tours were conducted in different localities of district Multan. Data were collected daily using an aerial net. After collecting phase, specimens were killed in a potassium cyanide jar. Later on, specimens were spread and preserved in wooden boxes. The samples were identified up to species level with the help of taxonomic keys and available literature. As a result, 20 species were identified based on morphology and physiology. These were also cross-checked from National Agriculture Research Centre (NARC) Islamabad. The identification keys, Photography of adults, and wings were also provided." (Authors)] Address: Sarwar, Z.M., Dept Entom.,

FAST Bahauddin Zakariya University Multan. 60800, Pakistan. Email: zmsarwar@bzu.edu.pk

21220. Raimondo, D.; Young, B.E.; Brooks. T.M.; Cardoso. P.; van der Colff, D.; Dias, B.F.; Vercillo, U.; de Souza, E.; Juslén, A.; Hyvarinen, E. von Staden, L.; Tolley, K.; McGowan, P.J.K. (2022): Using Red List Indices to monitor extinction risk at national scales. Conservation Science and Practice. 2022; e12854: 12 pp. (in English) ["The Red List Index (RLI) measures change in the aggregate extinction risk of species. It is a key indicator for tracking progress toward nine of the Aichi and many proposed post-2020 Global Biodiversity Framework Targets. Here, we consider two formulations of the RLI used for reporting biodiversity trends at national scales. Disaggregated global RLIs measure changing national contributions to global extinction risk and are currently based on five taxonomic groups, while national RLIs measure changing national extinction risk and are based on taxonomic groups assessed multiple times in country. For 74% of nations, the disaggregated global RLI is currently based on three or fewer taxonomic groups. Meanwhile, national RLIs from selected pilot countries Finland, South Africa, and Brazil are computed from twelve, eight, and nine taxonomic groups, respectively. The national RLI and the disaggregated global RLI measure different aspects of biodiversity, in that the former detects national trends in populations of species for which each country is responsible while the latter provides standardized comparisons of nations' contributions to the global extinction risk of the same species groups. As governments commit to the post-2020 Global Biodiversity Framework, we encourage them to monitor a standard set of taxonomic groups representing different biomes using both RLI formulations to ensure effective target tracking and accurate feedback on their conservation investments." (Authors)] Address: Raimondo, Domitilla, Threatened Species Unit, Biodiversity Assessment & Monitoring Directorate of the South African National Biodiversity Institute, Private Bag X101, Pretoria, South Africa. Email: d.raimondo@sanbi.org.za

21221. Ranjith, M.; Bajya, D.R.; Ramya, R.S. (2022): Abundance and composition of arthropods in sugarcane (Saccharum officinarum) ecosystem. Indian Journal of Agricultural Sciences 92(11): 1386-1390. (in English) ["A short investigation was devised by Dept of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore in 2022 to document the arthropod composition in sugarcane (Saccharum officinarum L.) ecosystem. Arthropod fauna was collected from sugarcane ecosystem in farmers' field at Puthur of Coimbatore district, Tamil Nadu at weekly intervals. Totally, 2,310 individuals of the subclass Pterygota were collected and among them most of specimens belonged to Exopterygota. The exopterygota (1,029) were represented by 5 orders, viz. Hemiptera, Odonata, Orthoptera, Isoptera and Dermaptera. Majority of the individuals belonged to the family Aphididae (330) under the order Hemiptera. Under order Orthoptera, Gryllidae (46) was the dominant family closely followed by Acrididae (45). Among these, the dominant species was Gryllus spp. The order Odonata was represented by a single family Libellulidae (38) (Orthetrum sabina Drury, 1773). Under Endopterygota, 4 orders were identified and among these, Hymenoptera was the most common order with 740 numbers, followed by Diptera (237), Coleoptera (215) and Lepidoptera (89). Under the order Coleoptera, 3 families were recorded, with most of them falling under the family Coccinellidae (172) followed by Cicindelidae. Hymenopteran order comprised majorly of ants, belonging to the family Formicidae, of which 3 species were identified. Lepidoptera consisted of single species Ariadne merione Cramer, 1779 belonging to family Nymphalidae. Majority of Arachinda was represented by order Araneae. Under the order Araneae most of them pertained to families Araneidae, Lycosidae and Thomisidae. Neoscona sp., Hippasa sp., Pardosa sp. and Pardosa birmania Simon were found to be common in sugarcane ecosystem." (Authors)] Address: Ranjith, M., Tamil Nadu Agricultural Univ., Coimbatore, Tamil Nadu, India. Email: entoranjith@gmail.com

21222. Rippel, C.A. (2022): Control biológico de culícidos: análisis de la capacidad predatoria de estadios inmaduros de insectos del orden Odonata. PhD thesis, Facultad de Ciencias Exactas, Químicas y Naturales, Universidad Nacional de Misiones, Posadas: 105pp. (in Spanish, with English summary) ["Mosquitoes are a major global health problem. The life cycle of these insects includes an aquatic stage, during which immature stages develop, and is the period during which many of the processes of population regulation occur. Predation is considered one of the most important biological interactions in aquatic environments. Given the need for ecological strategies to address the problem of mosquito proliferation vectors poses natural enemies as an attractive option. The order Odonata (Insecta) has immature aquatic states and flying adults. Although there are no ecological studies in the area on the predatory-prey relationship of odonates and mosquitoes, the capacity and efficiency of several Odonata species have been evaluated worldwide. For a sustainable biological control program, it is a prerequisite to characterize the trophic relationships between native species. Therefore, in the first place, we surveyed the fauna of Odonata present in the area. Larvae and adults were collected and raised in streams and drainage channels in the southern part of the province of Misiones. Sites from the Selva Paranaense ecoregion were also surveyed. Artificial breeding sites (swimming pools) were examined, where the composition of the accompanying entomofauna was determined at the highest possible taxonomic level, in addition to odonates and mosquitoes. After determining the distribution and partially the breeding conditions of insects of the order Odonata, we proceeded with the characterization of predatory activity. The predatory capacity of Odonata larvae on culicids was evaluated in laboratory and in swimming pools (artificial hatcheries used by both orders). Predation capacity and performance tests were performed on a gradient of conditions with varying difficulties. Functional response was evaluated for Pantala flavescens (Anisoptera: Libellulidae). Finally, different ways of observing the preys after intake were evaluated through dissections, fecal matter and extraction and amplification of the DNA prey of the digestive tract of odonates with markers of the mitochondrial gene Cytochrome Oxidase I. The results show that odonates are present in various environments in the province of Misiones, including those where urbanization is advancing. In artificial breeding sites, such as swimming pools, the immature stages of Pantala flavescens coexist with mosquito larvae and these are part of their diet. The presence of predators of the orders Hemíptera and Coleoptera is also recorded in these farms. The predatory capacity of the analyzed Odonata larvae shows that they are voracious predators with a functional response of type II. Post-intake analyses allowed the identification of the larvae consumed by Culex quinquefasciatus. The coexistence and regulation of Odonata and mosquitoes occurs naturally in favorable conditions. Then through protection of water and vegetation, biological control could occur spontaneously in biodiverse areas such as the province of Misiones." (Author)] Address: not stated

21223. Sadasivan, K.; Nair, V.P.; Palot, M.J.; Samuel, A.; Shereef, A. (2022): Taxonomic notes on the genus Heliogomphus, with a redescription of H. kalarensis. International Journal of Odonatology 25: 107-120. (in English) ["The taxonomy and distribution of dragonflies of the genus Heliogomphus from the Western Ghats of southern India are discussed. A morphological study of fresh male specimens from the field, as well as holotypes and lectotypes from repositories was undertaken. Contradicting statements in scientific literature, we found that the markings on the occiput and thorax are not dependable features in distinguishing sympatric Heliogomphus promelas (Selys, 1873) and H. kalarensis Fraser, 1934. The structure of the epiprocts and the male genitalia were key features for differentiating them. H. pruinans, Fraser, 1922 is removed from the synonymy of H. promelas and is synonymized with H. kalarensis instead based on the analysis of the structure of its epiproct. In accordance with the provisions of ICZN Article 23.9.1.2, in suppression of the unused senior synonym, the taxon name H. kalarensis is retained as a nomen protectum. H. unifasciatus is treated as nomen nudum. Taxonomic notes and updated distribution summaries of the two species from the Western Ghats with an identification key to the males are provided. H. kalarensis is redescribed from fresh field-collected specimens, including details of the male genitalia and anal appendages. Fieldwork in the Western Ghats revealed that H. kalarensis is the most common of the two Heliogomphus species in Kerala state. The published records of H. promelas and H. kalarensis from this region need to be revisited in light of the facts presented here." (Authors)] Address: Sadasivan, K., Travancore Nature History Society MBRRA, Mathrubhumi Rd, Vanchiyoor P.O., Thiruvananthapuram, Kerala, India. Email: kaleshs2002in@gmail.com

21224. Samways, M.J.; Deacon, C. (2022): Extinction reprieve for the ancient and imperiled dragonflies at the southern tip of Africa. Imperiled: The Encyclopedia of Conservation. Publisher: Elsevier: 471-484. (in English) ["The ancient mountains of southern Africa are rich in local endemic species, including dragonflies. Despite the mountains experiencing hot and dry summers, the perennial mountain streams enable the dragonflies to survive the harshest of summers. This has continued for millions of years, with some species having an ancient phylogenetic history. Yet today, these insects are experiencing significant novel impacts from human activity, especially from invasive trees impacting the mountain streams. However, the tide of local extinction risk has turned around. A large-scale national project has successfully removed many of the alien trees. This timely conservation action has resulted in effective recovery of many of these ancient dragonflies with great success. Southern Africa is rich in localized biota. The ancient mountains create complex rainfall patterns and support many perennial streams, making them an evolutionary stage for many endemic dragonfly species. These mountain streams enable the dragonflies to survive the hot, dry summers characteristic of the region. However, these insects are now facing significant impacts from human activity, especially invasion from alien trees along the streams. But all is not lost. A strategic national project has already removed many of the alien trees with great success, showing how targeted conservation action can be highly effective for imperiled dragonflies, and as sentinels for recovery of entire freshwater ecosystems." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

21225. Sawant, D.; Sanap, R. (2022): A checklist of odonates from Aarey milk colony, Mumbai suburban district, Maharashtra, India. International Journal of Tropical Insect Science volume 42: 3855-3868. (in English) ["Odonates are fresh-water insects that serve as indicators of the quality of fresh water resources. Aarey Milk Colony (AMC) harbors several seasonal wetlands, serving as an ideal habitat for dragonflies and damselflies. To date, however, odonate diversity in AMC remains understudied. Moreover, the region is currently facing immense anthropogenic pressure, which may result in the permanent destruction of some of the most important wetland habitats in Mumbai Suburban District. Therefore, to document odonate diversity in AMC, we conducted surveys during 2018–2019 and recorded 51 species belonging to 32 genera in 9 families of 2 suborders. Of these, 27 represent new records from the Mumbai Metropolitan Region. In the present article, we provide photographic documentation of odonate species and highlight the thriving diversity of these insects in urban habitats. Our findings will contribute to emphasizing the ecological importance of AMC and aid its protection." (Authors)] Address: SawantView, D., Seth G S Medical College and KEM Hospital, 400012, Mumbai, Maharashtra, India

21226. Sawant, D.; Ogale, H.; Deulkar, R.M. (2022): An annotated checklist of odonates of Amboli-Chaukul-Parpoli region showing new records for the Maharashtra State, India with updated state checklist. Journal of Threatened Taxa 14(11): 22164-22178. (in English) ["Amboli region, consisting Amboli, Chaukul, Nene, and Parpoli villages is one of the biodiversity rich areas in northern Western Ghats. We opportunistically surveyed odonates from the region and prepared an annotated checklist of 93 species belonging to 12 families. We report 15 Western Ghats endemic species and six new records for the State of Maharashtra. We further present an updated checklist of Odonata of Maharashtra state with a total of 144 species." (Authors)] Address: Sawant, D., Community Medicine, Seth GS Medical College and KEM Hospital, Mumbai, Maharashtra 400012, India. Email: dattaprasad.101@gmail.com

21227. Scribano, G.; Gazzola, A.; Winkler, A.; Balestrieri, A.; Grioni, A.; Lastrico, G.; Tremolada, P.; Pellitteri-Rosa, D. (2022): Antipredatory Behavioural Responses of Microplastic-Exposed Tadpoles of the Italian Agile Frog. Environmental Science and Pollution Research 30: 13688-13696. (in English) ["Microplastics (MPs) are nowadays abundant, persistent, and ubiquitous in the environment, representing a new threat for terrestrial, marine, and freshwater ecosystems. Although anuran populations and species are globally declining, the effect of MP exposure on this taxon has been poorly investigated. With the aim of assessing the effects of microplastic exposure on the defensive responses of Italian agile frog (Rana latastei) tadpoles, we exposed them to three different concentrations (1, 7, and 50 mg L-1) of a mixture of plastic polymers (HPDE, PVC, PS, and PES) for 2 weeks. Then, we measured the total distance covered by individual tadpoles before and after exposure to tadpole-fed dragonfly larvae (Aeshna cyanea) cues. As expected, predation risk sharply lowered the total distance travelled by tadpoles; however, MP concentration did not affect their defensive performances. We also collected data on tadpole development, activity, and mortality. In contrast with previous experiments, neither tadpole growth nor mortality varied with MP concentration. Our results indicate that the intensity of MP effects on growth and development may depend on tadpole size, with large tadpoles being less susceptible to the negative effects of MP exposure." (Authors)]

Address: Tremolada, P., Dept of Earth & Environ. Sci., Univ. Pavia, I.27100 Pavia, Italy. Email: paolo.tremolada@unimi.it

21228. Siepielski, A.M.; Gómez-Llano, M.; McPeek, M. (2022): Environmental conditions during development affect sexual selection through trait-fitness relationships. American Naturalist 199(1): 34-50. (in English) ["Sexual selection can be shaped by spatial variation in environmental features among populations. Differences in sexual selection among populations generated through the effects of the environment could be shaped via four paths: differences in mean absolute fitness, differences in the means or variances of phenotypes, or differences in the absolute fitness–trait function relationship. Because sexual selection occurs only during the adult life stage, most studies have focused on identifying environmental features that influence these metrics of fitness and trait distributions among adults. However, these adult features could also be affected by environmental factors experienced in early life stages that then shape the trajectory for sexual selection during the adult life stage. Here we investigated how among-population variation in environmental conditions during the juvenile (larval) stage of two species of Enallagma damselflies [E. ebrium, E. geminatum] shapes sexual selection on male body size. We found that environmental factors related to predation pressures, lake primary productivity, and habitat availability play a role in shaping spatial variation in sexual selection. This acts mainly through how the environment affects absolute fitness–body size associations, not spatial variation in mean fitness or body size means and variances. These results demonstrate that the underpinnings of sexual selection in the wild can arise from environmental conditions during prereproductive life stages." (Authors)] Address: Siepielski, A.M., Dept Biol. Sciences, Univ. Arkansas, Fayetteville, Arkansas 72701, USA. Email: amsiepie@uark.edu

