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1997

21297. Jehangir, Z. (1997): Taxonomic studies of Odonata of Gilgit and Baltistan areas. MSc. thesis, Fac. Agriculture, University of Agriculture Faisalabad. IV + 92 pp. In English [The adult Odonata collected during the summer months of 1994-95 from 24 different localities of Gilglt and Baitistan were indentified into 27 species and subspecies belonging to 18 genera, 6 families and 2 suborders. Fourteen Species, viz., Anax nigrolineatus, Aeshna juncea. Cordulegaster brevistigma, Orthetrum chrysostigma luzonicum, O. sabina, Trithemis aurora, T. festiva. Tramea virginia. Palpopleura sexmaculata sexmaculata. Diplacodes lefebvrei. Ischnura aurora, I. senegalensis. Ceriagrion coromandelianum and Megalestes major were recorded for the first time from this area. Of these, Aeshna juncea has been recorded for the first time from Pakistan. The characters of the taxa above the genus level have not been given in this manuscript because they are easily available in monographs, catalogues, faunal workes and textbooks. The daviating characters of genera, species and subspecies have been given in this manuscript. Libellula quadrimaculata, Ophiogomphus reductus and 1st form of the female Ischnura senegalensis were described in detail, as they differ greatly from the published descrlptions. A family Key. to the species. distribution of various species and measurements of various parts like abdomen, hindwing. forewing. pterostlgma and anal appendages have been provided in this manuscript. Different statistics. such as range, mean and Standard deviation for measuring differenecs in various body parts have also been used. (Author)not stated

21298. Russell, R.W.; Wilson, J.W. (1997): Radar-observed "fine lines" in the optically clear boundary layer: Reflectivity contributions from aerial plankton and its predators. Boundary-Layer Meteorology 82(2): 235-262. In English ["Sensitive Doppler radars regularly detect fine lines of enhanced reflectivity in mesoscale boundary-layer convergence zones. Recent studies have concluded that these “fine lines” are attributable primarily to backscatter from concentrations of small, weakly flying insects (“aerial plankton”) entrained in the convergence zones. Such concentrations are likely to be attractive to aerial predators that feed on small insects, raising the question of whether the presence of the predators themselves may contribute significantly to the radar-observed fine lines. In this paper, we examine the relative contributions of aerial plankton and its predators to fine-line reflectivity, using field data from visual and radar studies together with a compilation of literature data on radar cross sections of birds and insects. Visual counts of birds and dragonflies in convergence zones, together with simultaneous remote radar observations during the CaPE project in Florida, indicated that aerial predators usually contributed little to fine-line reflectivity (median contribution ss 2%). Assuming that the size distribution of insect targets was spatially invariant, the density of insects composing the aerial plankton was inferred to be on average, about one order of magnitude higher inside convergence zones than in nearby areas. These results suggest that clear-air radar reflectivity may be a useful measure of the quantity of aerial plankton in boundary-layer convergence zones. This finding is relevant to biology because it indicates that remote sensing techniques can be usefully employed to document patterns and processes in the distribution of aerial plankton. The results presented here also have relevance for operational meteorology, because most of the organisms comprising the plankton probably serve as passive tracers of horizontal air motions, and are therefore ideal targets for remotely detecting wind patterns. In contrast, the aerial predators move actively and rapidly, rendering them less useful as tracers of wind fields in studies using Doppler radars. The influence of atmospheric structure on the ecology of aerial predators and their prey has received little attention, but we believe that sensitive radars with clear-air observational capabilities offer great potential as research platforms for future studies of aerial plankton and aerial planktivory. (Authors)] Address: Russel, R.W., Dept of Ecology & Evolutionary Biology, Univ. of California, Irvine, CA, 92717, USA

1999

21299. Walia, G.K.; Sandu, R. (1999): Autosomal fragmentation in five species of the family Coenagrionidae. Fraseria (N.S.) 6: 15-20. In English ["Karyological investigations have been carried out in five species belonging to family Coenagrionidae viz. Argiocnemis obscura (female) [= Argiocnemis rubescens Selys, 1877], Ceriagrion coromandelianum (male) Coenagrion dyeri (female) Pseudagrion decorum (male), P. rubriceps (male & female). Majority of plates possess the typical diploid number 27 in males and 28 in females with XO - XX sex determining mechanism. Numerous plates also show fragmentation of the autosomes and diploid number vary from 27-58. This is the first cytological report on A. obscura and C. dyeri and also on autosomal fragmentation in this family." (Authors)] Address: Walia, Gurinder Kaur, Dept. Zool. & Environmental Sciences, Punjabi Univ. Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

2001

21300. Ketelaar, R. (2001): De speerwaterjuffer in Nederland: verspreiding, ecologie en bescherming. De Vlinderstichting, rapport VS2001.032, Wageningen. 75 pp. In Dutch [Coenagrion hastulatum is a highly endangered dragonfly species in the Netherlands. In 2001, it occurs at 16 locations in the Netherlands. Since 1980, C. hastulatum has disappeared from 7 locations. Two strongholds can be distinguished: the first in North Brabant south of Eindhoven and a second in the Achterhoek/Twente. Outside of that, C. hastulatum has completely disappeared except for two small populations on the Kampina and the Vressels Bos. From loose observations of floaters it can be deduced that C. hastulatum is not very mobile. In the Netherlands, C. hastulatum is only found on fens and in the edge zones of raised moors. There is one deviating population in weakly

flowing water. The habitats of the damselfly are characterized by the following aspects: • The vegetation of locations with damselflies is characterized by a species-poor deciduous vegetation with species that are minerotrafent for nutrient-poor systems and which indicate groundwater influence, such as Lesser Bladderwort, FieldRuss and Knotweed Pondweed. • The vegetation is heterogeneous in character with both large and small floating leaf plants, emerse vegetation (sedges, reeds, mat rushes) and relatively few floating sphagnum mosses. • Peat formation and/or embankment landings occur on many fens. • C. hastulatum are small in size and usually no deeper than 1.5 metres. • C. hastulatum are quite acidic and have a fairly low ELV. Compared to other fens, the concentrations of potassium, iron, calcium and bicarbonate are relatively high. As with other fens, the ammonium content is sometimes quite high. • The habitats of the damselfly are weakly buffered by a slight influence of groundwater. The fens are generally located on an apparent water table in which the groundwater emerges for short periods, for example after heavy rainfall. The hydrological system that feeds the fens is local to at most supralocal (usually within 500 meters of the fen). • The water level is stable. • Coenagrion puella is a numerous species, and Erythromma najas, fire damselfly and emerald dragonfly are also guide species for the presence of C. hastulatum. High numbers of the water sniffer, on the other hand, are a bad signal. The disappearance of suitable habitat of the larvae and egg-laying substrate is the main reason for the disappearance of the damselfly damselfly from many fens and still poses a threat. The deterioration and disappearance of the specific heterogeneous vegetation structure is caused by: • acidification as a result of the loss of groundwater influence and increased ammonium deposition. • fluctuating water levels, so that the (cross) vegetation is dominated by pitrus • alkalization through intake of hard surface water • cleaning up fens • stocking herbivorous fish In addition, there are indications that internal acidification as a result of banks drying up poses a potential risk for the damselfly. Using a logistic regression, a model was made based on a habitat quality index that can be used to estimate the suitability of a fen for the damselfly damselfly. The model seems to work well in practice, but still needs to be validated. In the follow-up process, work must be done on the following aspects: • drawing up a protection plan for damselfly damselflies as soon as possible • informing managers • changes in management • restoration of groundwater influence and development of new habitat • expansion of monitoring. (Author / Google translate)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

21301. Machado Caballero, J.E. (2001): Inventario y estudio comparativo de la fauna de Odonata en tres áreas de Honduras. Tesis presentada como requisito parcial para optar al titulo de Ingeniero Agronomo en el grado académico de Licenciatura. Zamorano Carrera de Ciencia y Produccion Agropecuaria. Zamorano. XI, 31pp. In Spanish [The odonate assemblages (84 species) of 3 areas in the departments of Atlantida and Francisco Morazan (Honduras) are described, and the odonate faunae of Honduras, Belize, Costa Rica and Nicaragua are briefly analysed and compared. „For the conservation of forests and the diversity they have, a better knowledge of the species that inhabit them, their distribution and classification is necessary. Most of this diversity is made up of insects. The group of odonata, by its nature, helps in the control of some pests and can be used as an ecological indicator of the quality of ecosystems. Currently there is little information on them in Honduras. The objectives were: to carry out an inventory of the species of the Odonata order, create a database and compare the fauna found with that of Belize, Nicaragua and Costa Rica. Captures were made from February to October in the Zamorano Valley (Yeguare) and in April and August in the Cuero y Salado Wildlife Refuge and the Pico Bonito National Park, complementing with specimens provided by parataxonomists and those existing in the ecological inventory of Zamorano. The trapped insects were laterally placed in paper envelopes and placed in acetone for 24 hours to prevent decomposition and color loss. Then they dried for one or two hours and were transferred to a transparent envelope with data on location, date and collector, as well as family, genus and species. A database was generated to compare the fauna of the three study areas with each other, and with the fauna of Belize, Nicaragua and Costa Rica. There are 84 species in the three study areas, belonging to 43 genera and 10 families. The families with the greatest richness of cspccics were Libellulidac, Cocnagrionidac and Aeshnidae, which together account for more than 83% of the total fauna found. Two species, Mecistogaster linearis and Brechmorhoga nubecula, reported in the Pico Bonito National Park, are new records for Honduras. Contrasting the odonatofauna of Honduras with that of Belize, 114 species (65%) were found in common of 174 reported in that country. Costa Rica. There are 84 species in the three study areas, belonging to 43 genera and 10 families. The families with the greatest richness of cspccics were Libellulidac, Cocnagrionidac and Aeshnidae, which together make up more than 83% of the total fauna found. Two species, Mecistogaster linearis and Brechmorhoga nubecula, reported in the Pico Bonito National Park, are new records for Honduras. Contrasting the odonatofauna of Honduras with that of Belize, sc found 114 cspccics (65%) in common of the 174 reported in sc country. Costa Rica shares with Honduras 132 (49%) of its 268 registered species, and Nicaragua coincides with 82 species (82%) of the 100 registered species. Despite having found a high diversity of Odonata species in Honduras, a good percentage is unknown. It is recommended to complete the information with collections in the departments of Ocotepeque, Lempira, Intibuca and La Paz that have not been studied."] Address: https://bdigital.zamorano.edu/server/api/core/bitstreams/4f21289a-a6f9-41e5-9cda-57e6b3-627e77/content

21302. Obara, K.; 0, Mishima, H.; Yodoe. K.-i. (2001): Insects fauna in the Sada-cho, Shimane Prefecture. Bull. Hoshizaki Green Found. 5: 139-160. In Japanese, with English summary ["Insect fauna was surveyed in the Sada-cho, Shimane Prefecture, in 2000. From May to October, we surveyed in the area six times, and 647 species belonging to 13 orders were recorded. This faunal record contains 261 species of Lepidoptera (42. 9% of all faunal record), 133 species of Coleoptera (21. 1 % of all faunal record) and 104 species of Hemiptera (16. 5% of all faunal record). These three orders occupy 78. 9% of all faunal record. In this report, Ethmia epitrocha (Meyrick) and Ilema nachiensis (Marumo) are recorded from Shimane Prefecture for the first time. The fauna was characterized by species being common with those in lower mountains of eastern Japan." (Authors)] Address: Obara, K., Otsu 426-7, Izumo City, Shimane Prefecture, 693-0011 Japan

2002

21303. Dolny, A.; Kraut, M.; Horcicko, I. (2002): Dragonflies (Odonata) of Natural Reserve Stepán (bioregion Poodri).

Cos. slez. Muz. Opava (A) 51: 259-269. In Czech, with English summary. ["The object of this work was based on an intensive research that lasted from 1998 to 2000. We were set to find and to value qualitative and quantitative pieces of information about the constitution of odonatofauna in Štepán natural reserve (Czech Republic, Silesia, square 6175). The collections of material (adults and larvae) were realized in 49 days. During the research was valued habitat selection. There were found together five types of biotopes: surface area of the pond and contiguous (shore, waterside) parts, growths of reed, pool, contiguous meadows, contiguous part in a protected area on the banks of the Opava river. There were found 31 species of the order Odonata (31 presented species makes perhaps 44 % from the whole number of species in the Czech Republic), 11 species of the suborder Zygoptera, 20 species of the suborder Anisoptera. The developmental process was proved in 16 species when juvenile adult or larva was caught and we believe that other 13 species are likely to have undergone the same process. Natural reserve Štepán makes acceptable habitat for any different odonatocoenoses with relation to their cenotop, including tyrfofil representatives Somatochlora flavomaculata, Sympetrum danae and Leucorrhinia pectoralis. Two species of the Czechoslovak Red Data Book (Škapec 1992) were found – Calopteryx splendens and Leucorrhinia pectoralis." (Authors)"] Address: Dolny, A., Katedra Biol. & Ekol., Ostravske Univ., ul. 30-dubna 22, 70103 Ostrava, Czech Republic

21304. Kitagawa, K.; Katatani, N. (2002): Notes on Thai Odonata, Part 1. The Odonata from Chantaburi in March 1998. Aeschna 39: 33-42. (in Japanese, with English summary) ["65 species of the dragonflies were taken in Chantaburi, where is located around the border with Thailand and Cambodia, by the authors in March, 1998. An unknown dragonfly of the genus Idionyx, probably new to science, was taken. Undescribed female figure of Coeliccia yamasakii is shown. Merogomphus parvus and Aethriamanta gracilis are the first records in this area. We report the list of the collected dragonflies and the observation records." (Authors)] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

21305. Kuijer, A.A. (2002): Libellen en insecticiden. Een literatuuronderzoek naar en risicobeoordeling van de effecten van insectenbestrijdingsmiddelen op libellen in Nederland. Wetenschapswinkel Biologie, Universiteit Utrecht; Rapportnummer: P-UB-2002-01. 34 pp. In Dutch [For butterflies have shown that agricultural pesticides may pose a high risk. Dragonflies life during a vulnerable phase of life in the water. It is not unlikely that they were in contact can be dissolved in the water with pesticides from agriculture. The Butterfly Foundation therefore, the Science of Biology at Utrecht University the following questions: • How sensitive dragonflies to insecticides? • What are the risks in current use in the Netherlands? To answer these questions in this report, a risk assessment on the basis of data from the literature. First, an inventory of literature about the effects on dragonflies in field situations pesticide used in the Netherlands. In addition, toxicity data controlled toxicity studies published. From these eight pesticides for short-term toxicity data obtained for dragonflies. From these data the long-term toxicity data calculation necessary for the risk assessment. These short and long term toxicity data compared with the maximum tolerable concentrations (MACs) of these pesticides. This MTR values are derived from toxicity data for different species and by the government used to provide the environmental quality of surface fixed. In addition, the risk assessment in the most recent measurements of these pesticides compared to toxicity data. In field studies with pesticides dragonflies seem no more or less bothered by pesticides than other insects. Any decreases in dragonfly populations in addition to the direct toxic effects sometimes attributed to indirect effects such as loss of prey. If the concentrations of pesticides in surface water equal to the MPR values the risk of these pesticides for dragonflies minimal. This shows the sensitivity of dragonflies to pesticides from controlled experiments. However, there are significant breaches of the MTRwaarde of some pesticides detected. It is not known how often and how long overruns occur. Such overruns may pose a significant risk for some dragonfly species. From this preliminary risk assessment can be concluded that pesticides, given the low risk for dragonflies, probably not a major cause of the decline in its position dragonfly. During peak loads may be local effects. The main causes of the decline should rather be sought in habitat alteration and destruction. (Author/Google translate)] Address: not stated

21306. Walia, G.K.; Sandu, R. (2002): Reduction in chromosome number in five libellulid species. Fraseria (N.S.) 7: 17-20. (in English) [Karyological investigations have been carried out on five species belonging to family Libellulidae viz. Orthetrum luzonicum, Orthetrum japonicum internum, Potamarcha congener, Tholymis tillarga and Trithemis festiva. All the species possess diploid chromosome number 2n (male) = 23, with XO-XX sex determining mechanism. This type of reduction in chromosome number has boon reported for the first time in these species." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

21307. Walia, G.K.; Sandu, R. (2002): Cytogenetical data on Neurobasis chinensis chinensis (Zygoptera: Calopterygidae). Fraseria (N.S.) 7: 13-16. In English ["Male germ cell complement of N.c. chinensis … has been studied and illustrated from Himachal Pradesh (India). Chromosomal investigations show diploid number 23m, with XO sex determining mechanism. Relative length of chromosomes, total chromosome length (TCL), largest autosome: X (A:X) and m:X ratios have been calculated for the first time in this species. Variation in karyotype of Neurobasis chinensis chinensis from different localities has also been discussed." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

2003

21308. Kalkman, V.J. (2003): Ongewervelde fauna van het Rijntakkengebied, met veldstudie in uiterwaarden rond Zaltbommel deelrapport libellen (Odonata). European Invertebrate Survey – Nederland. 33 pp. In Dutch ["In 2001 and 2002, EIS-Nederland carried out an inventory of terrestrial invertebrates in five floodplains along the Waal around Zaltbommel (Gelderland) on behalf of Rijkswaterstaat, Directie Oost. These are the Breemwaard, the Gamerensche Waard, the Heesseltsche Waard, the Hurwenensche Waard and the Rijswaard. This report discusses the results of this inventory with regard to dragonflies (Odonata). The first aim of the project was to obtain a frame of reference for the diversity of the floodplains of the Rhine tributaries. In addition, the results are related to the flooding regime of the river and indicator species are determined for biotope types in the floodplains. Each floodplain was examined twice in 2001 and 2002 for the presence of dragonflies. In addition, during fieldwork on the ecology of the river rump Gomphus flavipes,

each groyne section was specifically examined for the occurrence of this species. In order to place the results in a broader context, an overview of the species known from the floodplains of the Dutch Rhine branches has been compiled with the help of the national dragonfly database NVL/De Vlinderstichting/EIS-Nederland. Based on this overview, the species were determined with a preference for the Rhine branches. Since 1980, 45 species of dragonflies have been found in the Rhine branches area, of which 15 are rarely or never breeding in the Rhine branches area and have mainly been observed as vagrants. Of the 30 other species, 14 have a significant preference for the Rhine branches. Three species that are bound to running water occur in the Rhine tributaries area. Two of these (Calopteryx splendens and Gomphus vulgatissimus) are quite rare in the Rhine branch area and are much more common in streams in the east and south of the Netherlands. The third species, Gomphus flavipes, has a very strong preference for the Rhine branches area and the majority of the Dutch populations are located here. The majority of the species of the Rhine Branches area in the Netherlands are general species with little critical choice of biotope. A large proportion of the species with a preference for the Rhine branches area also fall into this category. An important exception to this are three species (Aeshna isoceles, Brachytron pratense, Libellula fulva) that occur in waters with land vegetation such as old oxbows. In the Netherlands, these species are mainly found in low peat bogs, but are quite scarce elsewhere. These species have probably declined in the river area but are still numerous locally. In addition to the above-mentioned types of land vegetation, the green glazier Aeshna viridis also occurred in the Rhine branches area at the beginning of the 20th century. This species only reproduces in extensive crab shaving fields, a vegetation type that is no longer found in the floodplains today. 26 species of dragonflies have been found in the floodplains of Zaltbommel. With the exception of the plasrombout Gomphus pulchellus, all species with a preference for the Rhine branches area were found during the inventory. Species diversity increases as the distance from the river increases. Most species are found in areas with extensive water and riparian vegetation. These vegetations are mainly present in the channels against the winter dike. More frequent and more intensive flooding makes the emergence of this type of vegetation impossible. Shrubs and woods located on the upstream side seem to have a protective effect for the riparian vegetation and therefore lead to species-rich dragonfly biotopes." (Author/Google translate)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

21309. Kitagawa, K.; Katatani, N. (2003): Notes on the Odonata of Thailand, Part 2. The Odonata from Trang Prefectue in March 1998. Aeschna 40: 13-23. (in Japanese, with English summary) ["Fifty six species of the dragonflies were taken in Trang, where is located in the base of Malay Peninsula and around the border with Thailand and Malaysia, by the authors. Aethriamanta brevipennis, Aethriamanta gracilis, Indothemis limbata limbata are the first records in this area." (Authors)] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

21310. Kumar, A.; Sharma, G. (2003): Fauna of Asan Wetland. Odonata. Wetland Ecosystem Series 5: 11-13. In English [The study of Odonata diversity surrounding Asan reservoir area reveals 43 species spreading to 29 genera under seven families. Out of these, 16 species (37%) under 13 genera are Oriental, one species (2%) under one genus is Palaearctic, 16 species (37%) under six genera are Tropical, two species (5%), under two genera are Ethiopian four species (9%) under three genera are Australian and four species (9%) under four genera are Cosmopolitan in distribution. Anax parthenope, Diplacodes lefebvrei and Urothemis s. signata have been recorded for the first time from Dehra Dun valley where as the latter two are new records from the western Himalaya as well (Mitra, 1999). The most important ecological phenomenon is the presence of both stream species as well as the standing water species, which indicates that the both ecosystem are properly maintained. The running water breeding species like, Calicnemia eximia, Neurobasis ch. chinensis were much more abundant at the confluence of the river Asan with the reservoir. The inlet channel coming from Dakpathar barrage is deep and with unstable or altered ecological conditions that hardly any dragonfly species is able to breed there and, therefore, its surrounding remained somewhat barren except some species from the reservoir occasionally visiting the area. Classified list of 43 species of dragonflies, including 14 species of Zygoptera and 29 Anisoptera available at Asan reservoir is given below. The scientific name of each species is followed by the name of the authority and year of the original description of species. The habitat preference study revealed seven stream breeding species (160/0) and 13 reservoir (standing water) breeding species (30%) whereas 23 species (54%) were common in both the habitats. Interestingly all the 43 species are breeding residents at the Asan reservoir and contiguous areas." (Authors)] Address: Kumar, A., Zoological Survey of India, Northern Regional Station, Dehra Dun, India

21311. Swer, S.; Singh, O.P. (2003): Coal mining impacting water quality and aquatic biodiversity in Jaintia hills district of Meghalaya. ENVIS Bulletin Vol 11(2): Himalayan Ecology. 29-36. In English [The Jaintia hills, one of the seven districts of Meghalaya, lies between latitude 25°5'N to 25°4'N and longitude 91°51'E to 92°45'E. The district is bound by the state of Assam on the north and east, the East Khasi Hills on the west and Bangladesh in the south. The water bodies are badly affected by contamination of Acid Mines Drainage (AMD) originating from mines and spoils, leaching of heavy metals, organic enrichment and silting by coal and sand particles. Pollution of the water is evidenced by the colour of the water which in most of the rivers and streams in the mining area varies from brownish to reddish orange. Low pH (between 2-3), high conductivity, high concentration of sulphates, iron and toxic heavy metals, low dissolved oxygen (DO) and high BOD are some of the physico-chemical and biological parameters which characterize the degradation of water quality. Observations on physico-chemical and biological characteristics of water are discussed below and summarized in Tab. 1. Low pH, low DO, higher sulphate content and turbidity in water of coal mining areas are affecting the aquatic life. Study on benthic macroinvertebrates revealed presence of only a few tolerant species namely Chironomus larvae (Diptera), dragonfly larvae and water bugs (Hemiptera) in rivers and streams of the area. Analysis further revealed lower abundance and species diversity of macroinvertebrates. The presence of only a few tolerant species of benthic macroinvertebrates and the absence of most of the aquatic organisms particularly the sensitive species are most likely due to acidic water contaminated with AMD. Further, most of the river of the mining area lack commonly found aquatic organisms such as fish, frog and crustacean." (Authors)] Address: Swer, S., Centre for Environmental Studies, North-Eastern Hill Univ., Shillong – 793014