21229. Sirois-Delisle, C.; Kerr, J.T. (2022): Climate change aggravates non-target effects of pesticides on dragonflies at macroecological scales. Ecological Applications 32(2), e2494: (in English) ["Critical gaps in understanding how species respond to environmental change limit our capacity to address conservation risks in a timely way. Here, we examine the direct and interactive effects of key global change drivers, including climate change, land use change, and pesticide use, on persistence of 104 odonate species between two time periods (1980-2002 and 2008-2018) within 100 X 100 km quadrats across the United States using phylogenetic mixed models. Non-target effects of pesticides interacted with higher maximum temperatures to contribute to odonate declines. Closely related species responded similarly to global change drivers, indicating a potential role of inherited traits in species' persistence or decline. Species shifting their range to higher latitudes were more robust to negative impacts of global change drivers generally. Inherited traits related to dispersal abilities and establishment in new places may govern both species' acclimation to global change and their abilities to expand their range limits, respectively. This work is among the first to assess effects of climate change, land use change, and land use intensification together on Odonata, a significant step that improves understanding of multi-species effects of global change on invertebrates, and further identifies conditions contributing to global insect loss." (Authors)] Address: Sirois-Delisle, Catherine, Canadian Facility for Ecoinformatics Research, Dept Biol., Univ. Ottawa, 30 Marie-Curie Private, Ottawa, ON, K1N 6N5, Canada. Email: E-mail: csiro098@uottawa.ca

21230. Solihah, E.E.; Utami, S.; Dewi, N.K. (2022): Penyusunan ensiklopedia Berbasis keanekaragaman capung (Odonata) di Kawasan Air Terjun Teleng Ngawi sebagai sumber belajar kelas X [Compilation of an encyclopedia based on the diversity of dragonflies (Odonata) in the Teleng Ngawi Waterfall Area as a learning resource for class X]. Jurnal Edukasi Matematika dan Sains 10(2): 424-430. (in Indonesian, with English summary) ["This study aims to compile a product in the form of an encyclopedia of learning resources for class X diversity of dragonflies (Odonata) in the Teleng Ngawi Waterfall area. This research is a qualitative research that identifies and processes data from observations in the teleng waterfall field in accordance with the facts, circumstances and data during the research. This study describes the situation that occurs with the relevant data. The identification of dragonflies (Odonata) was carried out from February to June 2022, and found 7 species, namely Rhinocypha fenestrate, Vestalis luctuosa, Euphaea variegate, Copera marginipes, Orthetrum sabina, Crocothemis servilia, and Neurothemis terminate. The findings of this study became the material for compiling an encyclopedia of dragonfly diversity (Odonata). The stages of compiling the encyclopedia include: (a) drafting of the encyclopedia, (b) validation of the encyclopedia, (c) revision of the validation result of the encyclopedia based on the validator's criticisms and suggestions, (d) printing of the encyclopedia product. Validation was carried out by 2 validators, namely the material expert validator and the media expert validator. An Encyclopedia was formed with the title: "The Encyclopedia of Odonata Diversity in the Teleng Ngawi Waterfall Area". The result of the calculation of the validation of the Encyclopedia is 79%, which means that the Encyclopedia is suitable to be used as a learning material for class X high school based on local wisdom." (Authors)] Address: Eno Erika Solihah, Universitas PGRI Madiun, Indonesia. Email: ennoerika@gmail.com

21231. Sophian, A.; Nasir, L.O. (2022): Analysis of purity and concentrations of DNA isolated in dragonfly (Onychogomphus forcipatus). Wahana-Bio: Jurnal Biologi dan Pembelajarannya 14(2): 130-136. (in English, with Indonesian summary) ["Analysis of the purity and concentration of DNA isolation results was carried out using samples of dragonflies (Onychogomphus forcipatus) species of insects. This research is important because there are many kinds of research in the molecular field that require good DNA isolation techniques to support the success of the research. The purpose of this paper is to provide information about the quality of the isolated DNA seen using the purity and concentration parameters. The extraction method uses the centrifuge column method. The isolated data were analyzed statistically using the average test. The results of DNA isolation showed that the average concentration value was in the range of 60.10 – 69.95. The analysis of the purity of the isolated DNA read at the A260/A280 ratio was in the range of 1.817 – 1.929, while the purity analysis at the A260/A230 ratio was in the range of 0.760 – 0.822. Based on the results of the study, it can be concluded that the analysis of the purity and concentration of DNA from the isolation of dragonfly samples was in a good category at the A260/A280 ratio, while the purity read at the A260/A230 ratio was below the value categorized as good." (Authors) The authors don't give any information where the studied material was sampled. O. forcipatus is a western Palaearctic faunal element, and is not occurring in Indonesia.] Address: Sophian, A., Pusat Pengembangan Pengujian Obat dan Makanan Nasional, Badan POM, Jl. Percetakan Negara, No. 23, Jakarta Pusat, 10560, Indonesia. Email: alfi.sophian@pom.go.id

21232. Souza, C.A.; Silva Cordeiro, I.; Magalhães, O.M.; Ferreira Grossi, P.; Queiroz, J.M. (2022): Conserving the invisible common: Advances and challenges of the insect conservation in Brazil. Brazilian Archives of Biology and Technology 65 (e22210699, 2022 www.scielo.br/babt): 15 pp. (in English) ["In 2019, B. Jarvis paraphrased E. Wilson in that "insects are a case study in terms of the invisible importance of the common". However, threats to insect diversity are rapidly increasing worldwide, and there is a significant challenge to halt or reverse this process. This is especially true in tropical regions where insect diversity is large, but resources are scarce and conservation policy is poorly developed. In Brazil, studies into insect conservation have grown over the last 30 years and, in this contribution, we use available literature to ask: i) what advances have been made; ii) where are the major knowledge gaps and iii) what are the priorities for action? Brazilian studies into insect conservation reflect international trends with respect to levels of ecological organization and a focus on taxonomic conservation. In general, research is restricted to the main Brazilian hotspots and to the states with better infrastructure. Hymenoptera, Diptera, Coleoptera and Lepidoptera are the main orders studied. Work on Ephemeroptera, Plecoptera, Trichoptera and Odonata has increased in recent years and currently are the main insect orders covered by official management initiatives Highlights: • Most Brazilian entomology has focused on the Atlantic Forest biome. • Research on the Amazon and Pantanal biomes should be increased given their biodiversity. • The Hymenoptera is the most studied taxon in Brazil for conservation. • Aquatic insects are widely used in official monitoring and conservation programs. • Insect recovery programs should provide effective conservation. Abstract: In 2019, B. Jarvis paraphrased E. Wilson in that "insects are a case study in terms of the invisible importance of the common". However, threats to insect diversity are rapidly increasing worldwide, and there is a significant challenge to halt or reverse this process. This is especially true in tropical regions where insect diversity is large, but resources are scarce and conservation policy is poorly developed. In Brazil, studies into insect conservation have grown over the last 30 years and, in this contribution, we use available literature to ask: i) what advances have been made; ii) where are the major knowledge gaps and iii) what are the priorities for action? Brazilian studies into insect conservation reflect international trends with respect to levels of ecological organization and a focus on taxonomic conservation. In general, research is restricted to the main Brazilian hotspots and to the states with better infrastructure. Hymenoptera, Diptera, Coleoptera and Lepidoptera are the main orders studied. Work on Ephemeroptera, Plecoptera, Trichoptera and Odonata has increased in recent years and currently are the main insect orders covered by official management initiatives due to their role as indicators of water quality. Priority areas for future work include the promotion of species conservation and ways to increase resource contribution from the private sector through legal instruments that can support integrative public policies for insect species conservation." (Authors)] Address: Souza, C.A., Rural Univ. Rio de Janeiro, Inst. Forests, Dept Environ.Sci., Seropédica, Rio de Janeiro, Brazil. Email: seteorus@yahoo.com.br

21233. Stelzer, V.; Rütten, M. Krenkel, L. (2022): Numerical Investigation of a 3D Dragonfly Wing Captured with a High-Resolution Micro-CT. 8th European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS Congress 2022, 5-9 June 2022, Oslo, Norway: (in English) [Verbatim: "The special wing geometry of dragonflies consisting of veins and a membrane forming a corrugated profile leads to special aerodynamic characteristics. To capture the governing flow regimes of a dragonfly wing in detail, a realistic wing model has to be investigated. Therefore, this study aimed to analyze the aerodynamic characteristics of a 3D dragonfly wing reconstructed from a high-resolution micro-CT scan. Afterwards, a spatially high discretized mesh was generated using the mesh generator CENTAUR™ 14.5.0.2 (CentaurSoft, Austin, TX, US) to finally conduct Computational Fluid Dynamics (CFD) investigations in Fluent® 2020 R2 (ANSYS, Inc., Canonsburg, PA, US). Due to the small dimensions of the wing membrane, only the vein structure of a Camacinia Gigantea was captured at a micro-CT voxel size of 7 microns. The membrane was adapted and connected to the vein structure using a Boolean union operation. Occurring nconsistencies after combining the veins and the membrane were corrected using an adapted pymesh script [1]. As an initial study, only one quarter of the wing (outer wing section) was investigated to reduce the required computational effort. The resulting hybrid mesh consisting of 10 pseudo-structured prism layers along the wing surface and tetrahedra in the farfield area has 43 mio. nodes. The flow around the wing was considered to be incompressible and laminar using transient calculations. When the flow passes the vein structures, steady vortices occur in the corrugation valleys leading to recirculation zones. Therefore, the dragonfly wing resembles the profile of an airfoil. This leads to comparable lift coefficients of dragonfly wings and airfoil profiles at significantly reduced structural weight. The reconstructed geometry also included naturally occurring triangular prismlike serrated structures at the leading edge of the wing, which have comparable effects to micro vortex generators and might stabilize the recirculation zones. Further work aims to investigate the aerodynamic properties of a complete dragonfly wing during wing flapping." (Authors)] Address: Stelzer, Vera, Fak. Maschinenbau, Regensburg Center of Biomedical Engineering, Ostbayerischen Tech. Hochschule Regensburg, Germany

21234. Susanto, M.A.D.; Putri, N.M. (2022): Inventarisasi dan Studi Komposisi Capung (Odonata) pada Area Persawahan Kelurahan Warugunung, Surabaya, Jawa Timur. Bio-Edu: Jurnal Pendidikan Biologi 7(1): 33-43. (in Indonesian, with English summary) ["The rice field area of Warugunung Village is an agricultural area with a pond. In rice fields there are various kinds of insects and ponds which are aquatic habitat types with great potential as natural habitats for dragonflies (Odonata). Dragonflies are flying insects that have an important role in the ecosystem, namely maintaining the balance of the food chain by being a predator for insect pests. This study aims to inventory and determine the composition of dragonflies found in the rice fields of Warugunung Village, Surabaya. The research method used is the VES (Visual Ecounter Survey) method and belt transects, as well as data analysis using the Shannon-Wienner (H') species diversity index formula. The results obtained were 17 species from 3 families with a total of 139 individuals. The results of the diversity index analysis show that the lowest diversity index is found at the Vegetation Pond observation location with a value of H'= 2.41 and the lowest diversity index is at the rice field observation location with a value of H'= 1.27] Address: Susanto, M.A.D., Dept of Biology, Faculty of Science and Technology, Universitas Islam Negeri Sunan Ampel, Surabaya, Indonesia. Email: muhammadazmidwi@gmail.com

21235. Susanto, M.A.D. (2022): The diversity and community structure of dragonflies (Odonata) in various types of

habitat in Lakarsantri District, Surabaya. Program Studi Biologi, Fakultas Sains Dan Teknologi, Universitas Islam Negeri Sunan Ampel, Surabaya: 129 pp. (in Indonesian, with English summary) ["Lakarsantri District is one of the areas in the city of Surabaya that has various types of aquatic habitats so that it has a big role for the sustainability of various living things, especially dragonflies (Odonata). Dragonflies are flying insects that spend most of their life cycle in the water, so the existence of aquatic ecosystems is very important for the survival of dragonflies. Diversity and community structure of dragonflies have an important role in an ecosystem, including as a bioindicator of environmental quality and predators of insect pests and disease vectors. The purpose of this study was to determine the species diversity and community structure of dragonflies in various habitat types in Lakarsantri District. The data collection method in this study used the Visual Encounter Survey (VES) method, which is an observation method by tracing all predetermined observation locations by recording the diversity of dragonfly species and counting the number of individuals of each dragonflies species observed. The study was conducted at 6 observation locations during July, August and September 2021. The results of this study showed that there were 22 species with a total of 1028 individuals from 4 families. The diversity index value shows that the Open Pond location has the highest dragonflies diversity value with a value of H'= 2.23 with 19 species of dragonflies found in 4 families with a total of 351 individuals. Meanwhile, the location with the lowest dragonflies diversity index was at the Unesa Reservoir with a value of H'= 0.55 with 11 dragonfly species found with a total of 94 individuals." (Authors)] Address: Susanto, M.A.S., Program Studi Biologi, Fakultas Sains dan Teknologi UIN Sunan Ampel Surabaya, Jalan A. Yani 117, Surabaya, Indonesia. E-mail: muhammadazmidwi@gmail.com

21236. Tunturi, M.O. (2022): The rare libellulid Urothemis abbotti recorded and photographed in southern Thailand. Agrion 26(2): 34-38. (in English) [U. abbotti was recorded and photographed between 1 January and 1 February 2022 in the surroundings of the Thai Break Resort, Nayong district in Trang Province (WGS84 co-ordinates: 7.483026° N, 99.724994° E).] Address: Markku O. Tunturi. Email: markku.tunturi@iki.fi

21237. Vega-Sánchez, Y.M.; Mendoza-Cuenca, L.; González-Rodríguez, A. (2022): Morphological variation and reproductive isolation in the Hetaerina americana species complex. Scientific Reports 12, Article number: 10888: 10 pp. (in English) ["Incomplete premating barriers in closely related species may result in reproductive interference. This process has different fitness consequences and can lead to three scenarios: niche segregation, sexual exclusion, or reproductive character displacement. In morphologically cryptic species, isolation barriers can be difficult to recognize. Here, we analyzed the morphological, behavioral, and genetic differences between two sympatric cryptic species of the genus Hetaerina to determine the characters that contribute the most to reproductive isolation and the effect of the high rates of behavior interference between the species. We found complete genetic isolation and significant differences in the morphometry of caudal appendages and wing shape, as well as body size variation between species. In contrast, we did not find clear differences in the coloration of the wing spot and observed high rates of interspecific aggression. Our results suggest that divergence in the shape of the caudal appendages is the principal pre-mating barrier that prevents interspecific mating. Moreover, a scenario of character displacement on body size was found. Nevertheless, size could play an important role in both inter- and intrasexual interactions and, therefore, we cannot differentiate if it has resulted from reproductive or aggressive interference." (Authors)] Address: Vega-Sánchez, Yesenia Margarita, Instituto de Investigaciones en Ecosistemas y Sustentabilidad, Universidad Nacional Autónoma de México, 58190 Morelia, Mexico. Email: yvega@cieco.unam.mx

21238. Ziter, C.D. (2022): Cryptic eco-evolutionary feedback in the city. Journal of Animal Ecology 91(3): 510-513. (in English) ["Research Highlight: Brans, K. I., Tüzün, N., Sentis, A., De Meester, L., & Stoks, R. (2021). Cryptic eco-evolutionary feedback in the city: Urban evolution of prey dampens the effect of urban evolution of the predator. Journal of Animal Ecology. https://doi.org/10.1111/1365-2656.-13601. Despite the strength and ubiquity of urban stressors on multiple taxa, there have been minimal attempts to determine the ecological consequences of urban evolution on multiple species. Brans & Tüzün et al. use a well-known predator prey system—damselfly nymphs Ischnura elegans and water fleas Daphnia magna—to test whether scenarios in which both species evolve in response to urbanization differ from scenarios in which only the predator or prey evolves. The authors show that urban damselflies showed higher encounter and predation rates when paired with rural prey, but that the advantages conferred by urbanization-driven adaptation disappeared when urban predators encountered urban prey. This represents a cryptic eco-evolutionary feedback, where evolution of both predator and prey concealed the effect of evolution in each partner individually. Results suggest that mismatches in the evolutionary responses of interacting species may have significant ecological consequences, and highlight the importance of a multispecies approach in eco-evolutionary dynamics research." (Author)] Address: Ziter, C.D., Dept Biol., Concordia Univ., Montreal, QC, Canada. Email: carly.ziter@concordia.ca