21312. Ubbelohe, R.G. (2003): Zur Biologie und Verbreitung der Späten Adonislibelle (Ceriagrion tenellum de Villers) in der Fischbeker Heide. Diplomarbeit. Universität Hamburg. 36 pp. In German ["C. tenellum is a species that occurs frequently in Mediterranean latitudes. It also occurs in northern Europe, but here it is associated with bogs. Here it lives in small, sheltered and climatically favorable bodies of water. Their flight time usually begins in mid-June, but sometimes as early as the end of May and extends into September. Their extensive copulation can last for hours and takes place in vegetation in Water Mane. She then lays her eggs on aquatic plants such as Sphagnum or Eriophorum angustifolium. The latter does not appear to be present in other C. tenellum habitats, but this species shows a large tolerance in the choice of oviposition substrate. Due to the destruction of their habitat, bogs with small bodies of water in northern Germany are threatened with extinction." (Author)] Address: not stated

21313. Yokoi, N. (2003): A record of Odonata in central Laos. Aeschna 40: 33-35. (in Japanese, with English summary) ["The dragonflies collected in central Laos, Lak Sao and Sam Nua area, in 2002-2003 were listed. Eleven species were recorded from Laos for the first time. The following 6 Chinese and Vietnamese species; Philoganga vetusta, Amphigomphus nakamurai, Davidius fruhstorferi, Microgomphus jurzitzai, Macromia katae and Idionyx carinata were newly added to the Laos fauna. Total number of named Lao Dragonflies was 183 species." (Author)] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan

2004

21314. Gao, X.-T.; Liu, Y.; Wang, C.; Zhao, L.; Guo, D.-S.; Liu, D.-Z. (2004): Ecological distribution of damselflies in Beijing area. Entomological Knowledge 41(5): 426-430. In Chinese, with English summary ["A survey on the ecological distribution of Zygoptera and the influencing factors was carried out in Beijing area from March of 2002 to October of 2003. Ten species of damselflies, which belonged to 3 families and 7 genera, were found in our study. Among them, Cercion calamorum and Ischnura asiatica were dominant and widespread species. The results of Principal Components Analysis (PCA) indicated that the coverage of freely-floating aquatic plants, emergent aquatic plants, plants around the plots and the submergent aquatic plants were significant factors affecting the distribution of those two damselflies. They contributed 30.49, 24.14, 17.45 and 15.26%, of the total variation respectively. Moreover, Calopteryx atratum, and Matrona basilaris were merely recorded within the waters of the southwestern and northern parts in which the water flowed rapidly, with shallow depth and less pollution. Cercion plagiosum, Ischnura elegans, and Platycnemis foliacea were comparatively uncommon species of damselflies, which occurred only in the edges of rivers, lakes and reservoirs. Mnais mneme, M. earnshawi and Copera annulata were restricted-ranged species that were only found in the mountain areas of Beijing." (Authors)] Address: Gao, X.-T., Lab. Bio-div. Sci. & Ecol. Engineering, Inst. Ecol., Beijing Normal Univ., Beijing-100875, PRC

21315. McAbendroth, L. (2004): Ecology and conservation of Mediterranean temporary ponds in the UK. Ph.D. thesis, Faculty of Science and Technology, University of Plymouth: XV + 247 pp. (in English) ["Macroinvertebrate and plant assemblage composition and abiotic habitat characteristics were examined in 76 ponds, in the New Forest (Hampshire, UK) and on the Lizard Peninsula (Cornwall, UK), in order to unravel the ecological processes influencing ponds at a range of spatial scales and provide a clear definition of Mediterranean Temporary Pond (MTP) habitat (92/43/EEC) in the UK. In addition, a set of newly created experimental ponds were monitored on the Lizard to examine patterns of colonisation and evaluate the use of habitat creation in temporary pond conservation. The findings are synthesised into a number of management recommendations for ponds in the regions, with a particular focus on MTPs. MTPs equated to ephemeral, winter-flooded ponds occurring in shallow depressions on the Lizard, which had some fioristic similarities to other western Atlantic fringe sites. They were dominated by low growing grasses, rushes and rare annual species of the Nanocyperion alliance along with a depauperate macroinvertebrate assemblage comprising Coleoptera (including characteristic rare taxa), Trichoptera and Chironomidae. The strength of physicochemical and spatial pattern in assemblage composition varied between the regions. Lizard macroinvertebrate assemblage similarity was spatially autocorrelated and related to water chemistry and pond area but New Forest macroinvertebrate similarity was not related to any of the measured physicochemical parameters. Plant assemblage composition was only weakly related to wet phase physicochemistry. Pond vegetation structured macroinvertebrate assemblages in different ways at different spatial scales. At large-scales, macrophyte richness and composition affected macroinvertebrate assemblage composition in both regions, whereas, at smaller-scales, macrophyte structural complexity (measured using fractals) influenced body size scaling and overall biomass of macroinvertebrates. Assemblages in both regions were significantly nested, indicating that species-poor sites tended to be subsets of rich sites. Macroinvertebrate nesting, on the Lizard, was not due to passive sampling, and was best explained by pond area, with habitat parameters and isolation being of secondary importance. Nested and idiosyncratic taxa differed in their spatial response to factors which structured assemblage-level nestedness; idiosyncratic taxa tended to possess broad ecological tolerance and good dispersal capacity, whilst nested species had narrower tolerance or limited powers of dispersal. Experimental pond macroinvertebrate assemblage similarity converged with pond age, despite continued variation in physicochemistry, and the assemblages that developed were not significantly different from small natural ponds in the region. Augmentation of current MTP habitat could therefore be achieved by creating new sites in close proximity to existing water bodies." (Author) The only odonate taxa mentioned is "Sympetrum ssp.".] Address: not stated

2005

21316. Annon, M.R. (2005): Life history studies of the damselfly Sympecma paedisca BRULL [sic] (Odonata: Lestidae) in a shallow pond in Garmat-Ali, Basraii. Mesopotamian Journal of Marine Science 20(2): 297-310. (in English) ["Life history of S. paedisca been investigated in a combined field and laboratory study. The field study is conducted at a shallow pond in Garmat-Ali, Basrah in the period from October 1997 to September 1998. Some environmental factors such as temp., D.O., pH. and salinity were measured. The field results indicate that the life cycle is univoltine, however this species is unique in that it does not enter nymphal diapause. Emergence is rather an unsynchronized and dispersed temporally. Sexual maturation requires four weeks. Oviposition site is Potamogeton. The laboratory study revealed that incubation period was 14 days at 27 °C. The nymphal stage includes twelve instars and requires 252.5 days for completion the development. The whole life cycle

requires 266.5 days." (Author)] Address: Annon, M.R., Dept of Biology, College of Education, University of Basrah, Iraq

21317. Briers, R.A.; Biggs, J. (2005): Spatial patterns in pond invertebrate communities: separating environmental and distance effects. Aquatic Conserv: Mar. Freshw. Ecosyst. 15: 549-557. In English ["(1.) The nature and extent of spatial pattern in communities has important implications for their dynamics and conservation. Previous studies of pond ecosystems, over relatively small spatial scales, have found little evidence of spatial autocorrelation of community composition. Patterns in community composition over greater spatial distances have not been documented. (2.) Here, data on macroinvertebrate communities [including 10 odonate species without further specification] and physico-chemical characteristics of 102 ponds over a 60 x 60 km area of Oxfordshire, UK, were used to examine evidence for spatial autocorrelation in community composition and to separate the effects of environmental similarity and physical distance on community similarity. (3.) Overall similarity between communities was low, but showed significant positive spatial autocorrelation. There was evidence for both environmental and physical distance effects on spatial autocorrelation of community similarity. Community similarity was negatively related to differences in environmental conditions, but effects were only significant for large environmental differences. (4.) When environmental effects were accounted for, there was significant positive spatial autocorrelation of community composition over inter-site distances of up to 13 km. These results suggest that interactions between pond sites, potentially through dispersal, are evident over larger spatial scales than has previously been appreciated, and emphasize the need to consider spatial issues when developing strategies for pond conservation." (Authors)] Address: Briers, R.A., School of Life Sciences, Napier Univ. Merchiston Campus, Edinburgh, EH10 5DT, UK. E-mail: r.briers@napier.ac.uk

21318. Chartier, A. (2005): Twin-spotted spiketail: new sight record for Wayne county and record late date. Williamsonia 9(1): 3. In English [Verbatim: (Cordulegaster maculata) has been recorded from most of the UP and northem LP counties in Michigan, and from about a third of the Southern LP counties (14), including six in the southeast (MOS website). On the cool morning (58° F, -9:00 AM EST) of 22 Aug 2004, while checking mist nets at my bird banding Station in a closed area of Lake Erie Metro Park, Wayne Co., I encountered a Twimspotted Spiketail hunting over an open grassy field surrounded by shrub, hedgerow, and woodland. Initially, I thought it was the Canada Damer (Aeshna canadensis) that I had seen a short time earlier. But, when it landed near me I immediately saw the paired yellow triangulär spots on the abdomen and I suspected it was a Cordulegaster instead, but I wasn't sure which species. I got my digital caim era out of the car and took a few photos, hoping to identify it when I got home, as I had no dragonfly references handy. Due to the temperature, it was very cooperative. I then tumed my attention back to the bird I needed to band at that moment. I did not take the spiketail as a specimen because I had no way to keep it from getting dam-aged, and my purpose this day was bird banding, not dragonfly collecting. I determined the species once I got home, and also determined that it was a male. Color photos of this individual can be viewed on my website at: www.-amaziha.net/images/Inverts/Odonata/Cordulegaster_maculata.htm. The flight period for the Twimspotted Spiketail in our region is described as late May through the end of July (Holder 1996, Legier 1998, Mead 2003), and to early August in New Hampshire (Dunkle 2000). This is likely a record late date in our region, and possibly within the entire ränge of the species. Mead (2003) describes the habitat for C. maculata as "clean, clear streams and smaU rivers in wooded areas..." To the west of the site (within 0.25 mile) is an area of freshwater marsh that drains south into the Huron River, and to the south of the site (also within 0.25 mile) is a wooded creek near the Pte. Mouülee State Game Area Headquarters which also drains southeast into the mouth of the Huron River. More freshwater marsh and a stream (not wooded) that drains into Lake Erie occurs to the east of the site. To the north is an open woodland, and a golf course is to the northwest. It seems possible that streams in this area could have provided breeding habitat for the species, though it seems equally possible that this individual was simply a very tardy vagrant.] Address: Email: amazilial@comcast.net

21319. Kishida, O.; Nishimura, K. (2005): Multiple inducible defences against multiple predators in the anuran tadpole, Rana pirica. Evolutionary Ecology Research 7: 619-631. In English ["Question: What conditions are required for evolution of predator-specific inducible defences? Hypotheses: (1) Prey organisms distinguish among predators to which they are exposed. (2) Prey individuals with a predator-specific defence must attain higher survivorship than those with a mismatched defensive phenotype. Organisms: Prey, anuran tadpoles (Rana pirica); biting type predator, dragonfly larvae. (Aeshna nigroflava = Aeshna serrata); swallowing type predator, salamander larvae (Hynobius retardatus). Methods: Rana pirica tadpoles were exposed to the predator signal in close proximity to or remote from the dragonfly larvae or the salamander larvae to determine whether the tadpoles develop predator-specific morphologies and whether they utilize predator-specific signals in the induction process. We conducted predation trials to determine whether the tadpoles with induced phenotypes were more resistant to the attack in the corresponding predator environment. Results: Rana pirica tadpoles developed predator-specific morphologies in response to exposure to two different types of predator. The tadpoles discriminated between the predators – that is, different signals were required to develop the specific phenotypes in the induction process. The survival rate of tadpoles of specific phenotypes was higher than that of tadpoles of mismatched or non-induced phenotypes when exposed to predation by the corresponding predators." (Authors)] Address: Kishida, O., Graduate School of Fisheries Sciences, Hokkaido University, Hakodate 041-8611, Hokkaido, Japan. E-mail: kishida@fish.hokudai.ac.jp