21239. Zoch, L.; Reich, M. (2022): Torfmooskultivierungsflächen als Lebensraum für Vögel, Amphibien, Libellen und Tagfalter. Naturschutz und Landschaftsplanung 54(11): 22-31. (in German, with English summary) ["Sphagnum paludiculture as a habitat for birds, amphibians, Odonata, and Lepidoptera – What habitat quality do sustainably managed raised bogs provide? - Peatland species are often highly endangered and isolated in their pop ulations due to large-scale drainage-based use and destruction of their habitats. Current climate policy goals are leading to new approaches for a wet, sustainable use of peatland sites, so-called paludiculture. On raised bog soils, the cultivation of peat mosses (‘Sphagnum farming’) is suitable, which creates potential habitats for peatland species due to the wet conditions and the establishment of vegetation typical for raised bogs. This study investigated the extent to which this potential can be used by birds, amphibians, dragonflies, damselflies, butterflies and moths. In 2017 and 2018, comparative surveys were carried out at two Sphagnum farming sites (established from 2015 to 2016), two rewetted cut-over restoration sites, and two near-natural bogs in Lower Saxony (Germany). In particular, the Sphagnum farming sites showed high po tential for characteristic peatland bird species and lowland breeders, as well as for characteristic Odonata species. For the moor frog, the only peatland amphibian species in this study, Sphagnum farming sites could serve as valuable connecting elements in habitat corridors. In contrast, the habitat quality for Lepidoptera was low due to site management and the lack of windbreak structures." (Authors)] Address: Zoch, Lotta., Institut für Umweltplanung,

Herrenhäuser Str. 2, D-30419 Hannover, Germany. E-mail: zoch@umwelt.uni-hannover.de

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21240. Abhilash, H.R.; Mahadevaswamy, M.; Shashank, K.R.; Nagaraj, M.; Kumar, A. (2023): Biodiversity and abundance of aquatic insects in two freshwater lakes of Mysore district, Karnataka, India. Arthropods 12(1): 1-15. (in English) ["A study on aquatic insects biodiversity and abundance along with physicochemical parameters of two lentic water bodies (Varuna and Dalvoy) of Mysore district was carried out on monthly basis from October 2018 to March 2019. A total of 31 species belonging to 19 families and 6 orders were recorded during the study period. At order level, Coleoptera showed maximum relative abundance (57%) followed by Hemiptera (13%) in Varuna Lake, while in Dalvoy Lake, the order Hemiptera (66%) was most abundant, followed by Coleoptera (16%). Computation of dominant status of different species of aquatic insects in lakes based on Engelmann's scale revealed that Canthydrus laetabilis and Gyrinus distinctus, from the order Coleoptera, were dominant in Varuna Lake, while two Hemipteran species, Diplonychus rusticus and Anisops sp., were dominant in Dalvoy Lake. The highest Shannon diversity index (2.803) and evenness values (0.66) were recorded in Varuna Lake, which was slightly greater than Dalvoy Lake (2.028 and 0.45). Similarly, the Biological Working Party Score (BMWP) and Average Score Per Taxon (ASPT) values were 80 and 5.33 in Varuna Lake and 53 and 4.08 in Dalvoy Lake. This indicates Varuna Lake is less polluted and has higher species diversity than Dalvoy Lake. In terms of the physico-chemical properties of water, a significant difference was noted in electrical conductivity, total dissolved solids, free carbon dioxide, dissolved oxygen, total alkalinity, hardness, nitrate, sulphate, and chloride concentrations between Dalvoy Lake and Varuna Lake. The results of physicochemical analysis and diversity indices suggest stressed and disturbed water quality conditions at Dalvoy Lake." (Authors) The list of taxa includes Diplocodes sp. and Ischnura sp.] Address: Kumar, A., DOS in Sericulture Science, Manasagangotri, University of Mysore, Mysore-570006, Karnataka, India

21241. Alfieri, J.M.; Jonika, M.M.; Dulin, J.N.; Blackmon, H. (2023): Tempo and mode of genome structure evolution in insects. Genes 2023, 14, 336. https://doi.org/10.3390/ genes14020336: 11 pp. (in English) ["The division of the genome into discrete chromosomes is a fundamental characteristic of eukaryotic life. Insect taxonomists' early adoption of cytogenetics has led to an incredible amount of data describing genome structure across insects. In this article, we synthesize data from thousands of species and use biologically realistic models to infer the tempo and mode of chromosome evolution among insect orders. Our results show that orders vary dramatically in the overall rate of chromosome number evolution (a proxy of genome structural stability) and the pattern of evolution (e.g., the balance between fusions and fissions). These findings have important implications for our understanding of likely modes of speciation and offer insight into the most informative clades for future genome sequencing. ... In Odonata, we had a total of 203 species present on our phylogeny and in our karyotype dataset. The species in our karyotype dataset had a haploid chromosome count range from 2 to 20. The species that could be included in the comparative analysis (species that were shared between the phylogeny and karyotype dataset) had a haploid chromosome count from 4 to 14. Using the simple two-parameter model, we estimated rates of 0.004 (95% HPD Interval: 0–0.01) and 0.001 (95% HPD Interval: 0–0.001) for fusions and fissions, respectively (Figure 2). Using the more complex model we estimated rates of 0.004 (95% HPD Interval: 0–0.005), 0.001 (95% HPD Interval: 0–0.001), and 0.035 (95% HPD Interval: 0.01–0.06) for fusion, fission, and polyploidy, respectively. We calculated the mean normalized rates ratio as 0.86 (95% HPD Interval: 0.77–0.95) (Figure 3)." (Authors)] Address: Blackmon, Heath, Dept of Biology, Texas A&M University, College Station, TX 77843, USA. Email: coleoguy@gmail.com

21242. Aristizabal-Botero, A. (2023): Ecological dynamics of macroinvertebrates from inselbergs of the Colombian Guiana Shield. PhD thesis, Sciences & Bioengineering Sciences, Facultad de Ciencias, Universidad de los Andes: 144 pp. (in English, with Spanish and Dutch summaries) ["Understanding ecological dynamics implies disentangling the connections and interactions between living and non-living components of an ecosystem. Here, we studied links between the unique physical environment of the granite outcrops of the Guiana Shield, one of the most ancient bedrock formations on Earth, and local biodiversity. On these outcrops – also known as inselbergs – there are eroded depressions that become rock pools that can periodically hold water from rain or river input, allowing for the development of a unique diversity of microorganisms, plants, and animals. Although the fauna of temporary rock pool systems on rocky outcrops has been documented in temperate, arid, and semi-arid regions, little is known about similar systems in the Neotropics. The first challenge was to characterize the complex three-dimensional (3D) structure of the habitat; for this, we used remote sensing via an unoccupied aerial vehicle (UAV). We concluded that drone imagery could help to reconstruct spatial variation in microhabitat structures that would be impossible to quantify using ground-level observations or satellite images. In addition, we managed to reconstruct relevant proxies for habitat quality, like photosynthetic activity and rock pool connectivity, via stream network modeling based on a digital elevation model. Even though inselberg ecosystems are renowned for their plant diversity, little was known about the aquatic fauna associated with this habitat, and certainly not in this region. In the second chapter, we explored the aquatic biodiversity of macroinvertebrates in the early and late phases of the rainy season. This section presents the first biodiversity survey and first characterization of the water properties of this ecosystem in the Neotropics. We found strong seasonality with both taxonomic and functional differences in communities. Early inundation communities were dominated by microcrustaceans and gathering collectors. At the same time, predators almost doubled their relative abundance and increased their contribution to community diversity from 40 % to 50 % later in the rainy season. However, the species pool also housed predators such as specialized dragonflies with adaptations that helped them to exploit resources from the beginning of inundations. Finally, in chapter three, we showed strong differentiation in Odonata communities between pools that differ in permanence. To help explain this variation in habitat use, we performed a large-scale life-history experiment with three Odonata families. Here, we tested whether slight variations in dissolved salt concentrations and water level are used by naiads as cues for impending pond drying and could stimulate them to accelerate development. The chapter illustrates how developmental plasticity triggered by different cues can help odonates avoid mortality and exploit prey in short-lived habitats. It also contributes to a better understanding of the requirements and flexibility of odonates in response to environmental conditions. Overall, this project

provides the first documentation of the inhabitants of this peculiar and unexplored aquatic microcosm system in South America. Using innovative technologies, faunistic inventories, multivariate analysis, and life-history experiments, we gained more insights into the fundamental ecological processes that determine the composition of local macroinvertebrate communities. This can facilitate their inclusion in informed land management and conservation initiatives. .... Abstract Chapter 3: Developmental plasticity can help organisms to survive in temporally variable environments. At the same time, heterogeneous environments can allow the coexistence of species with differences in their life-history traits. Our main goal was to evaluate to which extent life-history plasticity can help to explain the coexistence of a diverse assemblage of odonates in a peculiar tropical freshwater habitat characterized by substantial variation in pond permanence. Some dragonflies and damselflies (Odonata) can accelerate their development to leave the water before their temporary rock pool habitat dries. However, how they sense habitat drying is poorly understood. Here, we experimentally tested to what extent elevated concentrations of salts in water or reductions in water level can be used as cues for developmental acceleration in a Neotropical Odonata assemblage from granite rock pools. Libellulidae dragonflies were found along the pond permanence gradient and accelerated their growth in response to elevated dissolved salts (measured as conductivity). Anax amazili Burmeister, 1839 (Aeshnidae) was also found in all environments and did the same in response to lower water levels. On the contrary, larvae of Telebasis simulata (Coenagrionidae) were restricted to deeper long-lived pools and did not respond to the tested cues. The work illustrates how differentiation in life-history strategies can contribute to niche differentiation in this diverse predator assemblage and how developmental plasticity triggered by different cues can help them avoid mortality and exploit short-lived habitats. The global acceleration of freshwater salinization due to human activities might disrupt the delicate links between low levels of dissolved salts and life-history responses and represent a significant threat to these ecosystems and their biodiversity." (Author)] Address: not stated

21243. Bartkowska, A.; Mieczan, T.; Plaska, W. (2023): Colonization of artificial substrates by invertebrate macrofauna in a river ecosystem — Implications for forensic entomology. International Journal of Environmental Research and Public Health 20(4): 2834. https://doi.org/10.3390/ijerph20042834: 11 pp. (in English) ["Forensic entomology includes the analysis of organisms colonizing various parts of the body in order to determine the circumstances of an incident, mainly the time, place, and cause of death. The presence of insects and other arthropods on carcasses can be a source of knowledge for the judicial system. However, this type of research (on submerged bodies) is less published. The aim of our study was to analyse the qualitative and quantitative structure of macroinvertebrates colonizing potential evidence in an upland river. The experimental research involved an eight-week exposure to articles of clothing made of different materials: natural materials (bottom sediments with plants from a river), synthetic (socks), and cotton (t-shirts). Control samples of water after 2, 4, 6, and 8 weeks were taken from experiment locations in the River Bystrzyca with a tube apparatus and hand net. The results indicated that the abundance of organisms on a given substrate depended on the period of development of invertebrate macrofauna and the time of exposure of the substrates. The abundance of aquatic macrofauna on the exposed items increased in direct proportion to the duration of the experiment, which may indicate the adaptability of these organisms to new habitat conditions. Among the taxonomic groups used in forensic entomology, Diptera, Coleoptera, and Odonata were the most abundant. The remaining taxa (including Heteroptera), though not widely used in judicial proceedings, can also provide valuable information about the circumstances of an incident." (Authors)] Address: Bartkowska, Aleksandra, Dept of Hydrobiology & Protection of Ecosystems, Univ. Life Sciences, Dobrzanskiego 37, 20-262 Lublin, Poland. Email: aleksandra.bartkowska@up.lublin.pl

21244. Boal, C.W. (2023): Scavenging of roadkill by Mississippi Kites (Ictinia mississippiensis). Journal of Raptor Research 57(1): 1-2. (in English) [Passing reference to Odonata as prey of Mississippi kites.] Address: Boal, C.W., US Geological Survey, Texas Cooperative Fish and Wildlife Research Unit and Dept of Natural Resources Management, Texas Tech University, Lubbock, TX 79409 USA. Email: clint.boal@ttu.edu

21245. Carbonell, J.A.; Wang, Y.-J.; Sentis, A.; Stoks, R. (2023): Evolution of predator–prey interactions during range expansion in an aquatic insect predator. Functional Ecology 36: 3060-3072. (in English) ["1. Many ectotherms are shifting their distributions polewards, which has been associated with the evolution of phenotypic traits and their thermal plasticity. Trophic interactions may determine the dynamics and ecological impact of range expansions. However, it is largely unknown how trait evolution in edge populations shapes trophic interactions. 2. We studied evolutionary changes in the short-term (functional response) and long-term predator–prey interactions between an aquatic insect predator (the damselfly Ischnura elegans) and its prey (the water flea Daphnia magna) during the predator's ongoing poleward range expansion in northern Europe. 3. Using a common-garden warming experiment at 20 and 24°C we tested for differentiation between predator populations from edge and core regions in metabolic rate and functional response parameters, and used these empirical data to estimate the effects of range expansion on the short-and long-term predator–prey interaction strengths. 4. Metabolic rates did not differ between populations from edge and core regions nor between rearing temperatures. Functional response parameters and their thermal plasticity showed signals of evolution during the range expansion. Attack rates did not differ between predators from edge and core regions, but only decreased under warming in predators from the edge region. Handling times decreased under warming in predators from the edge region but increased under warming in predators from the core region. While handling times were shorter in predators from the core region at 20°C, these did not differ between regions at 24°C. As a result, the short-term interaction strength was higher for predators from the core region at 20°C, but not different between regions at 24°C. The predator–prey system from the edge region showed lower long-term system stability at 20°C, but this region difference disappeared under warming because the edge region stability then increased. 5. Our results suggest that rapid evolution of functional response parameters during a predator's range expansion reduced the direct feeding impact on its prey and made the predator–prey system from the edge region more unstable, but not under warming. This provides rare evidence that functional responses can rapidly evolve during range expansions, potentially destabilizing food web dynamics." (Authors)] Address: Carbonell, J.A., Evolutionary Stress Ecology & Ecotoxicology, University of Leuven, Leuven, Belgium. Email: jacarboher@us.es

21246. Ceia-Hasse, A.; Boieiro, M.; Soares, A.; Antunes, S.; Figueiredo, H.; Rego, C.; Borges, P.A.V.; Conde, J.; Serrano, A.R.M. (2023): Drivers of Insect Community Change along the Margins of Mountain Streams in Serra da Estrela Natural Park (Portugal). Insects 2023, 14(3), 243; https://-doi.org/10.3390/insects14030243: 14 pp. (in English) ["Simple Summary: Mountain ecosystems are important biodiversity hotspots since they host many unique species and provide valuable services. In this study, we analyze the diversity patterns of butterflies and odonates in a mountainous area of high conservation value—Serra da Estrela Natural Park (Portugal)—and we assess which factors are responsible for insect community change between study sites. The insects were sampled along 150 m transects near the margins of three mountain streams, at three elevation levels (500, 1000, and 1500 m). Butterfly species richness was lowest at high altitudes, while odonate species richness did not differ between elevations. Interestingly, species replacement drove the changes between butterfly assemblages, while changes in odonate communities were mostly due to species richness differences. Climatic factors, namely temperature and precipitation, were the main drivers of community change between sites for the two insect groups. The study of mountain insect biodiversity is key to further our understanding on the community assembly processes and provides valuable information to help predict the impacts of environmental changes on mountain biodiversity. Abstract: Mountain ecosystems are important biodiversity hotspots and valuable natural laboratories to study community assembly processes. Here, we analyze the diversity patterns of butterflies and odonates in a mountainous area of high conservation value—Serra da Estrela Natural Park (Portugal)—and we assess the drivers of community change for each of the two insect groups. The butterflies and odonates were sampled along 150 m transects near the margins of three mountain streams, at three elevation levels (500, 1000, and 1500 m). We found no significant differences in odonate species richness between elevations, but marginal differences (p = 0.058) were found for butterflies due to the lower number of species at high altitudes. Both insect groups showed significant differences in beta diversity (ßtotal) between elevations, with species richness differences being the most important component for odonates (ßrich = 55.2%), while species replacement drove the changes between butterfly assemblages (ßrepl = 60.3%). Climatic factors, particularly those depicting harsher conditions of temperature and precipitation, were the best predictors of total beta diversity (ßtotal) and its components (ßrich, ßrepl) for the two study groups. The study of insect biodiversity patterns in mountain ecosystems and of the role played by different predictors contribute to further our understanding on the community assembly processes and may help to better predict environmental change impacts on mountain biodiversity." (Authors)] Address: Ceia-Hasse, Ana, Centre for Ecology, Evolution & Environmental Changes, Azorean Biodiversity Group, CHANGE—Global Change & Sustainability Inst., Fac. Sci., Univ. Lisbon, 1749-016 Lisbon, Portugal

21247. Coayla-Peñaloza, P.; Cheneaux-Díaz, A.A.; Moreno-Salazar, C.V.; Cruz-Remache, C.E.; Colque-Rondón, E.W.; Damborenea, C. (2023): Benthic macroinvertebrate communities and water quality assessment in high Andean wetlands Callali-Oscollo, Arequipa-Cusco, Peru. Revista Mexicana de Biodiversidad 94 (2023): e944206: 13 pp. (in English, with Spanish summary) ["High Andean wetlands are fragile systems, vulnerable to human activity and climate change. In the Arequipa region (Peru), there are high Andean lotic and lentic systems currently affected by livestock raising, fish farming, and dams. The aim of the study was to evaluate the aquatic invertebrate community in the Callalli-Oscollo wetlands and the possible impact of human activities. Samples were taken from November 2017 to October 2018 at 4 sampling stations in lotic environments and 2 in lentic environments. Macroinvertebrates were identified to the family level. The following were determined to evaluate community structure: richness, relative abundance, Shannon-Wiener diversity, Simpson dominance, Pielou evenness, and true diversity. The indices ABI, BMWP/Bol and nPeBMWP were applied to evaluate the ecological quality of the environments sampled. Thirty families were recorded in lotic environments, the most abundant being Chironomidae, Naididae, Limnesiidae, Elmidae, Baetidae and Lumbriculidae. The ecological quality was good, except at the station associated to the dam, where it was doubtful. Twenty-six families were recorded in lentic environments, the most abundant being Cyprididae, Naididae and Corixidae. The macroinvertebrate communities in high Andean environments reflect ecosystem conditions. Environments associated to human activity have lower ecological quality." (Authors) The list of taxa includes "Coenagrionidae".] Address: Damborenea, Cristina, Consejo Nacional de Investigaciones Científicas y Técnicas, División de Zoología de Invertebrados-Universidad Nacional de La Plata, FCNyM, Paseo del Bosque s/n -B1900FWA, La Plata, Argentina. Email: cdambor@fcnym.unlp.edu.ar

21248. Dash, S.S.; Nayak, S.K.; Dhal, A. (2023): Biodiversity of Insects in Black Gram [Vigna mungo (L.) Hepper] during Rabi in the western undulating zone of Odisha. International Journal of Current Science 13(1): 505-527. (in English) [This study „was conducted at Research farm, College of Agriculture, OUAT, Bhawanipatna to study about insect biodiversity, their succession and influence of climatic factors on the population growth of insects during rabi-21. During the study period twenty seven insects belong to seven orders and twenty two families were noticed during different growth stages of crop in an overlapping manner. Beside the insects twelve numbers of predators, three numbers of parasitoids and two pollinators were also recorded. The highest diversity index and evenness of insects were recorded at 42 SMW (0.902 and 1.000) followed by 50 SMW (0.833 and 0.710) respectively. The diversity of insects was almost uniform because of the evenness of the species. The insect order Homoptera and the insect white fly came under superdominant class of dominance during all the growth stages of crop, whereas Coleoptera and Hemiptera were categorized under sub-dominant class at vegetative stage and flowering to podding stage of crop growth respectively. The insect orders Hemiptera, Coleoptera, Diptera and hymenoptera and the insects i.e, galerucid beetle, jassid, stem fly, aphids and thrips came under recedent class of dominance. The relative abundance and dominant status of insect's revealed that the maximum numbers of insects belonged to orders Homoptera (75.22%) followed by Hemiptera (7.92%), Coleoptera (6.30%), Diptera (4.62%), Hymenoptera (4.05%), Orthoptera (0.89%), Lepidoptera (0.86%) and Odonata [Aeshnidae] (0.09%)." (Authors)] Address: Dash, Suman Samilita, Dept of Entomology, College of Agriculture, Odisha University of Agriculture and Technology, Bhubaneswar, 751003 India

21249. Durand, E., (2023): Distribution et éléments d'écologie de Sympetrum depressiusculum (Libellulidae) dans le pays avignonnais (Vaucluse et Bouches-du Rhône). Martinia 37(1): 1-10. (in French, with English summary) ["Distribution and ecology of S. depressiusculum in the Avignon area

(Vaucluse and Bouches-du-Rhône). Results of Sympetrum depressiusculum specific fieldworks lead in part of the Rhone alluvial plain and downstream section of the Durance river are presented. Between 2014 and 2021, a total of 14 new localities with proven autochthony were discovered and underline the importance of this new population localized at midistance of two major national populations (Pierrelatte area and the plain of la Crau). The distribution of this new population is strongly linked to phreatic activity, traditional gravity irrigation system and the existence of a retention basin network which provide conditions required. As a result of degradation of its natural habitats, these man-made basins offer currently some kind of alternative. Nevertheless, severe threats could lead to a quick decline of this local population." (Author)] Address: Durand, E., Naturalia environnement: Site Agroparc, 60 rue Jean Dausset, 84911 Avignon cedex 9, France. Email e.durand@naturalia-environnement.fr

21250. Ferreras-Romero, M.; Márquez-Rodríguez, J. (2023): Aeshna affinis Vander Linden, 1820 (Odonata: Aeshnidae) in the Iberian Peninsula: A review of past and recent records, and a larval biometric study. Revista Chilena de Entomología 49: 93-100. (in English, with Spanish summary) ["Aeshna affinis, … is a native odonate species uncommon in many areas of the Iberian Peninsula. Field observations in Andalusia, the southernmost peninsular region, are notably scarce. Several photographs of one larva of this species, as proof of its reproduction in southern Spain, are provided." (Authors)] Address: Joaquín Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376 km 1. 41013 Sevilla, Spain. Email: jmarrod1@admon.upo.es

21251. Florez, T.; Comoglio, L.; Pinzón, T.; Bota-Sierra, C.A.; Cano-Cobos, Y. (2023): A collecting trip to San José del Guaviare, Colombia, with the description of a new species of Perissolestes (Zygoptera: Perilestidae). International Journal of Odonatology 26: 7-17. (in English) ["This study aims to preliminary assess the taxonomic diversity of dragonflies and damselflies from San José del Guaviare, Guaviare Dept, Colombia. A total of 47 species were collected at five localities in different freshwater ecosystems during a field trip. We highlight three new species records for the country: Erythrodiplax tenuis, Micrathyria spinifera, and Perithemis rubita. Finally, a new species - Perissolestes rupestris Florez, Bota-Sierra & Cano-Cobos 2023 - is described from Guaviare and Casanare, Colombia." (Authors)] Address: Cano-Cobos, Yiselle, Laboratorio de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nacional de Avellaneda, Piñeyro 1870, Avellaneda, Buenos Aires, Argentina. Email: yp.cano137@uniandes.edu.co

21252. Galbiati, M.; Lapadula, S.; Forlani, M.; Barzaghi, B.; Manenti, R. (2023): Both light stimuli and predation risk affect the adult behavior of a stygobiont crustacean. Diversity 2023, 15, 290. https://doi.org/10.3390/d15020290: 11 pp. (in English) ["Stygobiont species show common, typical traits derived from their adaptation to subterranean life. Due to the general absence of light in cave environments, the majority of them are eyeless. Although the absence of eyes generally does not allow them to perceive luminous stimuli, some stygobionts still present phototaxis. Previous studies determined that different species of the eyeless amphipod crustaceans of the genus Niphargus are able to react to light; this has been interpreted as an adaptation to avoid dangerous surface habitats, even if recent studies suggest that this could also be an adaptation to exploit them when a situation is less dangerous (i.e., during the night). Niphargus thuringius is a stygobiont amphipod that can also be observed in spring environments despite possessing all the main morphological features of subterranean organisms, such as depigmentation and a lack of eyes. In the present study, we test how the species respond to light stimuli according to the light cycle and predation risk experienced during a conditioning period. We assessed the reactions to light stimuli of adult individuals of N. thuringius after 30 days of rearing in microcosms with different conditions of light occurrence (total darkness or a light/darkness daily cycle) and predation risk (without predators, with one predator, and with two predators). Both light stimuli during the test and rearing conditions affected the behavior of Niphargus thuringius. With light stimuli, individuals presented a strong photophobic response. Moreover, individuals reared in conditions of high predation risk preferred a more sheltered environment during behavioral tests than individuals reared in safe conditions. Our results add a new species to those of stygobiont amphipods known to display negative phototaxis, confirming that this pattern is widespread and conserved in the field. N. thuringius could be a good candidate model to perform further studies aiming to assess if differences occur between spring populations and populations present in deeper groundwater. ... The conditions representing risk of predation included the following: controls (no predator); meso-predators (four fire salamander larvae (Salamandra salamandra), permitted to wander across the microcosm); and meso-predators plus one top-predator (four salamander larvae wandering across the microcosm, plus one large dragonfly larva (Cordulegaster boltonii) placed in a small cage inside the microcosm; see below). Salamander larvae are considered to be meso-predators as, in nature, they are often preyed on by dragonfly larvae [32]. Fire salamanders were widespread in the study area [38] and often bred in springs and subterranean environments along with Niphargus amphipods [13,33]] Address: Lapadula, S., Laboratorio di Biologia Sotterranea “Enrico Pezzoli”, Parco Regionale del Monte Barro, Località Eremo, 1, 23851 Galbiate, Italy. Email: stefano.lapadula.1999@gmail.com

21253. Garcia–Pozuelo–Ramos, C. (2023): Primeras observaciones de Ceriagrion tenellum (de Villers, 1789) (Odonata: Coenagrionidae) en la provincia de Toledo (Castilla-La Mancha, España central). Zoolentia 3: 18-23. (in Spanish, with English summary) ["We report the discovery of imagos of the species C. tenellum in the province of Toledo. These could be two small populations." (Authors) UTM 30 429765-/4438023, datum ETRS89, 30TVK23, 550 m.s.n.m.; 12-/06/2022) and UTM 30 428337/4434885, datum ETRS89, 30TVK23, 545 m.s.n.m.; 19/06/2022.] Address: García–Pozuelo–Ramos, Sociedad Entomológica y Ambiental de Castilla–La Mancha, Spain. Email: pkymp@yahoo.es

21254. Guillermo-Ferreira, R.; Cezário, R.R.; Datto-Liberato, F.H.; Lopez, V.M. (2023): A coloração em Odonata: o que é e como medir. Hetaerina 5(1): 6-16. (in Portuguese) ["Coloration in Odonata may mediate behaviors related to inter/intraspecific interactions and regulate physiological processes. However, understanding and analyzing the coloration of these animals depends on an interdisciplinary knowledge (biology, chemistry and physics), as well as the use of appropriate equipment and protocols. Therefore, in this essay, we seek to present the methodologies used to measure coloration in Odonata, and the possible problems of the techniques employed. Mainly, we present techniques of optical spectrometry, analysis of photographs and of the vision of the animals. These methods can be employed in

several ecological, evolutionary, physiological and behavioral analyses, which we discuss as possibilities for future studies." (Authors/DeepL)] Address: Guillermo-Ferreira, R., Lestes Lab, Universidade Federal do Triângulo Mineiro. Uberaba, Brasil. Email: rhainer.ferreira@uftm.edu.br

21255. Harabiš, F.; Hronková, J.; Holer, T.; Šípková, J. (2023): Selective effect of fish farming management on freshwater diversity. Biodiversity and Conservation 32: 735-753. (in English) ["In some European regions, ponds are the dominant freshwater habitat type. The ecological value of ponds is decreasing owing to human activities, including intensive fish farming involving predation pressure from fish, reduction of macrophytic vegetation, high nutrient loads, and turbidity. Studies have shown the negative effects of high fish stocks on the diversity of macroinvertebrates. Nevertheless, the effect of fish predation on invertebrate communities could be strongly influenced by other factors, such as the structural complexity of aquatic vegetation. Consequently, we aimed to analyze the effects of environmental-trait interactions on the responses of amphibians, odonates, aquatic true bugs, and diving beetles that are directly or indirectly related to pond management. Each monitored group reflected very different variables. Odonates were sensitive to variables reflecting the quality of the aquatic environment and the overall landscape structure, and accurately reflected differences in the management intensity of ponds. Amphibians reflected only the landscape structure, while diving beetles reflected the quality of the aquatic environment. The aquatic Heteroptera community structure was very indifferent to the management and habitat quality. With the exception of oviposition strategies, we were unable to identify functional traits that could present adaptive advantages or disadvantages in relation to management intensity. We deduced that fish farming management is a selective mechanism that operates with an enormously high intensity which fundamentally homogenizes the structure of assemblages and therefore there is no morphological or phenological variability among species. It is therefore difficult to implement appropriate management measures that would benefit species across taxonomic groups. The key is to maintain the variability of the ponds and surrounding landscape mosaic. Moreover, farm ponds are secondary habitats whose role in supporting biodiversity may be important but cannot be seen as an equal alternative to natural wetlands." (Authors)] Address: Harabiš, H., Dept Ecol., Fac. Environ. Sciences, Czech Univ. Life Sciences Prague, 16500 Prague, Czech Republic. Email: harabis@fzp.czu.cz