21320. Niechoj, S. (2005): Die Libellenfauna des Naturschutzgebietes Krickenbecker Seen. Diplomarbeit. Westfälische Wilhelms-Universität Münster. 69 pp. + Anhang. In Geman [In 2004, the dragonfly fauna was examined in ten bodies of water in the NSG KS. The recording mainly took place in flowing waters, for which only few data are available up to now. With 33 proven dragonfly species, more than half of which are native, the NSG KS can be described as particularly species-rich. A third of the recorded species are on the red list of North Rhine-Westphalia (SCHMIDT & WOIKE 1999) and Germany (OTT & PIPER 1998). Considering the small number of water body types examined, the importance of this area for dragonflies becomes clear. If you add the data from other mappings in recent years, the total number of species and the number of proofs of indigenousness continue to increase. By recording the watercourses, O. coerulescens could be detected again in the NSG KS for the first time since 1990, and S. metallica was proven to be indigenous to a section of the Nette. The importance of the

area for L. fulva could be clarified, and the wide distribution within the NSG KS could be proven on the basis of the numerous finds of exuviae. The indices commonly used to compare the composition of species in the various bodies of water, such as the Sörensen quotient or the WAINSTEIN index, cannot be used appropriately for dragonfly zoenoses. The need to include not only the factors considered by Sörensen and WAINSTEIN, but also (potential) indigenousness, abundance and relative find rates is discussed. The influence of the temperature increases in recent years could be documented in the phenological data for 2004 and the discovery of the Mediterranean species C. erythraea. The use of the term "ubiquist" appears premature for many species based on the literature and our own surveys and has been discussed. Since mapping always involves a certain degree of subjectivity, a method for the objective recording of horizontal vegetation density with the help of a computer program was presented. Due to the heterogeneous water body structures, many photographs of the vegetation have to be taken, so that the effort involved in digital post-processing is too high and this method becomes unprofitable. For low-growing, more homogeneous structures, however, this method is considered to be useful. It is established that those seeking relaxation in the NSG KS not only pose a threat to flora and fauna by entering the waterfront, but also create structures through this disruption that are used by some dragonfly species for hatching. The nutrient input into the waters is a serious problem in the NSG KS. This entry can be counteracted by simple measures such as removing the cuttings from the embankment. Measures such as the extensification of agricultural areas in the catchment area of Nette and Renne and the replacement of private small sewage treatment plants with connections to large sewage treatment plants are necessary to reduce the inputs themselves. The neozoa muskrat and coypu not only damage embankments and dams, but also decimate the natural aquatic vegetation with their food spectrum, which can have negative effects on the dragonfly fauna. (Author/Google translate)] Address: not stated

21321. Schmidt, C. (2005): Pflege und Bewirtschaftung von ausgewählten Gräben im LSG „Nassau und Elbwiesen bei Brockwitz“ unter besonderer Berücksichtigung der Libellenfauna. Diplomarbeit. Hochschule für Technik und Wirtschaft Dresden (FH). 78 pp + Anhang. In German ["In the course of this work, structural mapping was carried out on the ditches of the study area as a basis for the care and management concept. At the same time, the dragonflies occurring there were recorded. To characterize the sections of the ditch, different parameters were considered (e.g. information on the longitudinal and transverse profile, bed structure, vegetation and environment), which represent the current condition of the respective body of water. Since open water areas are necessary for most dragonfly species, a follow-up mapping was carried out in August, with a focus on vegetation. The existence of an optical profile-narrowing effect and the covering of the water surface by the embankment vegetation as well as the density of the emersed plants were recorded. A total of 22 dragonfly species were found in the study area. These include seven species that BROCKHAUS & FISCHER (2005) continue to propose for the red list based on the latest distribution findings, and one species for the early warning list. Target species among these particular species is Coenagrion ornatum, which is listed in Appendix II of the Habitats Directive. It is given special consideration within this concept. Other threatened species are Calopteryx virgo, Coenagrion pulchellum, Lestes barbarus, Orthetrum brunneum, O. coerulescens, Sympetrum flaveolum and S. pedemontanum. Based on the evidence, the sections of the ditch were later divided into four maintenance zones: first sections with an occurrence of C. ornatum, then sections for the promotion of C. ornatum, then sections with the occurrence of other special dragonfly species and finally sections without direct earmarking to certain dragonfly species. Finally, specifications for necessary maintenance measures (slope mowing, weeding and clearing) were developed in terms of ditch management in line with nature conservation and taking into account the requirements of the various special dragonfly species. Furthermore, statements are made on flanking measures that serve to improve the habitat properties or to increase the structure in the study area. These are the construction of waterfront strips, the clearing of existing rows of trees, the leveling of the embankments, the removal of the river bed structures, the conversion of arable land to grassland and the disclosure of piped ditch sections. Finally, based on the existing structures, the individual maintenance and supplementary measures were summarized in action maps." (Author/Google translate)] Address: Schmidt, C., Louisenstr. 45, 01099 Dresden

21322. Schultz, H. (2005): Vergleichsstudie March im Abschnitt Marchegg (Fluss km 15,00 – 25,00): Odonata. Endbericht. Im Auftrag des Umweltbundesamtes Wien, Wien, Mai 2005: 49 pp. (in German) ["As part of the project "Bank and profile design measures and measures to connect the meanders for the March in the Marchegg section (river km 15.00-25.00)", 13 test sites were selected with a focus on the March to evaluate the design types. The biocenotic parameters total species inventory, proportion of autochthonous species, proportion of sensitive species, indigenousness of the species and abundance (relative frequency) were determined for each sampling site. The maximum abundance is given, whereby the species are classified according to the inspection date with the largest number of individuals found at the individual sampling sites. This database also enables the dominant species, the dragonfly communities and a characterization of the examined locations based on the dragonfly fauna to be addressed. A total of 22 dragonfly species (8 Zygoptera and 14 Anisoptera) from 8 families were identified. Of these, 11 species are classified in the Red List of Lower Austria (RAAB & CHWALA, 1997). For 6 species, the indigenousness could not be clearly confirmed. However, it can be assumed that the species in question are mostly native to the Marchauen. The autochthonous evidence of Sympetrum meridionale is to be emphasized as a special proof, since the species is considered "extinct or missing" in Lower Austria. In addition, the endangered dragonfly species Gomphus flavipes and Epitheca bimaculata as well as the highly endangered species Lestes barbarus and Ophiogomphus cecilia could be detected. O. cecilia and G. flavipes are protected animal species throughout Europe according to the EU Habitats Directive, with O. cecilia as a protected object of the Natura 2000 area "March-Thaya-Auen" subject to the strict area protection according to Article 6 of the Habitats Directive subject. On the March in the investigation section, the running water community Gomphus - Calopteryx splendens - coenosis has dev2008eloped, which corresponds to the biotope type of the brisk to sluggishly flowing rivers of the plain. The indicator species are the rheophilic dragonfly species Gomphus vulgatissimus, G. flavipes, O. cecilia and Calopteryx splendens, which are accompanied by Platycnemis pennipes (cf. JACOB, 1969; STARK, 1976; WARINGER, 1989). A total of 10 dragonfly species from 7 families could be identified as being sensitive. These are stenöke, i.e. narrowly niche, species that place special demands on their habitat and are

therefore particularly well suited as bioindicators. The occurrence of a total of 3 species out of 4 species of the family Gomphidae known for Lower Austria is remarkable. On the other hand, the sensitive species L. barbarus, Aeshna affinis and S. meridionale were detected at the two sampling sites away from the main river. The 13 sampling sites range from 1.09 to 3.95 on a scale from 1 for eu- and parapotamal permanent water bodies (habitat type H1) to 5 for temporary standing water bodies (habitat type H5). The surveyed AUI range of 2.86 can therefore be assessed as wide. The study sections along the March itself all correspond to habitat type H1. The results for sample site 8 in meander IV with 3.44 and for sample site 12 on the wet meadow with 3.95 are at the opposite ecological end of the spectrum of riverine and amphibious alluvial sites. The mean AUI of 1.73 shows the focus of the recordings on H1 habitat type sites. Tables 13 and 14 provide a summary of the evaluation of the sampling sites and the design types on the March based on the dragonfly fauna surveyed. The design types A2 (partial removal of the bank protection on the impact bank), B3 and B4 (accentuation of the transverse profile through measures on the slip bank), E2 (relocation of bed sediment) and E3 (installation of wooden structures) are rated positively. Sample site 11 with design type B4 represents an extremely valuable habitat for the dragonfly fauna on the March. At this site, by far the highest density of individuals of the endangered dragonfly species G. flavipes and most of the individuals of the very rare O cecilia raised. Design type C1 (selective lowering of the bank edge) with the aim of improving or restoring the lateral surrounding area network cannot be confirmed based on the available results. Due to the inspections in 2004, the execution of the measures must be rated rather negatively, since the trenches were dry on all inspection dates with the exception of April and the local subsidence was well above the level of the March. Improved networking of the main river with the floodplains and their backwaters and wet meadows is essential for their existence in order to counteract silting up or complete drying out. A dynamization of the meander IV could not be determined in the inspection period 2004. For sampling point 8 along the former inflow opening, a value of 3.44 was created as part of the calculation of the floodplain index based on native dragonfly species. Thus, meander IV in the examined section corresponds to standing water with no connection to the main river at medium water levels, but with a strong tendency to silt up. The planned integration of the meanders is to be demanded in accordance with the model typical of the river. The connection to the main river also counteracts the progressive silting up of the meanders. When carrying out the design measures for the meander inflow area to connect the meander, an approach should be chosen with consideration for the rare and in some cases highly endangered dragonfly fauna. If the meanders are fully integrated into the course of the river with year-round flow, the preservation of areas protected from the current, separate sections of water or similar is a decisive compensatory measure. Based on the available ecological results on the dragonfly fauna, tendencies and comprehensible differences between built and unbuilt or demolished sections can be determined. Undeveloped or dismantled sites on the March (corresponding to natural conditions) clearly show the better values in terms of the species inventory recorded, the proportion of native and sensitive species and the abundances. They have a larger and more specific range of species. With one exception, all trial tillages with hard-built banks due to heaped heaps generally show poorer values. From a dragonfly point of view, preference should therefore be given to all measures that create or promote a near-natural and less disturbed state and increase the range of structures. The strengthening of the bank with monotonous heaps of heaps is to be rejected. In general, the structural heterogeneity of the March has been improved by the design measures carried out, but there are long stretches of deficits in the area of water-land connectivity and the structural equipment, especially of the riparian bank." (Author/Google translate)] Address: not stated

21323. Torrejon, J.M.; Rerri, F.; Perez-Bote, J.L. (2005): Confirmación de la presencia de Paragomphus genei (Selys, 1841) en Extremadura (Odonata, Gomphidae). Boletín de la S.E.A. 37: 248. In Spanish ["This note graphically documents a Mauro male of this species, captured by F. Ferri in the Cáparra river (UTM: 29TQE 4608, Guijo de Granadilla, Cáceres) on 08.26.2005, which confirms the presence of P. genei in Extremadura." (Authors)] Address: Pérez-Bote, J.L., Área de Zoología, Facultad de Ciencias, Universidad de Extremadura, Avda. de Elvas s/n, 06071 Badajoz. Spain. Email: jlperez@unex.es