21256. Hartung, M. (2023): Description of the Larva of Oxyallagma dissidens (Selys, 1876) (Odonata: Coenagriidae, Ischnurinae). American Journal of Entomology 7(1): 9-12. (in English) ["Oxyallagma dissidens is a species of high elevations 2600-2700m in Ecuador and Peru. The larva of O. dissidens was hitherto unknown. Based on exuviae of reared specimens, the final instar larva of O. dissidens is described. Exuviae of O. dissidens have two parallel rows of dark spots on the dorsum of the abdomen, the prementum has 5-6 setae and the labial palps 6 setae. Antenna 7-segmented, distal margin of labial palp with four crenulations and a large spine. Head brownish and between the eyes at the front with a light band with three loops to behind. Pterothorax with parallel stripes on the wing bags at the inner side. Metathoracic femur length 2.75 mm. All femora with four darker edges with fine spines. Abdominal dorsum with fine punctuations and with a darker brownish distal half. O. dissidens has a comparable strong armation on the femurs. The gill lamellae have a medial broad dark brown vein, with several veins at all sides to the border of gills. In one case a description on O. dissidens was not given, but a figure was published. O. dissidens was mentioned from Peru (Quito, La Granadilla) and from Ecuador (Lago San Pablo, Campos of Guayaquil). O. dissidens is the recent name in contrast to the alternative name runtuni. Bota-Sierra & Andrés described Oxyallagma colombianum as new species of the genus from Colombia.“ (Author)] Address: Hartung, M., Wehnertstr. 20A, 12277 Berlin, Germany. E-mail: AEH.-Matthias.Hartung@t-online.de

21257. Hasik, A.Z.; Tye, S.P.; Ping, T.; Siepielski, A.M. (2023): A common measure of prey immune function is not constrained by the cascading effects of predators. Evolutionary Ecology 37: 13-30. (in English) ["Simultaneously defending against predators, stymieing competitors, and generating immune responses can impose conflicting demands for host species caught in the entanglement of a food web. Host immunity is not only shaped by direct interactions among species, but also many indirect cascading effects. By reducing competition, predators in particular can affect resource acquisition necessary for hosts to mount energetically costly immune responses. However, identifying the links between predators and host immune responses determined by resource acquisition is a complex affair, because predators can (1) reduce host density and thus competition among hosts, (2) exert non-consumptive trait-mediated effects on host resource acquisition behavior, and (3) generate natural selection on host resource acquisition behavior. To examine the relative contributions of these potential predator driven density- and trait-mediated effects on a key aspect of immune function (total phenoloxidase activity, total PO), we conducted mesocosm and field experiments with larval damselflies (Enallagma signatum) and their dominant fish predator (Lepomis macrochirus). Although we expected to observe declines in total PO activity with increases in damselfly density, we found no relationship between density and total PO activity. We also found no support for the prediction that total PO activity would vary as a result of either non-consumptive trait-mediated effects or selection on damselfly foraging activity underlying resource acquisition. Despite the lack of trait- or density-mediated effects, we did find that total PO activity increased with damselfly prey density among lakes, implying resource limitation for this aspect of immune function. These unexpected results point to the need to better understand the ecological conditions whereby predators and competitors constrain immune functions necessary for species to defend themselves in complex food webs." (Authors)] Address: Hasik, A.Z., Dept of Biological Sciences, University of Arkansas, SCEN 601, 850 W. Dickson St., Fayetteville, AR, 72701, USA

21258. Hendriks, J.A.; Mariaty; Maimunah, S.; Anirudh, N.B.; Holly, B.A.; Erkens, R.H.J.; Harrison, M.E. (2023): Odonata (Insecta) communities in a lowland mixed mosaic forest in Central Kalimantan, Indonesia. Ecologies 2023, 4; https://doi.org/10.3390/ecologies4010006: 55-73. (in English) ["Assessing a taxon’s response to change in environmental variables is fundamental knowledge to understanding trends in species diversity, abundance, and distribution patterns. This is particularly needed on Borneo, where knowledge on Odonata populations in different habitats is poor. To address this gap, we present the first study investigating the relationship between morphology and species distribution of Odonata communities in a heath (kerangas)-dominated mixed-mosaic lowland forest in southern Borneo. We sampled 250m line transects in three habitat types: mixed peat swamp, kerangas, and low-pole peatswamp,

with weekly surveys from December 2019 to February 2020. A total of 309 individuals were detected from 25 species. Anisoptera and Zygoptera diversity was the highest in mixed peat swamp and lowest in low pole, while abundance was the highest in low pole and lowest in kerangas; with kerangas notably harboring a very small sample size. Odonata community assemblages differed most between mixed peat swamp and low pole. Morphological data were compared between suborders and habitats. Anisoptera showed significantly larger thoraces, hindwings, and hindwing-to-body ratio than Zygoptera. Anisoptera in low pole were significantly smaller in body, thorax, and hindwing compared to both kerangas and mixed peat swamp. Anisoptera showed a strong association with pools and Zygoptera with flowing water. Heterogeneity, habitat characteristics, presence of specialists, body size, and the interaction between species' morphological traits and habitat characteristics likely explained the trends observed." (Authors)] Address: Harrison, M.E., School of Geography, Geology and Environment, University of Leicester, Leicester LE1 7RH, UK. Email: m.e.harrison@exeter.ac.uk

21259. Hettige, N.D.; Hashim, R.; Kutty, A.A.; Ashaari, Z.H. (2023): A new model for organic contamination assessments using benthic macroinvertebrates as biological indicators. Turkish Journal of Fisheries and Aquatic Sciences 23(8), TRJFAS22423. https://doi.org/10.4194/TRJFAS22423: 15 pp. (in English) ["The main goal of this study was to develop a model for organic pollution assessment. Seven sampling sites in six rivers in the Rawang sub-basin, Selangor River, Malaysia, were selected with one reference site. The sampling sites near the fish farm were used to develop the model. SR2 was used for the validation of the developed model. Benthic macroinvertebrates and water sampling were conducted from April 2019 to March 2020. The Principal Components Analysis (PCA) and regression were conducted to select the most representing benthic macroinvertebrates family. Based on the score value (variance coefficient) of each benthic macroinvertebrates family, the cumulative score value of each sampling site was calculated (i.e., 18=6 sampling sites x 3 replicates). The nine benthic macroinvertebrate families (Baetidae, Libellulidae, Protoneuridae Chironomidae, Curbicullidae, Hydropsychidae, Tubificidae, Lumbriculiade, and Naididae) were identified using PCA and regression. The cluster analysis and mean confidence intervals were used to classify water quality classes precisely. Finally, three different value scales were produced to represent the level of contamination (i.e., <0.69 as organically polluted, 0.69-0.87 as slightly organic polluted, and >0.87 as clean status). The newly developed model was validated. The results produced after validation were better than the water quality status from other studies based on the BMWP/BMWPThai score. This study concludes that the developed model can evaluate river organic contamination successfully. model can evaluate river organic contamination successfully" (Authors)] Address: Hashim, Rohasliney, Universiti Putra Malaysia, Faculty Forestry & Environmental Science, Dept Environment, 43400 UPM, Serdang, Selangor, Malaysia. Email: rohasliney@upm.edu.my

21260. Holuša, O.; Holušová, K.; Balázs, A. (2023): Is the current forest management to the northernmost population of Cordulegaster heros (Anisoptera: Cordulegastridae) in Central Europe (Czech Republic) threatening? Forests 14(2):228. DOI: 10.3390/f14020228: (in English) ["C. heros is included in the EN category on the IUCN Red List for the territory of the Czech Republic, where it inhabits an area of approximately 100 km2. All of the localities are located in the forest complex in Chriby hills, and all of the forests fall into the category of management forests. Most of the forest stands have a high and very high degree of naturalness; they are natural forest stands. The predominant management units are Nutrient sites in middle elevations (78.2 % of the area) and Oligotrophic sites in middle elevations (2.1 % of the area), with stand types of Fagus sylvatica representing 92.5 % of the area, and forest stand types of Quercus sp. representing 5.7 % of the area. The wider alluvia in forest streams are classified as being in management unit alder and ash sites on waterlogged and floodplain soils (1.1 %), with the forest stand type of Alnus glutinosa. The forest stands are restored by regeneration under shelterwood (97.8 % of the area). The waterlogged alluvia, if a separate management unit is established for them, are restored by a regeneration by strip method. Realistically, seven factors were recorded in C. heros habitats, but they mostly have only point effects. Within forestry management, the factors of logging directly in the habitats and the subsequent transport of harvested timber in the habitat were recorded. The most intrusive effects were found on tractor logging roads, where fine soil washes into the stream and causes prolonged turbidity. Of the water management structures in the study area, logging roads with bridges and culverts are constructed, stream banks are reinforced with longitudinal walls at points, and stone steps in the channels are constructed only sporadically. The current forest management system can be described as a nature-friendly system, and therefore, it fully ensures the conditions for the survival of the C. heros population in the Czech Republic." (Authors)] Address: Holuša, O., Dept of Environmental Science & Natural Resources, Fac. Regional Development & International Studies, Mendel Univ. in Brno, Tr. Gen Píky 7, CZ-613 00 Brno, Czech Republic. Email: holusao@email.cz

21261. Huang, Q.; Tian, F.-B.; Young, J.; Lai, J.; Ravi, S. (2023): Numerical study of passively pitching tandem dragonfly wings for hovering flight. AIAA 2023-1027. Session: Bio-Inspired and Low-Reynolds Number Flows I. Published Online:19 Jan 2023https://doi.org/10.2514/6.2023-1027: 9 pp. (in English) ["Insect flapping-wing kinematics and aerodynamics have been studied extensively by re- searchers worldwide. Wing pitching motion in insect flapping flight has been recognized as a passive phenomenon induced by inertial and aerodynamic forces. The performance of passively pitching tandem dragonfly wings was investigated by varying the phase angle between the forewing and the hindwing. The simulations were conducted by a fluid-structure interaction solver based on an immersed boundary-lattice Boltzmann method. The primary performance metric of interest is the power economy (PE), which indicates the extent of lift generation of the wing concerning the power required to operate it. The flapping-wing system was rotated at a stroke plane angle that the total horizontal drag was precisely zero for each case. Results show that the variation of PE is small as the change of the phase angle. The stroke plane angle has a significant variation at phase angle -45° and 45°, while it is still in the range of the stroke plane angle reported in the literature. The effects of different material elasticities and corresponding power expenditures will be investigated and reported in future works." (Authors)] Address: Huang, Q., Univ. New South Wales, Canberra ACT 2610, Australia. Email: qiuxiang.huang@adfa.edu.au

21262. Hushtan, K.; Hushtan, H.H. (2023): The approbation of web resource «Biodiversity of Ukraine» on example of dragonflies (Insecta: Odonata) of Ukrainian Carpathians. Proceedings of the State Natural History Museum 38: 237-

244. (in Ukrainian, with English summary) ["The paper examines of individual possibilities of the "Biodiversity of Ukraine" web resource for the analysis of collections, observations and literary data on the example of dragonflies for the territory of Ukrainian Carpathians. The possibility of analyzing the spatial distribution of Odonata in terms of physical and geographical regions of the model territory was studied. Their faunal similarity was determined using the Sorensen and Jaccard indexes integrated into the web resource. Mountain massifs have been established, which are promising for further research into the fauna and ecology of dragonflies. Preliminary data on the spatial distribution of dragonflies for the territory of the Ukrainian Carpathians were obtained as a result of the approbation of the information capabilities of the "Biodiversity of Ukraine" web resource, in the context of administrative and physical-geographic regions. The most studied is the Ciscarpathians Upland (58 species). Territories that are the least studied and require thorough faunal studies of dragonflies have been identified, namely the Marmarosh-Chyvchyny region The perspective of the expediency of using the "Biodiversity of Ukraine" web resource to compare the dragonfly fauna of different administrative regions of the Ukrainian Carpathians has been established. It should be noted that the national biomonitoring system involves development on a pan-European basis, the use of modern methods of data collection, accumulation, analysis and information exchange, and the creation of conditions for free access to information by a wide range of interested. All these principles are provided by the Data Center "Biodiversity of Ukraine", as shown in this paper." (Authors)] Address: Hushtan, Kateryna, State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine. Email: katrinantonyuk@gmail.com

21263. Jeong, K.-Y.; Choi, J.-Y.; Joc, H.; Jeong, K.-S. (2023): Complete mitochondrial genome of Ischnura asiatica (Brauer, 1865) assembled from next-generation sequencing data. Mitochondrial DNA. Part B: Resources 8(3): 333-335. (in English) ["I. asiatica ... is distributed across most of Korea, primarily in areas with low water flow, such as ponds and wetlands. The complete mitochondrial genome of I. asiatica was sequenced by next-generation sequencing. The circular mitochondrial genome was found to be 15,769 bp long, with of 13 protein-coding, two ribosomal RNA, and 22 transfer RNA genes (GenBank accession no. OM310774). Maximum likelihood, phylogenetic analysis showed that this species clustered with other species belonging to the family Coenagrionidae. This study contributes to the phylogeny of damselflies and other members of the family Coenagrionidae." (Authors)] Address: Jeong, K.-Y., Dept Companion Animal Health, Dongju College, Busan, Republic of Korea

21264. Junaidi, F.A.; Soendjoto, M.A.; Dharmono, D. (2023): Practicality of popular scientific book on Odonata. Jurnal Biologi-Inovasi Pendidikan 5(1): 117-124. (in English, with Indonesian summary) ["The Popular Scientific Book (PSB) on Odonata that inhabits the Tabanio Coastal Forest, Tanah Laut Regency has been completed, but its practicality has yet to be determined. The aim of the research was to determine the practicality of the PSB. The determining parameters were readability, applicability, and student responses which in this case are undergraduate students of the Biology Education Study Program. Readability was tested by three students using the one-to-one method. The implementation was tested by five observers through a small group assessment (on five students using the PSB) to get the expected implementation value and field test assessment (on 10 students) so that the actual implementation was obtained. Student responses were obtained from small groups (five students) and field tests (10 students). The result is that the readability of the book is categorized as Very Good, the implementation of expectations and actual implementation is categorized as Very Good, as well as the expected and actual responses from students Strongly Agree. With these categories, this PSB on Odonata is stated to be practical to use." (Authors)] Address: Soendjoto, M.A., Master Program of Biology Education, Postgraduate Program, Universitas Lambung Mangkurat, Banjarmasin City, South Kalimantan, Indonesia. Email: masoendjoto@ulm.ac.id

21265. Kaligis, K.H.; Pollo, H.N.; Tulung, M. (2023): Penilaian Sumberdaya Alam di Sekitar Danau Pulisan, Linow dan Tampusu, Kota Tomohon, Sulawesi Utara: Capung (Odonata) sebagai Biondikator. Silvarum 2(1): 13-19. (in Indonesian) ["...These factors will limit the spread of several dragonfly species, especially endemic dragonfly species that have specific physical factors. Optimal physical conditions of the habitat will affect the presence of dragonfly species. The purpose of this study was to count the number of dragonfly species, the number of plants, measure water temperature, air temperature, water turbidity, water pH, total TDS dissolved particles, analyze dragonfly species which act as bioindicators and determine water quality status based on the Family Biotic Index. FBI. The results of this study showed that there were 13 species of dragonflies obtained, including 8 species in Linow Lake and 5 species in Pulisan Lake. Constituent plants found in Lake Pulisan, Linow and tampusu are 21 species. The result of calculating the total number of families from the FBI is 7.94, very badly polluted by organic matter. Based on the FBI, Lake Linow contains 2 families Ceonagrionidae and Libellulidae. The result of calculating the total number of families from the FBI is 7.84, the level of pollution is very bad with heavy pollution of organic matter." (Author/Google translate)] Address: Kaligis, K.H., Program Studi Kehutanan, Universitas Sam Ratulangi, Manado, Indonesia. Email: Kevinhiskiakaligis@gmail.com