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21324. Ballentes, M.G.; Mohagan, A.B.; Gapud, V.P.; Espallardo, M.C.P.; Zarcilla, M.O. (2006): Arthropod faunal diversity and relevant interrelationships of critical resources in Mt. Malindang, Misamis Occidental. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA). Biodiversity Research Programme for Development in Mindanao: Focus on Mt. Malindang and Environs. ISBN 971-560-125-1: 177 pp. (in English) [Philippines; An assessment of arthropod diversity and analysis of the interrelationships with other resources were conducted in 10 barangays in Oroquieta City, Don Victoriano, Lopez Jaena, and Calamba, Misamis Occidental from June 2003 to May 2005. The current inventory of Mt. Malindang arthropods includes 741 species in 340 genera, 135 families, 21 orders, and 5 classes. The most speciose orders, the Coleoptera, Hemiptera, Hymenoptera, Diptera, and Araneida account for 78.37 percent of all the species. Arthropod species diversity is generally higher in forest ecosystems than in agroecosystems. When treated per vegetation and per site, diversity is highest in the mixed dipterocarp forest of Peniel, Lopez Jaena, with 82 restricted species (60% beetles) out of 316 species. In terms of species composition, three major clusters of similarity among vegetation types are discernible: a) five agroecosystem sites in Gandawan, Mansawan, Lake Duminagat, Mamalad, and Mialen, with Gandawan and Mansawan having the most similar arthropods; b) montane-mossy forest and agrocereal grassdominated type and almaciga forest in Sebucal; and c) mixed lowland dipterocarp-plantation forests, agrocereal, agroforest, and mixed dipterocarp forest. Three vegetation types appeared to show little species similarities among each other or with any of the three clusters,] Address: Gapud, V.P., Univ. Philippines, Coll. Agr., Pest. Biol. and Biodivers. Div., Los Banos 4031, Philippines

21325. Groenendijk, D.; Bouwman, J. (2006): Ecologische status van de Hoogveenglanslibel in Noord-Brabant. Rapportnummer VS2006.035, Wageningen. 24 pp. In Dutch ["Introduction There is a population of Somatochlora arctica in the Reuselse Moeren in North Brabant. This is one of the five known populations of this endangered species in the Netherlands. The population in the Reuselse Moeren is relatively small (but viable) and therefore vulnerable. This project plan focuses on the protection of the moorland dragonfly in the province of North Brabant and is a result of the activities of the species protection plan moorland dragonfly

(Ketelaar et al., 2005). This report reports on the ecological inventory planned for 2006. Ecology The high moor shine dragonfly is a special species. It is one of the few species of dragonflies in Europe of which relatively little is known. Chapter 2 of this report devotes relatively extensive attention to ecology. This information can also largely be found in the species protection plan. Fieldwork 2006 The fieldwork in 2006 concentrated on the Reuselse Moeren. The main goal was to trace the exact breeding sites in this reserve. Secondly, 10 other possibly suitable peat remnants were searched for other populations in the province of Noord-Brabant. The areas where historical observations of the high moor shine dragonfly are known were also visited. Results: dissemination and management The high moor shine dragonfly is only found in the Reuselse Moeren. In the remaining areas, the presence of the species could not be established. The population in the Reuselse Moeren is located in the core of this area. The management of the Reuselse Moeren must be aimed at combating desiccation and maintaining small peat pits with sufficient peat mosses in the core. Bottlenecks and measures The peat pits in the Reuselse Moeren where the high moor shine dragonfly is located reproduces, contain very little open water and a large surface area of sphagnum moss. The current bottlenecks in the Reuselse Moeren mainly lie in the desiccation of the area. Measures should primarily be aimed at restoring the hydrology of the area. This is the main route. In addition to this first trajectory, Chapter 5 also proposes a second trajectory with measures for the short term." (Authors/Google translate)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

21326. Schleicher, J. (2006): Les peuplements de lépidoptères rhopalocères et d'odonates du bassin versant de la Drôme. État des lieux et mise en place d'un suivi des rhopalocères, d'odonates et des macrophytes aquatiques comme descripteurs des milieux alluviaux et fontinaux du bassin versant. FRAPNA DROME 38 Avenue de Verdun 26000 Valence. 146 pp. In French ["The biodiversity observatory, set up as part of the SAGE de la Drôme, plans to monitor the populations of rhopaloceres, odonates and aquatic macrophytes linked to alluvial and fontinal environments. As part of this study, we have established an inventory of knowledge of the populations of rhopaloceres and odonates at the level of the watershed. This inventory is based on an analysis of existing data in various naturalist databases. We analyzed the observation pressure and the specific richness by municipality of the catchment area. To each known species in the study area, we assigned an abundance/rarity index (in relation to occurrences in the database), as well as an index that takes into account the abundance or rarity of stations of the species. According to the different natural environments and types of wetlands, we have identified processions of characteristic species. In the second part of the study, we explain the implementation and methodology of monitoring at the sampling sites. We present each sampling site as well as the monitoring plots. For the rhopalocere sites, we describe the natural habitats sampled (according to the CORINE biotope nomenclature). For odonate and macrophyte sites, we describe the environmental parameters and we present a simplified phytosociological analysis for each one. The phytosociological analysis is based on our macrophyte surveys. The third part reports the results of the sampling by site. We present the specific diversity, abundance / density of imagos as well as the abundance of heritage species. For each site, we also present diagrams of the species composition of the populations, grouped by plot/transect. The results of the 2006 monitoring campaign represent the baseline for future monitoring. The results are analyzed in relation to the specific diversity and the balance of the populations of each site and for odonates in relation to the Global Quality Index (IQG) of odonatological value." (Author/Google translate)] Address: Schleicher, J., FRAPNA Drôme, 38 Avenue de Verdun 26000 Valence, France

2007

21327. Dinger, E.C.; Marks, J.C. (2007): Effects of high levels of Antimycin A on aquatic invertebrates in a warmwater Arizona stream. North American Journal of Fisheries Management 27: 1243-1256. (in English) ["Restoration of native fish to freshwater habitats often requires nonnative fish removal via chemicals such as antimycin A. Despite widespread use, there are limited field studies quantifying the effects of antimycin A on aquatic macroinvertebrates. We studied the immediate and short-term effects of antimycin A on macroinvertebrates during a fish renovation project in Fossil Creek, Arizona. We employed before–after control–impact (BACI) designs to measure the effects of antimycin A (at extraordinarily high levels of .54 and .100 lg/L) on macroinvertebrate drift, density, and species composition. We used the Hilsenhoff biotic index, a measure of invertebrate pollution tolerance, to study changes in species composition. At the highest dose (.100 lg/L), drift was five times the pretreatment drift level and invertebrate standing stocks in pools and riffles decreased immediately. Densities rebounded in riffles within 5 months but remained depressed in pools. At the lower concentration (.54 lg/L), macroinvertebrate mortality, measured as increased drift, was 24 times the pretreatment level. At this lower concentration, however, macroinvertebrate densities in the benthos were not reduced. Under both concentrations, species composition shifted toward more tolerant species. Although antimycin A effects were mostly short term, several species were locally extirpated. We found no explanation for the loss of some species over others. These results indicate that there is a high end concentration at which antimycin A can have deleterious effects on aquatic invertebrates. We caution managers contemplating the use of antimycin A in fish restoration to consider the risks to macroinvertebrates. We suggest the use of pretreatment surveys and bioassays at anticipated treatment levels to predict the effects upon macroinvertebrates, especially sensitive species. Where there are sensitive species, steps should be taken to mitigate effects." (Authors) At treatment site 1 Hetaerina sp. was extirpated. "By August 2006, five taxa had recolonized treatment site 1 (Baetodes, Bezzia, Metrichia, Rhagovelia, and Tinodes, whereas four taxa had not returned (Chimarra, Hetaerina, Lutrochus, and Tricorythodes)."] Address: Dinger, E.C., Merriam-Powell Center for Ecological Research, Dept of Biology, Northern Arizona Univ., Box 5640, Flagstaff, Arizona 86011, USA

21328. Walia, G.K. (2007): Chromosome variation in three libellulid species due to effect of pollutants in the aquatic ecosystem. Journal, Punjab Academy Sciences 4(1&2): 73-74. (in English) ["Chromosomal analyses have been carried out on three species belonging to family Libellulidae viz. Brachythemis contaminata contaminata, Crocothemis servilia servilia and Pantala flavescens. All the species were collected from the vicinity of stagnant polluted water bodies affected with environmental pollution. Type number of the family Libellulidae is 2n= 25m and n=13m, shown by 30% of the cells. Majority of the cells (70%) possess variation in chromosome number due to autosomal fragmentations and fusions. The chromosome number varies from n= 11-18 in

Brachythemis contaminata contaminata, n= 10-19 in Crocothemis servilia servilia and n= 10-13 in Pantala flavescens. This type of autosomal fragmentations and fusions due to the effect of pollutants has been reported for the first time in the family." (Authors)] Address: Walia, Gurinder Kaur, Department of Zoology and Environmental Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

2008

21329. Anonymus (2008): Salamander, Prachtlibelle und Quelljungfer. Die Gemeinde Rüti verfügt über ein einzigartiges Tierinventar der grossen und kleinen Fliessgewässer. Naturschutzverein Rüti ZH Rundbrief No. 63. 2 pp. In German ["Natural and near-natural streams are characterized by high water quality and a course rich in structure. They are equipped with various small habitats: with rock, gravel and sand bottoms, bank cavities and plant pads, calm pools and fast-flowing sections. The diversity of animal organisms increases with the number of different small habitats. The quality of small rivers as a habitat can be seen from selected animal species. In our region, the fire salamander and four types of dragonflies are suitable: banded and blue-winged demoiselle, two-striped and striped damson. All five species are protected, living as larvae in running water and as adults on land. The development of the larvae in the fire salamander takes three months, in the dragonfly one to two years and in the spring maiden around five years. During the entire larval period, they are continuously dependent on clean, relatively cool and oxygen-rich running water. However, the habitat requirements of the five species differ in detail. Their connection to certain structural properties of the small streams, their position in the food web and their conspicuousness make them excellent pointer organisms or bioindicators. As a retired biologist, our association member Hansruedi Wildermuth wanted to know specifically where fire salamanders, dragonflies and spring mermaids occur in the community. The aim of his project, which came about on his own initiative, was an inventory of running water with mapping of all occurrences of the five species in the municipal area of Rüti. The population sizes and spatial focal points of development should also be determined and the structural conditions of the streams and ditches should be recorded at the same time. In this way, over the course of two years, a complete overview of the distribution of the five animal species and their population situation in the community was created. The detailed report on the inventory has been available for a good six months. The maps clearly show that each of the five animal species has its own distribution pattern. While the occurrence of the fire salamander is limited to the eastern and southern parts of the municipality, Calopteryx virgo and the Cordulegaster boltonii are widespread outside the settlement area in suitable places. Calopteryx splendens probably only occurs as a guest in Rüti and Cordulegaster bidentata is extremely rare due to the lack of favorable larval waters. The fire salamander develops almost exclusively in small, fish-free spring waters with calmed current pools in the forest area between Weier and Batzberg. The two-striped spring damselfly also inhabits the larger streams, provided that there are calmed sections with fine sediments, and the blue-winged demoiselle needs additional sun and cushions from aquatic plants or fine-rooted nests floating freely in the water. The striped spring maiden only finds favorable development conditions in two small bodies of water close to the source on the southern flank of the Batzberg. For natural or man-made reasons, none of the five focus species are able to settle on many stretches of stream in the community. Routes where three species occur together are rare. The Rütiwaldbächli, Weierbächli/Feienbächli, Laufenbach im Tüfental, Dachseggbächli, Chüeweidbächli, Föriholzbächli and Gubelbächli in certain sections as well as the two ditches in the Weierbachried and in the Gründ Ost Ried have proven to be the most valuable bodies of water for the focus species. For the fire salamander, all waters that are used for breeding brown trout are unavailable because they eat the salamander larvae. All 34 officially registered watercourses in the municipality and two additional reed ditches are briefly characterized together with their importance for the focus species. It is also shown to what extent the larval habitats of the five species overlap or separate. The positive and negative factors for colonization are also listed, as well as the possibilities for upgrading the water bodies, provided that this does not require a great deal of effort. Rüti is probably the only municipality in Switzerland with such a detailed animal inventory of all watercourses. The report is now available to the municipality (nature and environment agency, building authority, nature and environment commission). It should not only impart collected knowledge, but also have an effect: it forms an indispensable basis for nature conservation practice by clarifying where there is a need for improvement measures with regard to habitat optimization. At the instigation of René Gilgen, nature conservation officer for the canton and municipality in Rüti, some biotope upgrades were already implemented in the course of the inventory work: clearing of wooded stream edges and structural improvements to reed ditches. They are already having a positive impact." (Author)] Address: http://www.nvr.ch/nvr_seiten/-03verein/031archivrundbrief/rundbrief_63.pdf; 23082012