21266. Kaunisto, K.M.; Suhonen, J. (2023): Territorial males have larger wing spots than non-territorial males in the damselfly Calopteryx splendens (Zygoptera: Calopterygidae). International Journal of Odonatology 26: 1-6. (in English) ["Males of C. splendens use two alternative mating tactics, territoriality, and non-territoriality. These different mating tactics are shown to vary between males within the same population and previous studies have shown that territorial males have considerably higher fitness than non-territorial males. In this paper, we tested whether the wing spot size as sexual ornament, wing length, relative wing spot size, asymmetry in wing length, asymmetry in wing spot size, or asymmetry in relative wing spot size differed between the territorial and non-territorial males. We sampled C. splendens males, representing both mating tactics, from a river system in south-west Finland. According to our results, territorial males have larger wing spot than non-territorial males. In contrast, there were no differences in the other tested traits between the territorial and non-territorial males. In conclusion, our data show that the size of pigmented wing spots may predict the alternative mating tactic of C. splendens males." (Authors)] Address: Kaunisto, K.M., Biodiversity Unit, University of Turku FI-20014, Turku, Finland

21267. Landmann, A.; Landmann, M. (2023): Habitat requirements, habitat variability, and altitudinal distribution of Coenagrion hylas (Odonata: Coenagrionidae) in the Lech-river valley and beyond (Tyrol, Austria). Libellula 41(3/4): 89-105. (in English, with German summary) ["C. hylas is the

rarest Central European odonate species and – at present – populations are exclusively known from an extremely limited area of occurrence of about 42 km² in the North-western Tyrol. Since 1973 the species has been recorded at 27 single sites in Tyrol whereof 15 (currently 10), and all sites with larger self-sustaining populations, are situated in the Lech valley, which thus can be regarded as the European stronghold of the species. The perception of the habitat niche breadth of C. hylas and the knowledge about the range of its altitudinal distribution are still somewhat superficial and biased in the literature. In particular, the “mountain lake myth” persists, stating that C. hylas in Europe is mostly bound to clear mountain lakes in the submontane to lower montane zone. Here, we therefore analyse and compare habitat characteristics of the 27 Tyrolean sites and, in addition, offer a pictorial overview of the habitats used by C. hylas in Tyrol. Our compilation indicates that C. hylas in Europe has a broader habitat niche than expected from its Siberian origin and as stated in literature. According to the chemistry, size, depth, sources of water, and the predominant vegetation we were able to distinguish six main types of C. hylas habitats. These comprise rather different waters including clear cold mountain lakes (3 cases only), dystrophic bog lakes, fishponds, spring water swamps, and shallow flood plain pioneer habitats. However, despite this wide spectrum of habitats used by C. hylas, a closer analysis of the data reveals that the few habitats constantly used by larger populations for reproduction have a combination of specific habitat features in common. The presence of waterbodies with very shallow water and stands of the sedge Carex rostrata along or near to incoming (or outgoing) small spring creeks with cold water or zones with cold groundwater entering seems to be required. Since such conditions currently mainly seem to be fulfilled at about a dozen sites in the Lech valley, the strict preservation and enhancement of these places via management measures as well as the creation of appropriate steppingstone habitats in between are the main issue to conserve the species. Such measures are already in progress as part of the current LIFE-Lech program Dynamic River System Lech." (Authors)] Address: Landmann, A., Institut für Naturkunde & Ökologie, Karl Kapfererstraße 3, 6020 Innsbruck, Austria. Email: office@arminlandmann.at

21268. Liao, J.; Wu, Z.; Wang, H.; Xiao, S.; Mo, P.; Cui, X. (2023): Projected effects of climate change on species range of Pantala flavescens, a wandering glider dragonfly. Biology 2023, 12, 226. https://doi.org/10.3390/biology12020226: 17 pp. (in English) ["Simple Summary: In this study, we simulated the distribution range and its shift of Pantala flavescens in past, present, and future scenarios, and revealed its habitat properties. Except at high latitudes near the poles (e.g., Antarctica and near the Arctic Circle), it is found almost everywhere in the world, with the most suitable habitat mainly in East Asia and the United States. The max temperature of the warmest month and the precipitation of the wettest month are important factors affecting its distribution, and its suitability decreases with the increase of altitude. Climate warming promoted the shift of lowly and moderately suitable habitats into moderately and highly suitable habitats, especially in equatorial regions, which increased the total habitat area. This study provides a global dynamic distribution pattern of P. flavescens across large temporal and spatial scales, and provides a reference for further understanding of its biodiversity and conservation. Abstract: Dragonflies are sensitive to climate change due to their special habitat in aquatic and terrestrial environments, especially Pantala flavescens, which have extraordinary migratory abilities in response to climate change on spatiotemporal scales. At present, there are major gaps in the documentation of insects and the effects of climatic changes on the habitat and species it supports. In this study, we model the global distribution of a wandering glider dragonfly, P. flavescens, and detected the important environmental factors shaping its range, as well as habitat shifts under historical and future warming scenarios. The results showed a global map of species ranges of P. flavescens currently, including southern North America, most of South America, south-central Africa, most of Europe, South, East and Southeast Asia, and northern Oceania, in total, ca. 6581.667 × 104 km². BIO5 (the max temperature of warmest month) and BIO13 (the precipitation of wettest month) greatly explained its species ranges. The historic refugia were identified around the Great Lakes in the north-central United States. Future warming will increase the total area of suitable habitat and shift the type of suitable habitat compared to the current distribution. The habitat suitability of P. flavescens decreased with elevation, global warming forced it to expand to higher elevations, and the habitat suitability of P. flavescens around the equator increased with global warming. Overall, our study provides a global dynamic pattern of suitable habitats for P. flavescens from the perspective of climate change, and provides a useful reference for biodiversity research and biological conservation." (Authors)] Address: Cui, X., Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China. Email: cuixuefan@ihb.ac.cn

21269. Manthey, C. (2023): The evolution of complete metamorphosis in insects. PhD thesis, Dept of Biology, Chemistry, Pharmacy, Freie Universität Berlin: 232 pp. (in English) ["Metamorphosis, the change (meta) in form (morphe), is a common phenomenon in the animal kingdom, where it has evolved several times independently. The most dramatic metamorphic changes occur in the most successful group of animals: the insects, which comprise more than 60% of all living animals. Within the group of insects, the Holometabola (e.g. beetles, butterflies, flies and bees) comprise more than 80% of all insect species. Holometabolous insects undergo complete metamorphosis. In a non-feeding pupal life stage, intercalated between the larval and adult stages, their entire anatomy is radically remodelled, including the digestive tract, which undergoes apoptosis and proliferation. The second major group of insects, the Hemimetabola (e.g. grasshoppers, true bugs, and dragonflies), undergo incomplete metamorphosis. Compared to Holometabola, hemimetabolous insects metamorphose more gradually, less drastically and without a pupal stage. Holometaboly is one of the key evolutionary innovations explaining insects' enormous and unique biodiversity. However, how the evolution of the pupal stage is related to the success of insects is unknown. The remodelling of the larval gut poses a significant challenge to the gut microbiota, as the gut is replaced during pupation, which does not occur in Hemimetabola. It gives holometabolous insects the unique opportunity to drive a change between the larval and adult microbiota, facilitating niche shifts by allowing the insect to acquire specialised symbionts for a life-stage specific diet, ecology and physiology- one barely studied adaptive hypothesis explaining the evolution of the pupa. In chapter II, using 16S rRNA gene metabarcoding, I studied 18 different herbivorous insect species from five orders of holometabolous and three orders of hemimetabolous insects. Comparing larval and adult specimens, I found a much higher beta-diversity and hence microbiota turnover in holometabolous insects than in hemimetabolous insects. My results support

the idea that the pupa offers the opportunity to change the gut microbiota and hence facilitates niche shifts. This possible effect of niche shift facilitation could explain a selective advantage of the evolution of complete metamorphosis. The unique opportunity to change the microbial composition throughout insect development by gut remodelling during complete metamorphosis also puts holometabolous insects at a higher risk of infections. Holometabola must control their gut microbiota and initiate an immune response to avoid infectious diseases during metamorphosis. In chapter III, using RNAseq, I compared the expression of immune effector genes in the gut during metamorphosis in two holometabolous and a hemimetabolous insects. I found high read count abundances of differentially expressed immune effectors in the gut at the larval-pupal moult in the two Holometabola; no such high abundances were observed at the nymphal-adult moult in Hemimetabola. My findings confirm that only complete metamorphosis elicits a prophylactic immune response as an adaptive response in holometabolous insects, which controls the microbiota during gut replacement. Another barely studied and not mutually exclusive hypothesis explaining the success of holometabolous insects could be that intercalating the pupal stage decouples growth and differentiation. Most growth is confined to the larval stages in holometabolous insects, while most development occurs in the pupa, allowing for fast larval growth. In chapter IV, I conducted a literature review and calculated growth rates and ratios. I compared 33 species from three holo- and seven hemimetabolous insect orders. I found faster larval growth, higher growth ratios, and much higher variances for those traits in holometabolous than hemimetabolous insects. I also found much shorter growth periods of the larval stages in holometabolous than hemimetabolous insects. My results support the decoupling of the growth and differentiation hypothesis in holometabolous insects, allowing fast larval growth. In this thesis, I investigated two barely studied and not mutually exclusive hypotheses explaining the evolution of the pupa in holometabolous insects, which constitute the majority of animal diversity. I could show a microbiota turnover in holometabolous insects, which is also under the control of the host gut immunity and allows the Holometabola to occupy different niches throughout development. The second hypothesis, which proposes that decoupling growth and differentiation allows for fast larval growth, is supported by my findings of faster larval growth rates in holometabolous than hemimetabolous insects. The facilitation of niche shifts by changes in the gut microbiota could be considered an essential driver of the evolution of the pupa. The microbiota turnover could also be driven by other selective factors such as growth rate. Fast larval growth could be a selective factor for decoupling growth and differentiation, ultimately resulting in the evolution of the pupa in holometabolous insects." (Author) The thesis includes many references to Odonata.] Address: not stated.

21270. Mesaglio, T.; Callaghan, C.T.; Samonte, F.; Gorta, S.B.Z.; Cornwell, W.K. (2023): Recognition and completeness: two key metrics for judging the utility of citizen science data. Frontiers in Ecology and the Environment published: 8 pp. (in English) ["Biodiversity citizen science data are being collected at unprecedented scales, and are key for informing conservation and research. Species-level data typically provide the most valuable information, but recognition of specimens to species level from photographs varies among taxa. We examined a large dataset of Australian photographic observations of terrestrial invertebrates uploaded to iNaturalist to quantify recognition to species across different taxa. We also quantified the proportion of Australian species that have been uploaded to iNaturalist. Across 1,013,171 observations covering 14,663 species (17.8% completeness), 617,045 (60.9%) were recognized to species. Dragonflies/damselflies and butterflies were the best-recognized and most complete taxa, and therefore represent the best groups for researchers and managers intending to use existing iNaturalist data at large spatial and temporal scales. The recruitment of additional experts to identify records, and enhanced support for accessible resources for hard-to-identify taxa, will likely increase recognition for other taxa." (Authors)] Address: Mesaglio, T., Centre for Ecosystem Science, School of Biological, Earth & Environmental Sciences, The Univ. of New South Wales, Sydney, Australia. Email: thomasmesaglio@gmail.com

21271. Miga, M.; Jahari, P.N.S.; Parimannan, S.; Rajandas, H.; Latiff, M.A.B.; Wei, Y.J.; Shamsir, M.S.; Salleh, F.M. (2023): Characterization of the nearly complete mitochondrial genome of ochraceous darkies, Euphaea ochracea Selys, 1859 (Odonata: Zygoptera: Euphaeidae) and phylogenetic analysis. Mitochondrial DNA Part B Resources 8(2): 292-296. (in English) ["In the present study, the nearly complete mitochondrial genome of Euphaea ochracea was described and its phylogenetic position in the family Euphaeidae was analyzed. Here, we recovered 13 protein-coding genes, 22 transfer RNAs, 2 ribosomal RNAs and a partial control region, resulting in a mitogenome length of 15,545bp. All protein-coding genes were initiated by the typical ATN codon except nad3 and nad1, which utilizes the TTG codon. Four protein-coding genes (cox1, cox2, cox3 and nad5) are terminated by an incomplete stop codon T, while others end with either a TAA or TAG codon. The intergenic spacer region, S5, is absent in this mitogenome, supporting the lack of this region as a specific character in damselflies. Phylogenetic analysis showed that the newly sequenced E. ochracea is phylogenetically closer to E. ornata with a high support value." (Authors)] Address: Salleh, F.M., Dept of Biosci., Fac. Sci., Univ.Tek. Malaysia, Johor, Malaysia Centre of Excellence for Omics-Driven Computational Biodiscovery (COMBio), Fac. of Applied Sciences, AIMST Univ., Bedong, Kedah, Malaysia. Email: faezah@utm.my

21272. Moreno Pallares, M.I.; Bonilla Gómez, M.A.; Guillot Monroy, G.H.; Torregroza-Espinosa, A.C. (2023): Macroinvertebrates composition as determinants of larval abundance in the dragonfly Miathyria marcella in tropical wetlands. Global Journal of Environmental Science and Management: 12 pp. (in English) ["Background and objectives: Odonate larvae play an important role in macroinvertebrate trophic networks and are excellent proxies for wetland quality. However, despite their ecological importance, research on odonates and how they interact with their environment is scarce. This study aims to assess macroinvertebrate composition as determinants of larval abundance in Miathyria marcella. Methods: 29 samples were collected from six wetlands with different hydrological influence using standardized invertebrate sampling techniques in the Dept of Atlántico, northern Colombia. Standardized invertebrate sampling techniques were used in 29 sampling points. Obtained data were used to analyze invertebrate abundance and a non-parametric multidimensional scaling analysis was applied. In addition, a correlation analysis was conducted between macroinvertebrate composition and M. marcella larval abundance. Findings: A total of 2586 larvae, and 12925 individual macroinvertebrates were collected, distributed in 25 orders and 58 families. The most abundant orders were Neotaenioglossa (26 percent), Odonata (15 percent) Calanoida (10 percent) and Diptera (8 percent). Heatmap and

scaling analysis indicated different macroinvertebrate compositions in the sampled wetlands. A high positive correlation between Miathyria marcella and the orders Odonata (R2 = 0.84, p-value = 0.05), Coleoptera (R2 = 0.52, p-value = 0.05), Basommatophora (R2 = 0.60, p-value = 0.05) and Hemiptera (R2 = 0.50, p-value = 0.05). Conclusion: The results suggest that the abundance of Miathyria marcella responds to the accompanying macroinvertebrates, the composition of which depends on the type of hydrological influence. Approaches focused on the relationships between macroinvertebrate taxa are important conservation tools for biodiversity assessment. Results from this study will serve as a baseline to propose monitoring and follow-up strategies on the environmental sustainability in wetlands in this region. Highlights: *The hydrological influence of wetlands has an effect on the distribution of macroinvertebrates; *The abundance of marcella responds to the accompanying macroinvertebrates; *The nMDS indicated a difference in the composition of the macroinvertebrates according to the sampled wetlands; *A high positive correlation was found between marcella and the orders Coleoptera, Basommatophora and Hemiptera." (Authors)] Address: Moreno Pallares, M.I., Depto de Biología, Universidad Nacional de Colombia, Bogotá, Colombia. Email: mimorenop@unal.edu.co