21330. Buschbeck, E.K.; Friedrich, M. (2008): Evolution of insect eyes: Tales of ancient heritage, deconstruction, reconstruction, remodeling, and recycling. Evo. Edu. Outreach 1: 448-462. In English ["The visual organs of insects are known for their impressive evolutionary conservation. Compound eyes built from ommatidia with four cone cells are now accepted to date back to the last common ancestor of insects and crustaceans. In species as different as fruit flies and tadpole shrimps, the stepwise cellular patterning steps of the early compound eye exhibit detailed similarities implying 500 million years of developmental conservation. Strikingly, there is also a cryptic diversity of insect visual organs, which gives proof to evolution's versatility in molding even the most tenacious structures into something new. We explore this fascinating aspect in regard to the structure and function of a variety of different insect eyes. This includes work on the unique compound–single-chamber combination eye of twistedwinged insects and the bizarre evolutionary trajectories of specialized larval eyes in endopterygote insects." (Authors) The paper includes references to Odonata. Address: Buschbeck, Elke, Dept of Biological Sciences, University of Cincinnati, 614 Rieveschl Hall, Cincinnati, OH 45221-0006, USA. E-mail: elke.buschbeck@uc.edu

21331. Cordero Rivera, A. (2008): Macromia splendens: Estado de conservación y problemática de futuro. 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: 117-130. (in Spanish) ["The genus Macromia is eminently tropical, as of the 100

or so recognised species, only one (splendens) is found on the European continent, and only about 10 in North America. The lack of knowledge of the biology of M. splendens is undoubtedly due to its rarity (living in slow habitats in rivers), the difficulty of capture and the fact that its populations are usually found in areas that are difficult to access. In addition, the flight period does not seem to last more than 4-5 weeks. The detection of the populations of this species is greatly hindered by this fact, so in the future it would be advisable to carry out searches for exuviae. In recent years, new populations have been found in the northwest and central-west of the Iberian Peninsula (including Galicia, northern Portugal, Castilla y León and Extremadura), which suggests that the distribution of the species is somewhat wider than previously thought. The conservation of the populations of this species requires the maintenance of favourable microhabitats for larval development, which include areas of sand, leaf litter and roots in slow, deep sections of rivers, and feeding areas in forest clearings for adults." (Author) Translated with www.DeepL.com/Translator (free version)] Address: Cordero Rivera, A., Depto de Ecoloxia e Bioloxia Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

21332. Ferreira, S. (2008): Situación de la odonatofauna en Portugal. 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: 149-152. (in Portuguese, with Spanish summary) ["The Odonata fauna of Portugal is one of the least studied in Europe, which is surprising if we take into account that the country is located on the Iberian Peninsula, a “hot spot” between the western Palearctic and Paleotropical fauna, constituting the western limit of Europe. Its study began more than two centuries ago, however the known distribution of the species is still clearly insufficient and distorted by the reduced sampling effort; at the same time, the catalogue of species has only recently been the target of a critical analysis. In the present work, a brief historical perspective of the study of Odonata in Portugal is presented, as well as the work carried out recently. An outline of the state of current knowledge will also be made, focusing on species distribution, information gaps and protected, rare and/or lesser known species." (Author/Googletranslate)] Address: Ferreira, Sónia, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, 4485-661 Vairão, Portugal. Email: hiporame@gmail.com

21333. Hofhansl, F.P.; Schneeweihs, S. (2008): Banderillas: Effects of deforestation on dragonflies (Insecta, Odonata) in the Pacific lowland of Costa Rica. Stapfia 88: 237-247. (in English, with Spanish summary) ["Deforestation in the past is responsible for the loss of large forest areas in all tropical regions and this process is ongoing. The reclamation of cultivated land reinforces the disappearance of natural habitats and reproductive sites for many species typical for pristine forests. Lotic waters may remain when the trees are gone, but their characteristics will have changed dramatically and species tied to these water bodies face different challenges maintaining self-sustaining populations. This study contributes to the question of whether changes in land use affect species assemblages and their ability for recruitment, and whether streams embedded in cultivated landscapes provide viable reproductive habitats for dragonflies. We surveyed dragonflies at four forest sites, two sites at forest margins and four sites at streams in an agricultural landscape. At each site, adult dragonflies were recorded twice along a 50 m transect in January and February 2007. We found significant differences in species richness, species assemblages and proportion and number of widespread species between forest and cultivated area. Only 3 of 11 species found in forests were also observed at streams in agricultural areas. Our results indicate that rivers in agricultural environment do not represent suitable reproductive habitats for the majority of ‘forest species’. Therefore, deforestation poses an enormous threat for these species." (Authors)] Address: Hofhansl, F., Department of Chemical Ecology & Ecosystem Research, Univ. of Vienna, Althanstraße 14, A-1090 Vienna, Austria. E-mail: florian.hofhansl@univie.ac.at

21334. Pérez Gordillo, J. (2008): El Proyecto LIFE “Conservación de Artrópodos Amenazados de Extremadura”. 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: 27-34. (in Spanish) ["Conclusion: The LIFE Project "Conservation of Threatened Arthropods of Extremadura" will allow, on the one hand, to comply with the objectives proposed in the project, which is to know the distribution of the species, create tools that allow the protection of the species in an adequate way, dissemination and the implementation of management measures, and on the other hand, breaking a spear in favour of arthropods, opening the way for future studies with other species in Extremadura, either by the Administration or by scientific groups, also being an example for other Autonomous Communities. Thus, in the near future, the Autonomous Community of Extremadura will no longer appear blank on maps and different studies carried out at the national level and there will be proper management of the populations found therein." (Author/Googletranslate)] Address: Pérez Gordillo, J., Coordinador del Proyecto LIFE “Conservación de Artrópodos Amenazados de Extremadura”. Servicio de Conservación de la Naturaleza y Áreas Protegidas. Junta de Extremadura, Spain.

21335. Walia, G.K. (2008): Comparative cytological data on twenty-six species of Libellulidae (Anisoptera: Odonata). Fraseria 8: 77-82. In English ["Chromosome studies have been performed on 26 species of family Libellulidae sampled from various localities of North & North-East and South & South-West India during pre-monsoon and post-monsoon seasons. Cytogenetical data pertains to 26 male species and 11 female species of 17 genera. Among these 21 male species reveal 2n=25m as diploid chromosome number, while 2n=26m is Present in all the female species. Remaining five male species possess 2n=23 as diploid chromosome number, m-chromosomes are absent. All the species have XO-XX type sex determining mechanism. Structure and behaviour of chromosomes during meiotic cycle have been studied and compared within the species and different species of the same genus or different genera. Diploid chromosome number, Total Complement Length, Relative length percentage of chromosomes." (Author)] Address: Walia, Gurinder Kaur, Dept Zoology & Environmental

Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

2009

21336. Grand, D. (2009): Les Libellules et le réchauffement climatique. Rev. sci. Bourgogne-Nature 9/10: 124-133. (in French) [f tropical origin, dragonflies are insects very sensitive to thermal variations. Their promptness to react to this parameter and their exceptional ability to fly make them ideal indicators for detecting possible global warming. The scientific documentation published from 1950 to the present day makes it possible to verify the arrival of several Afrotropical dragonflies on the Iberian Peninsula and then to follow their spread in Andalusia and the neighboring provinces, one of these species even reaching the south of France. The situation is a little more complicated for our country, but recent inventories highlight a northern migratory push of a majority of southern species which, to move over great distances, follow the Rhône-Saône axis to the east and, to the west, run along the Atlantic coast to the Loire Valley which serves as a springboard for them to go north. In recent years, several southern species have colonized Belgium and neighboring countries, some not hesitating to cross the Channel to spread to the British Isles, one of them seems to have established itself there permanently. If global warming promotes the diversification of dragonflies in all regions of our country, the worrying counterpart is a significant and recent scarcity of the most sensitive Euro-Siberian species." (Author/Google translate).] Address: deceased

2011

21337. OPIE, CEN-LR; Écologistes de l'Euziere (coord.) (2011): Déclinaison régionale du Plan National d'Actions Odonates en Languedoc-Roussillon (2011-2015). Rapport pour la DREAL Languedoc-Roussillon, Montpellier: 111 pp. (in French) [http://odonates.pnaopie.fr/wp-content/uploads/2010/12/0_D%C3%A9clinaison-r%C3%A9gionale-du-PNA-Odonat es-VERSION-FINALE.pdf] Address: Les Écologistes de l'Euzière, David Sautet, Domaine de Restinclières, 34730 Prades-le-Lez, France. Email: david.sautet@euziere.org

21338. Peters, G.; Theischinger, G. (2011): The genera of the Afrotropical "Aeshnini": Afroaeschna gen. nov., Pinheyschna gen. nov. and Zosteraeschna gen. nov., with the description of Pinheyschna waterstoni spec. nov. (Anisoptera: Aeshnidae). Odonatologica 40(3): 227-249. (in English) ["The generic names Afroaeschna, Pinheyschna and Zosteraeschna are introduced for 3 groups of Afrotropical dragonfly species, traditionally assigned to the paraphyletic taxon Aeshna. The phylogenetic relationships of these monophyla which are not immediately related to each other are discussed. The Ethiopian populations of Pinheyschna gen. n. are described and characterized as a new sp. (Pinheyschna waterstoni). Zosteraeschna ellioti (Kirby, 1896) and Z. usambarica (Förster, 1906) are regarded as distinct species. Only synonymy, information on status (if feasible) and distribution are given for the remaining species of the group, and a preliminary key to the adults of all but one species is presented." (Authors)] Address: Theischinger, G., Water Science, Office of Environment & Heritage, Dept of Premier & Cabinet, PO Box 29, Lidcombe NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

21339. Petzold, F.; Zimmermann, W. (2011): Rote Liste der Libellen (Insecta: Odonata) Thüringens. 4. Fassung, Stand: 11/2009. Naturschutzreport 26: 106-110. (in German) [Red List of Odonata, Thuringia, Germany] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: petzold.falk-@googlemail.com

2012

21340. Blondel, L. (coord.) (2012): Déclinaison régionale du plan national d'actionsen faveur des Odonates - Limousin. 2012 - 2016. CEN Limousin/SLO/DREALLimousin: 90 pp + Annexes- (in French) [https://www.conservatoirelimousin.com/tl_files/cen_limousin/contenus/Fichiers/PRAO/PRAO_Limousin_reduit.pdf]