21273. Musinguzi, L.; Olokotum, M.; Nakiyende, H.; Egessa, R.; Kiggundu, V.; Pabire. G.W.; Bassa, S.; Nsega, M.; Kamya, A.; Rwezawula,, P.; Lugya, J.; Magezi, G.; Naluwayiro, J.; Natugonza, V. (2023): Primary biodiversity data on zooplankton, macroinvertebrates, and fish from freshwater ecosystems of Uganda. J. Limnol. 2023; 82: 2117: 10 pp. (in English) ["Effective conservation requires reliable data and information on the status of biodiversity. The conservation of freshwater biodiversity lags behind terrestrial and marine biodiversity because data and information limitations are greatest in freshwater ecosystems. Given that freshwater ecosystems are inhabited by disproportionately more species than other ecosystems, the paucity of data and information is disadvantageous to many species and dependent ecosystem services. Data and information on freshwater biodiversity are limited mainly because few freshwater ecosystems are considered for regular monitoring. Existing data is also scattered and in non-user-friendly formats, limiting accessibility and use. It is desirable to make freshwater biodiversity data and information accessible everywhere to attain their full potential in guiding conservation. Here, we present 34 datasets, covering three major freshwater taxa (zooplankton, macroinvertebrates, and fish) in freshwater ecosystems in Uganda. The datasets provide occurrence records and corresponding abundance data, where applicable, for the three groups. The datasets which are available through the Global Biodiversity Information Facility (GBIF), cover many years (1971-2021) and have a total of 56,104 occurrence records. The datasets were mainly mobilized from archives of biodiversity surveys conducted at the National Fisheries Resources Research Institute (NaFIRRI) in Uganda. The surveys cover most of the water bodies in the country. The datasets are envisaged to increase accessibility to data for freshwater conservation research, decision making, and capacity building. Indeed, part of the data, especially on fish, has already been used to develop conservation tools and assess conservation status of species at both the global and national levels)." (Authors) Anisoptera, Aeshnidae, Corduliidae, Gomphidae, Libellulidae, Phyllomacromia, Progomphus [sic], Trithemis.] Address: Musinguzi, L, National Fisheries Resources Research Institute (NaFIRRI), P.O. Box 343, Jinja, Uganda. Email: musinguzilaban@gmail.com

21274. Nel, A.; Piney, B. (2023): Odonatopteran approaches to the challenges of flight: Convergence of responses subject to a common set of morphological constraints. In: Bels, V.L. & A.P. Russell (Eds.): Convergent Evolution. Animal Form and Function. Springer Cham: 21-36. (in English) ["Effective flight capacity is a crucial survival attribute of volant animals. Several vertebrate clades have acquired gliding capabilities and at least three of them independently acquired powered flight. Contrastingly, wings were probably acquired only once by pterygotan insects. Despite this, insects have developed a great variety of structural approaches that have diversified their collective flight capacity. Flight was a key contributor to their diversification during the Late Carboniferous (at least 330 Ma), and flying insects have remained the most diverse animal clade since then. Among pterygotans, representatives of the superorder Odonatoptera, which includes the extant Odonata, have developed impressive performance associated with the highly complex morphological structure of their wing venation. Some venation patterns, such as the nodus, discoidal complex, and arculus, were acquired only once, whereas others have been convergently acquired several times. One example of a pattern acquired more than once is the sclerotized pterostigma, convergently appearing in the Permian Protanisoptera and its sister group, the Discoidalia, these comprising the modern Odonata. All odonatopterans with broad wings were confronted by a major problem, that of 'how to strengthen the basal third of the wing' to prevent it from breaking longitudinally. At least eight different convergent 'solutions' have been 'adopted' that have resulted in the incorporation of structures oriented perpendicular to the main axis of the wing. Additionally, several clades within the Odonatoptera have convergently developed petiolated wings, adapted for flying in cluttered environments. The width and length of the petiole can vary greatly, with the most impressive ones being those of the 'giant' Permian-Triassic Triadophlebiomorpha. This great morphological disparity represents 'variations on a theme' of the already complex wing venation established by the first Carboniferous odonatopterans. It is possible that some of the 'solutions' arrived at by extinct clades allowed for performance that was more effective than that of modern odonatans. Many of these groups flourished and co-existed with the ancestors of modern taxa for millions of years. Extant odonatans have been adopted as models for the bio-mimetic development of small drones. The wing patterns of extinct clades should also be investigated for their potential for bio-mimetic inspiration and application." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

21275. Nieoczym, M.; Stryjecki, R.; Buczynski, P.; Plaska, W.; Kloskowski, J. (2023): Differential abundance, composition and mesohabitat use by aquatic macroinvertebrate taxa in ponds with and without fish. Aquatic Sciences (2023) 85:25 https://doi.org/! 0.1007/s00027-022-00922-y: 17 pp. (in English) ["Fish are known to pose strong effects on invertebrate abundance, species richness and assemblage structure. Littoral vegetation may play a crucial role as a refuge for invertebrates vulnerable to fish predation. We studied relative densities and taxonomic composition of water mites, aquatic beetles and bugs in large lake-like ponds with different fish status (fish-free and containing fish) and mesohabitats (emergent littoral vegetation and open water zone). The macroinvertebrate taxa differed in their responses to the fish presence and in mesohabitat preferences. The density and species richness of water mites were greater in fish-containing ponds, while no differences were

found between littoral and open-water habitats. In contrast, beetles were far more numerous and species-rich in fish-free ponds and in littoral vegetation. Total densities of aquatic bugs were non-significantly higher in fish-containing ponds, and they preferred littoral areas, but species richness was independent of fish presence and mesohabitat. No statistical interactions between fish presence and the densities of individual macroinvertebrate groups in the littoral habitat were detected, indicating that their use of emergent littoral vegetation was not an antipredator response to fish. The assemblages of the three macroinvertebrate taxa exhibited nested structures of a different order, consistent with their species richness patterns. Our research stresses the importance of littoral vegetation for the distribution and abundance of aquatic insects; however, high fish presence may not affect or may even benefit ecologically important macroinvertebrate groups, such as water mites or bugs." (Authors)] Address: Nieoczym, M., Dept of Zoology & Animal Ecology, University of Life Sciences, Lublin, Poland. Email: mnieoczy@wp.pl

21276. Novelo-Gutiérrez, R. (2023): Clave actualizada para la separación de familias y géneros de las larvas de Zygoptera de México (Insecta: Odonata) - Updated key to the families and genera of Zygoptera larvae of Mexico (Insecta: Odonata). Dugesiana 30(1): 3-10. (in Spanish, with English summary) ["An updated and illustrated key for the families and genera of odonate larvae inhabiting Mexico, is provided." (Author)] Address: Novelo-Gutiérrez, R., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C. Carretera Antigua a Coatepec 351, El Haya, 91073 Xalapa, Veracruz, México. Email: rodolfo.novelo@inecol.mx

21277. Onishko, V.V.; Kosterin, O.E.; Voinov, I.O. (2023): Results of odonatological studies in southern Primorye, Russia, in 2011-2020. International Dragonfly Fund - Report 177: 1-59. (in English) ["The odonatological results of five expeditions to two ecologically contrasted regions (forested foothills and coastal plains) in southern Primorsky Kray (or Primorye), Russia, undertaken from 2011 to 2020 are summarised. A total of 64 species have been recorded, including those with a limited presence in Russia, such as Lestes temporalis, Paracercion calamorum, P. hieroglyphicum, P. plagiosum (the 4th finding in Russia is reported here), Trigomphus citimus, Macromia manchurica (the 3rd finding in Russia), Deielia phaon, Lyriothemis pachygastra (the 3rd finding in Russia), and Sympetrum baccha. Aeshna caerulea is for the first time reported to Primorskiy Kray, although by a visual observation only. Simultaneous occurrence of the closely related Coenagrion hastulatum and C. lanceolatum was observed. The differences between Anax parthenope and A. julius, assumed to be different species, are discussed and illustrated; systematics of Coenagrion johanssoni, Aeshna juncea, Sympetrum depressiusculum and S. frequens and dimorphism for the frons maculation in males of Epophthalmia elegans are briefly discussed, as well. A steady and profound decrease in number of Odonata for the period 2011-2020 was observed." (Authors)] Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

21278. Ott, J.; Ott, N. (2023): Biodiversität über Kontinente verbinden. Von der Westpfalz bis nach Vietnam. Deutsche Kaffeerösterei und vietnamesische Kaffeefarm gehen Kooperation ein. Naturschutz Magazin 5(1): 64-69. (in German) [This is a brief report on a Vietnamese project to biologically produce coffee. The paper includes some accidental observations of dragonflies living in the coffee plantation.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

21279. Papastavropoulou, K.; Xiao, J.; Proestos, C. (2023): Edible insects: Tendency or necessity (a review). e-Food 4(1) e58: 17 pp. (in English) ["Eating insects has been a widespread habit in many cultures for many years. Edible insects represent an innovative food source with many advantages that will help the problem of protein and energy shortages created by the rapid growth of the world population. Using insects as food can increase the economy and help protect the environment and the human survival. Their nutritional value is excellent, since according to many studies insects have high protein content, high concentrations of various essential amino acids, a well-balanced fatty acid profile, with a high content of monounsaturated, polyunsaturated fatty acids and many minerals, trace elements, and vitamins. However, there are several risks in the use of edible insects, which need to be researched more extensively. Main goals are to spread knowledge and change the process of obtaining edible insects in better and safer ways. So that the edible insect food industry can develop on a solid basis, through the expansion of the composition of the insects already used and the future legalization of new species of edible insects as well as the establishment of additional legislative frameworks for the breeding, development, processing, storage, and safety of these innovative new foods. ... The most commonly consumed insect orders and their consumption rates are: ... dragonflies and Zygoptera (Odonata, 3%)..." (Authors)] Address: Papastavropoulou, Konstantina, Laboratory of Food Chemistry, Dept of Chemistry, School of Sciences, National and Kapodistrian, University of Athens, Athens, Greece

21280. Phan, Q.T.; Ngo, Q.P. (2023): An updated the checklist of dragonflies and damselflies (Insecta: Odonata) of Phu Quoc National Park, southern Vietnam. International Dragonfly Fund Report 175: 1-18. (in English) ["A checklist of 93 dragonfly and damselfly species from Phu Quoc Island, southern Vietnam, is provided. It contains 7 species newly recorded to the Island and Macromia cupricincta Fraser, 1924 newly recorded for Vietnam. The taxonomic status and occurrences of some species in previous studies are discussed and re-assessed." (Authors)] Address: Quo Toan Phan, Q.T., The Center for Entomology & Parasitology Research, College of Medicine and Pharmacy, Duy Tan University, 120 Hoang Minh Thao, Lien Chieu, Da Nang, Vietnam. Email: pqtoan84@gmail.com

21281. Pinilla-Rosa, M.; Garcia-Sauco, E.G.; Santiago, E.A.; Ferrandis, P.; Men, E.M. (2023): Can botanic gardens serve as refuges for taxonomic and functional diversity of Odonata? The case of the botanic garden of Castilla.La Mancha (Spain). Limnology 24(1): 37-50. (in Damselfly Dragonfly Functional trait Insect conservation Urban) ["In a scenario with declining biodiversity and habitat loss, botanic gardens could serve as refuges for invertebrates, but the opportunities they offer for animal conservation are still poorly understood. Odonata is a good model group for conservation studies, because it includes threatened species and responses to habitat disturbance are well documented. In this study, we assessed the role of the botanic garden of Castilla-La Mancha in Spain as a refuge for members of Odonata by analysing their taxonomic and functional diversity. We explored if the small size of the botanic garden might constrain the taxonomic diversity of Odonata and if low habitat diversity might limit their functional diversity. We

sampled adult Odonata from five water bodies along a gradient of human impact and characterized the Odonata communities based on 12 functional traits in Odonata. We used a species. area relationship to control for differences in the size of water bodies. Compared with natural lakes, the Odonata communities contained less species and their functional diversity was lower in the botanic garden ponds, where generalist species were basically hosted. Despite these limitations, the botanic garden ponds hosted the number of species expected for natural water bodies with the moderate surface area and functional diversity, thereby demonstrating that they are a valuable habitat for Odonata in an urban environment. Appropriate management involving the removal of exotic fish and habitat diversification, including creating lotic environments, would increase the taxonomic and functional diversity of Odonata in this urban system." (Authors)] Address: Pinilla-Rosa, M., Univ. Rey Juan Carlos, C/ Tulipan s/n, 28933 Mostoles, Madrid, Spain. Email: man.pinilla96@gmail.com

21282. Rincón, V.; Velázquez, J.; Gülçin, D.; López-Sánchez, A.; Jiménez, C.; Özcan, A.U.; López-Almansa, J.C.; Santamaría, T.; Sánchez-Mata, D.; Çiçek, K. (2023): Mapping priority areas for connectivity of Yellow-winged darter (Sympetrum flaveolum, Linnaeus 1758) under climate change. Land 2023, 12, 298: 39 pp. (in English) ["S. flaveolum, which is associated with high mountain areas, can be considered a flagship species. Due to climate change, its natural range will be negatively affected. In this study, we propose global potential distributions for this species up to the year 2100, considering four time periods (2021-2040, 2041-2060, 2061-2080, and 2081-2100) and three shared socioeconomic pathways (optimistic-SSP245, middle of the road-SSP370, and worst-SSP585), by using an ecological niche model to produce two sets of distribution models (80% to 100% and 60% to 100%). It is foreseen that in the worst of the considered climate scenario (SSP585-2100 year), the distribution of this species could be reduced by almost half, which could pose a risk for the species and provoke the shift from vulnerable to endangered. An analysis of connectivity has also been carried out for all the studied scenarios by applying the MSPA and PC indices, showing that the core habitat of this species will become more important, which is consistent with the decrease in the distribution range. Over time, the importance of the most valuable connectors will increase, implying a greater risk of some populations becoming isolated." (Authors)] Address: Rincón, V., Faculty of Pharmacy, Dept of Pharmacology, Complutense Univ. of Madrid, Plaza de Ramón y Cajal, s/n, 28040 Madrid, Spain. Email: virincon@ucm.es

21283. Sánchez-Guillén, R.A.; Vega-Sánchez, Y.M.; Sánchez-Herrera, M. (2023): Genetic structure, cryptic species, and hybridization - causes and evolutionary consequences in Odonata. In: Dragonflies and Damselflies. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. DOI: 10.1093/oso/-9780192898623.003.0009: 115-128. (in English) ["The term gene flow describes the spatial movement of genes within or between populations within species or between closely related species (that are not completely reproductively isolated) and plays an important role in the evolutionary trajectories of populations by changing allele frequencies and affecting the genetic diversity of populations. This chapter reviews our contemporary understanding of population genetic structure, cryptic species, and hybridization in odonates, framing it within a conservation context. We highlight the most common markers used and suggest the direction for future studies, including broadening research regions to collect data outside Europe, as genomic resources continue to advance." (Authors)] Address: Sánchez-Guillén, Rosa, Biología Evolutiva, Instituto de Ecología A.C. (INECOL) C.P. 91073 Xalapa, Veracruz, México. Email: rosa.sanchez@inecol.mx

21284. Sawant, D.; Kambli, A. (2023): Gynacantha anandmati, a new species of dragonfly (Odonata: Anisoptera: Aeshnidae) from Maharashtra, India. Zootaxa 5239(4): 537-550. (in English) ["We erect Gynacantha anandmati sp. nov. based on one male and one female specimens collected from Thane district of Maharashtra. The new species is distinguished from its congeners by long, straight and nearly flat cerci, distinct 'T-shaped mark' on postfrons and vividly marked abdomen. We also provide updated key to identification of males of South Asian Gynacantha spp. [G. albistyla; G. anandmati; G. bayadera; G. chaplini; G. dravida; G. khasiaca; G. millardi; G. subinterrupta]" (Authors)] Address: Kambli, A., 104, E wing, Mukta Heights, Valivali, Badlapur, Thane 421503, Maharashtra, India. Email: a.p.kambli@gmail.com

21285. Semiun, C.G.; Mamulak, Y.I.; Pani, E.; Stanis, S. (2023): The study of dragonfly (Odonata) diversity as bioindicator of water quality in Science Techno Park Spring-Beleknehe village. Jurnal Biologi Tropis 23(1): 174-178. (in English) ["Dragonflies are bioindicator insects for the quality of the aquatic environment, especially springs. This study aims to determine the types of dragonflies that live in the Science Techno Park (STP) spring, Beleknehe village, Nekemese sub-district, Kupang District. STP is owned by Widya Mandiri Catholic University. This research was conducted in September 2022. Data collection consisted of dragonfly samples and abiotic factors. Dragonfly samples were obtained using insect nets and hand sorting, while abiotic factor measurements included physical (Conductivity, TDS) and chemical (hardness, iron, sulfate, Mn, NO3, NO2) parameters. The results of the study revealed that there were four types of dragonflies namely Neurothemis stigmatizans, Coenagrion lunulatum [sic!], Megalagrion sp. [sic!], and Orthetrum pruinosum. The four dragonflies found showed that the quality of the Science Techno Park spring was still in good condition." (Authors)] Address: Semiun, Chatarina Gradict, Biology Study Program Faculty of Science and Mathematics Widya Mandira Catholic University, Kupang, Indonesia. Email: gr4dict@gmail.com

21286. Silva Farias, A.B.; Castro Ventura, I.M.; Ribeiro Barão, K.; Silva Vilela, D.; Santos, J.C. (2023): Lista preliminar e novos registros de Libélulas e Donzelinhas (Insecta: Odonata) para o Sul do estado de Alagoas, Brasil. Hetaerina 5(1): 17-26. (in Portuguese) ["The Northeast region of Brazil is still considered little known in terms of Odonata diversity due to the few collection campaigns carried out there. For example, only three studies have recorded Odonata for the state of Alagoas. The lack of information on the local diversity becomes an obstacle for the management and conservation of these organisms. Therefore, the present study aimed to provide a preliminary list of Odonata species reporting new occurrences in the south of Alagoas State. For this purpose, collections were carried out in eight sampling points on the margins of water bodies in the Marituba do Peixe Environmental Protection Area and adjacent areas. We collected 14 species in eight genera and three families, with a total of 43 specimens, of which nine species were new records for the state of Alagoas. For Anisoptera, 37 specimens were collected, distributed among the families Gomphidae and Libellulidae. The suborder Zygoptera

was represented only by the family Coenagrionidae, with six specimens. This study contributes to increase the knowledge about the occurrence and distribution of Odonata in the state of Alagoas, which already has 56 recorded species. Ongoing and future studies in the area will allow a better knowledge of the odonatofauna of Alagoas." (Authors/-DeepL)] Address: Silva Farias, A.B., Laboratório de Ecologia e Biodiversidade, Departamento de Ecologia, Universidade Federal de Sergipe. São Cristóvão, Brasil. E-mail: antoniobrunofarias@gmail.com

21287. Snegovaya, N.Yu. (2023): New data on the dragonflies of the Azerbaijan Republic – a progress study in 2022. International Dragonfly Fund Report 176: 1-30. (in English) ["A total of 35 odonate species from 8 families was recorded from 36 localities in 16 districts of Azerbaijan in 2022, of these, on the territory of the Kura-Araz lowland 21 species were noted, the Greater Caucasus - 27 species and the Middle Araz (Nakhichevn) - 7 species." (Author)] Address: Snegovaya, Nataly Yu., Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. Email: snegovaya@yahoo.com

21288. Subramanian, K.A.; Sivaperuman, C.; Babu, R. (2023): Odonata of Great Nicobar Biosphere Reserve. In: Sivaperuman, C., Banerjee, D., Tripathy, B., Chandra, K. (eds) Faunal Ecology and Conservation of the Great Nicobar Biosphere Reserve. Springer, Singapore: 77-89. (in English) ["The odonate fauna of the Great Nicobar Island comprises of 24 species belonging to two suborders, five families and 21 genera. Three species are endemic to the Great Nicobar Islands, of which Libellago balus is assessed as endangered by IUCN. The significant finding of the present study was the rediscovery of populations of endemic and endangered Libellago balus, which was known earlier only from museum specimens. The fauna is dominated by Libellulidae, with 18 species. Species such as Arginoptera insignis, Camacinia gigantea, Nesoxenia lineata, Tramea transmarina and the genus Nososticta show biogeographic affinity with Sundaland fauna. The present survey was carried out post rainy season, and extensive surveys are required to be carried out covering all seasons to comprehensively document the odonate fauna." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Southern Regional Centre, Chennai, India

21289. Sumah, A.S.W.; Banna, M. Z.A. (2023): Dragonfly diversity in a residential environment. Jurnal Biologi Tropis 23(1): 290-295. (in Indonesian, with English summary) ["...This study was to determine the diversity of dragonflies in three types of habitats and their correlation with environmental factors. The research was conducted in a residential area in Palembang City in November 2022 using the scan sampling method. The total number of dragonflies found was 18 species and 538 individuals … Orthetrum sabina is the dominant dragonfly species found (136 sp). Meanwhile, Ischnura verticalis [sic!], Pseudagrion microcephalum, Agriocnemis rubescens and Nososticta sp. is the rarest species of dragonfly to be found. The diversity value of the Shannon-Wiener index indicates that dragonflies prefer open habitats. Habitat shape and plant vegetation affect the number of dragonflies found, but does not affect the abundance of these dragonflies. The results of the analysis show that wind speed and temperature affect the presence of dragonflies during the observation." (Authors)] Address: Sumah, Astrid Sri Wahyuni, Program Pascasarjana Pendidikan Biologi, Univ. Muhammadiyah Palembang, Kota Palembang, Indonesia. Email: astrid.sumah@gmail.com

21290. Svensson, E.I.; Gómez-Llano, M.; Waller, J.T. (2023): Out of the tropics: Macroevolutionary size trends in an old insect order are shaped by temperature and predators. Journal of Biogeography 50(3): 489-502. (in English) ["Aim: Global interspecific body size distributions have been suggested to be shaped by selection pressures arising from biotic and abiotic factors such as temperature, predation and parasitism. Here, we investigated the ecological and evolutionary drivers of global latitudinal size gradients in an old insect order. Location: Global. Taxon: Odonata (dragonflies and damselflies). Methods: We compiled data on interspecific variation in extant and extinct body sizes of Odonata, using an already existing database (The Odonate Phenotypic Database) and fossil data (The Paleobiology Database). We combined such body size data with latitudinal information and data on biotic and abiotic environmental variables across the globe to investigate and quantify interspecific latitudinal size-gradients (“Bergmann's Rule”) and their environmental determinants. We used phylogenetic comparative methods and a global published phylogeny of Odonata to address these questions. Results: Phylogenetic comparative analyses revealed that global size variation of extant Odonata taxa is negatively influenced by both regional avian diversity and temperature, with larger-bodied species in the suborder Anisoptera (dragonflies) showing a steeper size-latitude relationship than smaller-bodied species in the suborder Zygoptera (damselflies). Interestingly, fossil data show that the relationship between wing size and latitude has shifted: latitudinal size trends had initially negative slopes but became shallower or positive following the evolutionary emergence and radiation of birds. Main Conclusions; The changing size-latitude trends over geological and macroevolutionary time were likely driven by a combination of predation from birds and maybe pterosaurs and high dispersal ability of large dragonflies. Our study reveals that a simple version of Bergmann's Rule based on temperature alone is not sufficient to explain interspecific size-latitude trends in Odonata. Our results instead suggest that latitudinal size gradients were shaped not only by temperature but also by avian predators, potentially driving the dispersal of large-sized clades out of the tropics and into the temperate zone." (Authors)] Address: Svensson, E.I., Dept of Biology, Lund Univ., 223 62 Lund, Sweden. Email: erik.svensson-@biol.lu.se

21291. Tanczuk, A.; Tonczyk, G. (2023): Collecting data of late recordings of dragonflies in Poland in the period of 2013-2020, as an example of the citizen science. Studia Ecologiae et Bioethicae 21(1): 16 pp. (in English, with Polish summary) ["The group “Wazki (Odonata) w Polsce” is an excellent example of citizen science, understood as a cooperation between society and professionals in scientific activity. The goal of the present paper is to show the data concerning the very late appearances of dragonflies and damselflies in the years 2013 – 2020, to enrich the knowledge about the phenology of various species in comparison to published data, which is no longer valid, taking into consideration the climatic changes over the last decades. It would not have been possible to gather such a great amount of information, if not for the amateurs engaged into a project like that (ca. 100 people). The data was catalogued according to date, place, and species. The main methods used were: the visual observation and taking photos of adult dragonflies. After thoroughly studying the data collected in early, middle, and late autumn (October, November, December), and analysing it carefully, the records were divided into three groups. The information gathered enables us to show the differences in phenology of some of

the species. The project organised as a citizen science action, contributed to the increase of the knowledge concerning the late aspect of Polish odonatofauna." (Authors)] Address: Tanczuk, Agnieszka, Institute of Biological Sciences, Maria Curie-Sklodowska Univ., Poland. Email: atanczuk@gmail.com

21292. Torralba Burrial, A. (2023): Empleando las libélulas de Asturias en educación ambiental. Iberae Monográfico Asturias: 30-36. (in Spanish) ["Dragonflies, like beetles and butterflies, are among the most visible, colourful and striking insects that can be found in Asturias. In this paper we start with the species of dragonflies present in Asturias, discuss a selection made from the perspective of their inclusion as resources in environmental education due to their different characteristics and comment on the results observed in their application in different interventions in non-formal and informal environmental education." Translated with www.DeepL.com/Translator (free version)] Address: Torralba Burrial, A., Depto de Ciencias de la Educación e Instituto de Recursos Naturales y Ordenación del Territorio (Indurot) – Univ. de Oviedo, Spain. Email: torralbaantonio@uniovi.es

21293. van Strien, A.J.; van Grunsven, R.H.A. (2023): In the past 100 years dragonflies declined and recovered by habitat restoration and climate change. Biological Conservation 277 (2023) 109865: 7 pp. (in English) ["The availability of opportunistic dragonfly data in the Netherlands spanning >100 years gave us the opportunity to quantitatively assess long term changes in range size. We estimated changes in the number of occupied 5 km × 5 km sites by applying a modified List Length method, which takes into account changes in observation effort. Trends were assessed for nearly all Dutch dragonfly species and the trends were then summarised in Multi-Species Indicators by taking the geometric mean of the species indices. Overall, dragonflies severely declined in range size between the periods 1850–1950 and 1975–1990. In the period thereafter, strong increases happened, during which many species compensated their earlier losses. The factors driving the changes in dragonflies shifted over time. Until 1975 dragonfly species declined due to deterioration of water systems. After 1975 both climate change and habitat restoration contributed to the recovery of many species. Restoration of dragonfly communities was most successful in running water and least effective in moorland pools." (Authors)] Address: van Strien, A.j., a Statistics Netherlands, 24500, 2490 HA The Hague, the Netherlands

21294. Wei, Y.; Guo, H.; Zhang, S.; Li, J.; Wang, Y.; Liu, C. (2023): Bionic mechanical analysis of dragonfly wings: The feasibility of mesh combination to improve structural stiffness. European Journal of Computational Mechanics 31(4): 459-504. (in English) ["The nodes of the object will show different degrees of deformation and displacement or even damage over time. The mesh structure is flexible and different mesh shapes and arrangements will affect the structural stiffness of the object. The unique structure of dragonfly wing veins allows the dragonfly to withstand pressures several times higher than itself and to fly freely. This study is based on dragonfly wing bionics to disassemble the structure of dragonfly wing vein geometry. And it aims to investigate the deflection under different geometries and three-dimensional spatial structures by using the drawing software Auto CAD to draw dragonfly sample graphics, the finite element software Hyper mesh to build the model and the solver OptiStruct to analyze the structure of wrinkling, arching deflection, z-direction maximum displacement, y-direction maximum rotation angle, combined displacement test under the different loads. The results show that: (1) The dragonfly wing vein mesh structure can enhance the stiffness under load. (2) In contrast, the displacement deformation of quadrilateral and combined hexagonal is smaller. (3) The structural stiffness of quadrilateral hexagon is enhanced as the height of wrinkling and arching increases. (4) The improvement of grid deflection with membrane structure is better than that without membrane structure. According to the above experimental results, the quadrilateral wrinkling and hexagonal arching structure has a significant improvement on the load bearing and deflection of the mesh, and has the potential to make structural optimization of the mesh series products, which is suitable for practical application and promotion." (Authors)] Address: Wei, Y., Architecture and Design College, Nanchang University, Nanchang 330031, China

21295. Wilson, K.D.P. (2023): A profile of Sha Lo Tung, a dragonfly hotspot in Hong Kong and case study in conservation planning. Agrion 27(1): 12-27. (in English) ["The Sha Lo Tung basin, located within the Pat Sin Leng Country Park in the north-east New Territories of Hong Kong, is renowned for its dragonflies. The basin is home to four small abandoned Hakka villages. From the early 1980s a succession of campaigns have been mounted against a series of proposed developments at Sha Lo Tung. The controversy is considered to be an outstanding example of green groups using legal means to block repeated and determined attempts to use a country park and abandoned ancestral village lands for private property development. The diverse ecology of the area, especially its odonate populations, are the principal reason for the planning authority's ultimate refusal to approve development at the site. A summary of the odonate communities, ecology and history of the Sha Lo Tung basin is provided here together with an account of the various development proposals and the planning process outcomes. The developer, villagers and the Administrations' mutual struggles that finally led to a solution acceptable to all parties and also allowed for the full protection of the basin's exceptional wildlife is documented." (Author)] Address: Keith D.P. Wilson [kdpwilson@gmail.com]

21296. Zayeid, Y.M.; AL-daikh, O.B.H.; Altaib, A.N. (2023): The activity and the abundance of some species belonging to (Odonata: Aeschnidae) in Al-Marj region, Libya. Libyan Journal of Plant Protection 13: 1-10. (in Arabian, with English summary) ["This study was carried out from January 2018 to December 2019 in Al Jabal Al Akhdar region which aimed to survey, describe and identify some distributed species belonging to the family Aeshnidae in twelve sites studied. The results indicated that the effect of temperature and relative humidity on the abundance of eight species, Anax imperator, A. parthenope, A. ephippiger, Crocothemis erythraea, Sympetrum fonscolombii, Orthetrum anceps, Trithemis arteriosa, Ischnura spp during five months: June, July, August, September and October in the two years of study, when temperature was between 21.5 - 27.4C° and the relative humidity was 50 - 65%, at the same time, when the temperature was below than 13C° and the relative humidity more than 68%, no species were recorded, while the species Ischnura spp were not recorded in low temperature." (Authors)] Address: Zayeid, Y.M.: E-mail: ymzaied@yahoo.com