21341. Heiser, M. (2012): Die Biogeographie der Libellen der Paläarktis und ihre Relevanz für die naturschutzrechtliche Normsetzung und Normanwendung. Dissertation, Fachbereich VI (Geographie/Geowissenschaften) der Universität Trier. 241 pp. In German and English ["The biogeography of the dragonflies of the Palaearctic and their relevance for conservation law setting and application. While the first nature scientists, such as von Humboldt and Darwin, in the field of classical biogeography studied especially the breakdown of the distribution of species, Wallace developed the recognition that there are causal reasons for the distribution of species. Wallace as well as de Lattin gained their findings by the fact that they projected distribution patterns of species over each other resulting in dispersal centres. In recent decades various possibilities of computer-based analysis offer special advantages for the analysis of distribution patterns, which are used in this thesis to write an interdisciplinary work at the intersection of nature science and conservation law. In five chapters various aspects of the field of classical biogeography are analysed and discussed. In the first chapter of this work, the biogeographic structure of dragonflies in the western Palaearctic is investigated by distribution analysis. The second contribution deepens the view with a regional analysis of the biogeography of Odonata and butterflies in Romania. A third paper concludes that West Palaearctic block with an analysis of island biogeography of the western Mediterranean region. In a second Eurasian block the fourth contribution, worked out the biogeographic pattern of Eurasia. Finally, the fifth article of the phylogeography of Nehalennia speciosa is offered as an example of trans-palaearctic distributed species. Besides their importance in basic research, these five chapters are a substantial basis for the elaboration of the legal treatise. In the legal treatise, with the aid of previous findings, various aspects are discussed that may have led the dragonflies underrepresented in the Habitats Directive. These aspects are a lack of uniform pan-European risk assessment, the lack of a protection criterion "dispersal ability" and a questionable approach when considering what species should be examined on their back for protection." (Author)] Address: https://ubt.-opus.hbz-nrw.de/frontdoor/index/index/docId/553

2013

21342. Berquier, C. (2013): Plan Régional d'Actions en faveur des Odonates. Région Corse. - 2013 – 2017. Office de l'Environnement de la Corse – Direction Régionale de l'Environnement, de l'Aménagement et du Logement de Corse: 67pp. (in French) [http://odonates.pnaopie.fr/wp-content/uploads/2010/12/PRA-Odonates-Corse-version-public1.pdf; Korsika] Address: Berquier, C., Office de l'Environnement de la Corse – Observatoire Conservatoire des Insectes de Corse, F-20250 Corte, France. E-mail: berquier@oec.fr

21343. Daigle, J.J. (2013): Orthemis discolor (Carmine Skimmer), new for Cuba and the Caribbean. Argia 25(1): 2- (in English) ["Guantanamo Province, Camino a La Naza, Municipio Baracoa, 4 February 2008,1 pair, Adrian Trapero; Santiago de Cuba Province, Rio Cauto, Municipio Palma Soriano, 23 February 2007, 1 male, Adrian Trapero and A. Cabrera. This is the first positive record of this species firom Cuba and the Caribbean. It normally ranges firom Texas to Bolivia." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

21344. Farkas, A. (2013): Emergence characteristics of riverine dragonflies (Odonata: Gomphidae). PhD thesis, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary: 170 pp. (in Hungarian, with English summary) ["Emergence characteristics of riverine dragonflies (Odonata: Gomphidae) were studied in details on the basis of the systematic collections of exuviae along Hungarian rivers. Our aims were to find out the species composition, abundance, phenology, emergence pattern, sex ratio at emergence, mortality during emergence as well as larval emergence behaviour of the riverine dragonflies at different sites. Systematic collections of exuviae were carried out during the whole emergence period in three years (2008, 2009 and 2011) at six different sites along the rivers Tisza, Szamos and Danube. At each sampling site exuviae were collected on standardised areas, 20 meter long stretches of the riverbanks. To study emergence behaviour, in the case of all exuviae found in situ, the distance travelled by the larvae from the water line to the emergence site and the type of the selected emergence support were recorded. Emergence behaviour was occasionally studied along the river Rába and several small watercourses too. To quantify the rates and the causes of mortality, dead and damaged specimens as well as dragonfly wings left behind by birds were collected and the causes of mortality were noted. In our study new data were given on the distribution and abundance of species. In the case of the Danube branches along the Szentendrei-sziget the co-occurrence of the four Hungarian gomphid species as well as data on the size of their populations were reported for the first time. Remarkable differences were found in species composition and abundances of gomphids between sites along the river Tisza, while the Tisza site upstream the mouth of the river Szamos and the Szamos site were similar. The Danube sites and the dammed Middle-Tisza site were similar in abundances but differed in species number. In this study we gave the first evidence of the negative influence of paving on the abundance of G. flavipes. The knowledge on the phenology of the studied species was supported by our new results. The described seasonal placement and separation of emergence periods of the studied species are most likely to be general in the rivers of the Carpathian basin. Our results support that the classification of species into 'spring' or 'summer' species based on the emergence pattern is not unambiguous in every case. Moreover, emergence pattern of a given species can be of either 'spring' or 'summer' type under different conditions. Up to date it was the first attempt to study the relationships between the daily numbers emerging and the actual water temperature and the actual water level in riverine dragonflies. In the former case positive, while in the latter case negative correlation was found. However, the influence of the two factors could not be clearly distinguished. Based on our results the temperature sums and the actual water temperatures jointly determine the onset of emergence, but it may also be influenced by the temperature sum during the whole period of larval development. In all studied species the protandry, which is thought to be typical of riverine dragonflies, was confirmed by our results. The sex ratio at emergence showed no consistent bias toward one sex, but varied between sites and years. In the two Gomphus species the sex ratio at emergence was correlated with the water temperature in the year preceding emergence. We concluded that the effect of water temperature can be mediated through cohort-splitting; temperature-dependent development of minor cohorts, including unequal proportions of males and females due to the faster development of male larvae, affects the sex ratio at emergence. The distance travelled by the larvae from the water line to the emergence site proved to be typical of the species, but was influenced by local factors (e.g. water level, slope of the riverbank). Long distance climbed by G. vulgatissimus larvae (in which it takes a long time to complete the emergence) may reduce the risk of being washed away by rapid floods during emerging. Furthermore, the scattering of the specimens in a larger area may also decrease the risk of predation. In this study the gomphid larvae were not found to choose a given type of support in higher ratio than the other ones. Support-selection for emergence was dependent on the ratio of available structures within the distance the larvae crawled from the water line to the emergence site. Thus, not the type but the appropriate distance from the water line of the substrate is substantial for emergence. The mortality rate remarkably differed between the two Gomphus species, such as the factors contributing to mortality. The difference may be in association with the population size and the emergence strategy: mortality rate is higher in populations of individuals emerging in larger numbers close to the water line in a rather narrow stretch (G. flavipes), while mortality rate is lower in populations of individuals emerging in small numbers far from the water line and being scattered in a larger area (G. vulgatissimus). Higher mortality in dense populations is mainly attributed to higher predation pressure; on the other hand individuals emerging close to the water line suffer higher mortality caused by artificial waves. The latter should be considered as an important factor in point of view of nature protection." (Author)] Address: Farkas, Anna, Dept Hydrobiology, Centre of Arts, Humanities & Sciences, Faculty of Science & Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

21345. Nirschl, R. (2013): Erythrodiplax fervida (Red-mantled Dragonlet), a new species for the United States. Argia 25(1): 9- (in English) [First record for USA; 18-XII-2012, National Butterfly Center in Mission, Texas. Hidalgo County] Address: Rick Nirschl. Email: ricknir@hotmail.com

Pinto, A.P. (2013): Análise cladística de Sympetrinae Tillyard, 1917 com énfase no grupo de armadura femoral especializada: os géneros de 'Erythemismorpha' (Insecta: Odonata: Libellulidae) - A cladistics analysis of Sympetrinae Tillyard, 1917 with an emphasis in the group of specialized femoral armature: the genera of 'Erythemismorpha' (Insecta: Odonata: Libellulidae). PhD. thesis, Instituto de Biociéncias da Universidade de Sao Paulo. Departamento de Zoología: 187 pp. (in Portuguese, with English summary) ["Libellulidae comprises the largest family of Anisoptera with more than a thousand of species and one of the most abundant among dragonflies' families. Die investigations of its phylogenetic pattern of relationships, especially among their genera have been shown complex, with widely divergent hypotheses, and considered tricky. A first cladistic analysis of 'Sympetrinae' based on 171 characters from adults morphology, with an emphasis on the 'aimed leg group'

(Erythemismorpha) including the genera Acisoma, Carajathemis, Cyanothemis, Erythemis, Poipax, Rhodopygia, Rhodothemis and Viiidithemis is presented here. Representatives of almost all Libellulidae subfamilies, as well as all genera of 'Sympetrinae' were also included, summing up a total of 69 terminal taxa. Diis broad sampling aimed to provide a strong test to hypothesis of monophyly of Erythemismorpha and identify monophyletic groups in 'Sympetrinae'. Two different analyzes were performed, each Fitch and Sankoff parsimony, both with distinct weighting schemes. The Sankoff parsimony was adopted to minimize the influence of 'gaps' on the results, but proved be inappropriate for to obtain stability indexes with resampling techniques, due to the high cost of computational requirements. Erythemismorpha was shown be monophyletic and further than to those genera previously cited, also includes, at least Erythrodiplax castanea. The genera Acisoma, Rhodothemis, and Rhodopygia were has each their hypotheses of monophyly also supported by the analyses performed here, however Erythemis showed be paraphyletic in almost all trees contradicting previous results. Almost all of the internal nodes of Erythemismorpha are inconclusive, however Cyanothemis + Poipax, as well as Carajathemis + Rhodopygia presents both high support. The entire composition of Erythemismorpha still open, pending the inclusion of other data sources. Also was discussed the misconceptions about homoplasy and its implications on venational characters of Anisoptera dragonflies. Is advocated the already discussed prevalence of pattern over process in cladistics paradigm. Homoplasy in cladistics is an error, more precisely an error of establishment of homologues (primary homology), thus convergence, reversal and similar terms are process tied ad hoc hypotheses over a pattern of inclusive hierarchy and not is concrete neither observable in real world." (Author)] Address: Pinto, A.P., Laboratório de Biologia e Sistemática de Odonata (LABIOSIS), Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/n, São Cristóvão 20940–040 Rio de Janeiro-RJ, Brazil. Email: odonata_angelo@hotmail.com

21346. Torralba Burrial, A.; Ocharan L.F.J.; Anadón Alvarez, M.A. (2013): La subcolección de Odonatos (BOS-Odo) de la Universidad de Oviedo: transfiriendo a la sociedad los datos del patrimonio natural albergado. XV Congresso Ibérico de Entomologia - Universidad de Oviedo: 78- (in Spanish) [Verbatim: Biodiversity collections, whether of arthropods, other animals or herbaria, whether public or private, contain important data on the present and past distribution of these representatives of our natural heritage. Although the dissemination of said data is common in the form of publications or specific reports, the truth is that systems are needed that allow this knowledge to be transmitted quickly and easily to meet the needs of natural environment managers from public administrations, environmental service companies, the rest of the scientific community and society in general. In this sense, the dissemination of these biodiversity data stored through databases accessible on the Internet greatly facilitates this transfer of knowledge. It is precisely within the framework of the Global Biodiversity International Facility (GBIF), a set of interconnected and coherent international databases, that most of the Odonata subcollection (BOS-Odo) of the Collection of Arthropods of the Department of Biology of Organisms and Systems of the University of Oviedo, through projects of the National R&D Plan (MICINN-08-CGL2008-04614-E, PTA2010-4108-I) and co-financing PCTI Asturias (COF11- 38). In addition to facilitating access from the GBIF national and international portals to the biodiversity data associated with the subcollection (more than 15,000 records), a web page has been developed that frames and puts the data of the BOS-Odo subcollection into perspective, facilitating its consultation individually by species or as a whole, in the same way that it compiles the publications in which funds housed in the subcollection have been treated or used. (Authors/-Google translate)] Address: Torralba Burrial, A., Departamento de Ciencias de la Educación e Instituto de Recursos Naturales y Ordenación del Territorio (Indurot) – Univ. de Oviedo, Spain. Email: torralbaantonio@uniovi.es

2014

21347. AK Libellen NRW; Conze, K.-J.; Joest, R. (2014): Die Grüne Flussjungfer etabliert sich wieder in NRW. Ergebnisse einer gezielten Suche nach der Grünen Flussjungfer (Ophiogomphus cecilia) an der Lippe im Kreis Soest. Natur in NRW 1/13: 28-31. In German [In recent years, there have been increasing numbers of observations of the O. cecilia in NRW, which had disappeared here for a long time. This is also of particular interest as it is given special protection under Appendix IV of the Habitats Directive and is one of the planning-relevant species in NRW. Due to its habitat requirements, including greater flow diversity, it is considered a good indicator of near-natural watercourses. After individual finds in previous years, a targeted search for the species was carried out on the Lippe in the district of Soest in the summer of 2012. As a result, there is a total of twenty records of one to five individuals, distributed over a 27 km stretch along the Lippe. Most of the finds come from the more intensively examined renatured Lippe sections. The current data situation suggests that the green river maiden will become firmly established again in NRW in the next few years. This development should be pursued further by means of a targeted search. Instructions are given for this. A new designation of special protection areas does not seem necessary at the moment, but planning measures should also be coordinated with their habitat requirements if necessary. Overall, the species benefits from the improvements made as part of the implementation of the Water Framework Directive and above all from the renaturation of floodplains on larger bodies of water in the state.“ (Authors/Google translate)] Address: AK Libellen NRW c/o K.-J. Conze, Listerstr. 13, 45147 Essen, Germany. E-Mail: kjc@loekplan.de

21348. Hämäläinen, M.; Marinov, M. (2014): Hivaagrion nom. nov., a replacement name for the preoccupied genus-group name Bedfordia Mumford, 1942 (Odonata: Coenagrionidae). Notulae odonatologicae 8(4): 112-116. (in English) ["A replacement name Hivaagrion nom. nov. is introduced for the damselfly genus Bedfordia Mumford, 1942, which is preoccupied by the name Bedfordia Fahrenholz, 1936 in Phthiraptera. The type species of Hivaagrion is Bedfordia halecarpenteri Mumford, 1942." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

21349. Horvath, G.; Csabai, Z. (2014): Polarization vision of aquatic insects. Polarized light and polarization vision in animal sciences (2014): 113-145. (in English) ["In this chapter we show that primary aquatic insects fly predominantly in mid-morning, and/or around noon and/or at nightfall. We describe the different types of their diurnal flight activity rhythm characterised by peaks at low and/or high solar elevations. We present here experimental evidence that the polarization visibility Q(0) of water surfaces is always maximal at the lowest (dawn and dusk) and highest (noon)

angles of solar elevation 6 for dark waters, while Q(Ø) is maximal at dawn and dusk (low solar elevations) for bright waters both under clear and partly cloudy skies. The ^-dependent reflection-polarization patterns, combined with an appropriate air temperature, clearly explain why polarotactic aquatic insects disperse to new habitats in mid-morning, and/or around noon and/or at dusk. This phenomenon is called the “polarization sundial” of dispersing aquatic insects. We also show that non-biting midges (Chironomidae. Diptera) are positively polarotactic and like many other aquatic insects, their females are attracted to horizontally polarized light. We present here measured thresholds (i.e., the minimum degrees of linear polarization of reflected light that can elicit positive polarotaxis) of the ventral polarization sensitivity in mayflies, dragonflies and tabanid flies. The mayflies Palingenia longicauda swarm exclusively over the river surface; thus, they need not search for water. It could be assumed that this species is not polarotactic. We show here that also P. longicauda has positive polarotaxis, which, however, can be observed only when the animals are displaced from the water and then released above artificial test surfaces. P. longicauda is the first species in which polarotactic water detection was demonstrated albeit it never leaves the water surface, and thus, a polarotactic water detection seems unnecessary for it. The yellow fever mosquito, Aedes aegypti, has been thought to locate its breeding habitats exclusively by chemical cues. We demonstrate here that horizontally polarized light can also attract ovipositing /4<*. aegypti females when they are deprived of chemical cues. Aedes aegypti is the first known water-associated species in which polarotaxis exists, but does not play a dominant role in locating water bodies and can be constrained in the presence of chemical cues. Finally, we deal with the negative polarotaxis in the desert locust. Schistocerca gregaria, the ventral eye region of which detects the horizontally polarized water-reflected light, and thus can navigate towards or away from large water surfaces." (Authors)] Address: Horvath, G., Environmental Optics Laboratory, Dept Biological Physics, Physical Institute, Eötvös Univ., Pázmány sétány 1, 1117 Budapest, Hungary. Email: gh@arago.elte.hu

21350. Khandozhivska, A.; Krazhan, S.; Mruk, A.; Koba, S. (2014): Diet of European grayling (Thymallus thymallus) from rivers of Zakarpattia in current conditions. Fisheries science of Ukraine 2/2014: 22-30. (in Ukrainian, with Russian and English summaries) ["Goal. To determine the feeding spectrum, qualitative and quantitative composition of the food lump of different age groups (2+, 1+, 0+) of T. thymallus of the Teresva and Tereblya rivers of the Transcarpathian region. Method. Primary material in the amount of 28 specimens of European grayling of different ages were collected during fieldwork on Transcarpathian rivers with the assistance of "Zakarpatderzhrybohorona". Fish were removed from poaching nets and fixed in 10% formalin solution. Processing of the recorded material was carried out in laboratory conditions according to generally accepted methods. The results. The nutrition of different age groups (2+, 1+, 0+) of the European grayling of the Teresva and Tereblya rivers of the Transcarpathian region was studied. It has been established that grayling consumes, mainly, bottom invertebrates, giving preference to amphibious organisms of the Insecta class. Organisms of the genera Diptera, Trichoptera, Plecoptera, Coleoptera, Ephemeroptera, Odonata, Amphipoda were common in the feeding of three-, two- and one-year-old grayling. The index of stomach filling in this yearling grayling with an average weight of 12.3 ± 0.72 g was on average 384.54 ± 114.01‰, in two-year-olds with an average weight of 29.53 ± 2.14 g – 177.75 ± 16.41% oo, three-year-olds with an average weight of 91.4 ± 11.42 g - 168.49 ± 25.44 ‰. Scientific novelty. Information on the feeding of European grayling in the rivers of Transcarpathia in modern conditions is fragmentary and insufficiently studied, since the indicated fish species is included in the Red Book of Ukraine, which limits the obtaining of material for research. Practical significance. The obtained data will make it possible to scientifically determine the extent of introduction of young European grayling into the Transcarpathian rivers in order to preserve and replenish its natural populations. Key words: European grayling, nutrition, stomach filling index, Transcarpathian rivers." (Authors/Google translate)] Address: Khandozhivska, Anna, Institute of Fisheries of NAAS, Kyiv, Ukraine. Email: anna-nyrka@mail.ru

21351. Le Dû, P.; Lesparre, D. (2014): Guide Atlas des libellules des Côtes d’Armor. VivArmor Nature, Côtes d’Armor: 98 pp. (in French) [France, Brittany, Département Côtes d’Armor. 57 naturalists contributed to this inventory of odonates bringing together 10,514 data resulting in the records of 50 odonate species.] Address: https://bretagne-environnement.fr/libellules-cotes-darmor-guide-atlas-odonates

21352. Noskovi, J.; Rakovska, A.; Porhajasova, J.; Ceryova, T. (2014): Agroecosystems and their effects on the structure of benthic invertebrate communities in the Nature Reserve alluvium Zitavy. Research Journal of Agricultural Science 46(2): 249-257. (in English) ["Agricultural activity permanently affected ecosystems - agroecosystems are particularly in terms of ensuring of nutrition for human society, very important functional units of the biosphere. Represent economically important organisms and their environment. Very often are surrounded by natural ecosystems, which are usually very closely linked. Although their relationship is two-sided, agroecosystems can induce not only reduce the heterogeneity of the country but also may affect the biodiversity of the surrounding terrestrial and aquatic habitats. In order to assess the impact of agricultural activities on the water quality characteristics, as well as on the biodiversity and the structure of communities of aquatic organisms, we carried out sampling of water from six sampling sites at regular quarterly intervals, 24 water samples was collected, in the year 2007 in the Nature reserve Alluvium Zitavy located in the southwestern part of Slovak Republic, in the geomorphologic unit of Podunajska rovina. As the basic biological material we used organisms of macrozoobenthos living at the bottom of the aquatic habitats. This group of individuals is an important indicator of water quality, based on their species and numerical representation can be evaluated the water quality of monitored biotopes. Analysis of samples of water we obtained 9920 individuals, deterministic as 110 species of fourteen systematic groups of invertebrates. Of them, the largest proportion in the structure of benthic macrozoobenthos had Gastropoda (24.01%), Isopoda (13.47%), Ephemeroptera (10.60%), Heteroptera (9.33%), Coleoptera (8.49%), individuals of family Chironomidae (8.25%) and Diptera (7,40%). The species with the smallest proportion in the structure of zoobenthos of monitored wetlands (ranging from 1.61% to 4.32%) included representatives of systematic groups Turbellaria, Odonata, Hirudinea, Trichoptera, Amphipoda, Bivalvia and Oligochaeta. The most of species that formed monitored community of aquatic organisms belongs to the good indicators of water quality. Therefore, not only based on the structure of community of macrozoobenthos but also based on the calculated saprobic index (Si), the water which is used by this community as their habitat corresponds to β-mezosaprobic zone, slightly polluted water. Between sampling sites the significant differences in

the quality and purity of water was recorded, even not only in the numerous represented of benthic fauna. Some differences in representation of species were observed, because each of the representatives of zoobenthos has different requirements for water quality characteristics. Despite this, agriculture fertilizer application, spillage of the oil substances and their floating could result in deterioration of water quality of monitoring wetlands and thus the structure and biodiversity of benthic invertebrates." (Authors)] Address: Noskovi, J., Department of Environmental Science & Zoology, Faculty of Agrobiology & Food Resouces, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra, Slovak republic. E-mail: Jaroslav.Noskovic@uniag.sk

21353. Philippov, D.A.; Pestov, S.V. (2014): Preliminary checklist of insects of mire biotopes of the Vologda Region. Instorfa Proceedings 10(63): 3-19. (in Russian, with English summary) ["The paper presents current knowledge on insects of mires of the Vologda Region (Russia). Based on the analysis of the published materials preliminary checklist of insects related to mire biotopes was established. In total 334 species from 220 genera, 74 families, 12 orders: … Odonata (18, 11, 7)… (Authors) The following odonate taxa are documented: Aeshna cyanea, A. grandis, A. juncea, A. subarctica, Coenagrion hastulatum, Enallagma cyathigerum, Cordulegaster boltonii, Cordulia aenea, Somatochlora flavomaculata, Gomphus vulgatissimus, Lestes dryas, L. sponsa, Leucorrhinia dubia, L. rubicunda, Libellula depressa, L. quadrimaculata, Sympetrum danae, S. flaveolum] Address: Pestov S.V., Animal Ecology, Dept of Institute of Biology of Komi Science, Centre of Ural Branch of the Russian Academy of Sciences. 167982, Syktyvkar, Kommunisticheskaya, 28, Russia: Email: pestov@ib.komisc.ru

21354. Sacha, D.; David, S.; Waldhauser, M.; Buczynski, P.; Tonczyk, G.; Juchiewicz, M.M.; Martynov, A.V.; Heltai, M.G.; Manci, C.O.; Jovic, M. (2014): Draft Red List of dragonflies (Odonata) of the Carpathians. In: Kadlecik, J. (Ed.) Carpathian Red List of Forest Habitats and Species, Carpathian List of Invasive Species (Draft). The State Nature Conservancy of the Slovak Republic, 234 pp: 172-185. (in English) ["There are 78 species of dragonflies ever reported from the Carpathians in total. Among them, two species are represented by dubious historical data only; no specimens exist which would confirm the identification. Four species are identified correctly and there is a material proving the identification, however they are vagrants or occasional occurrences (blown by the wind etc.) only and therefore cannot be considered permanent members of the Carpathian fauna. The rest 72 species are proven to have bree ding populations in the region. Since Carpathians are a very diverse bioregion in terms of their north-south extent and altitude levels, the dragonfly fauna constitutes mainly of Eurasian elements, accompanied by a fair proportion of thermophilous (Mediterranean) and boreo-mountainous elements. Most species are stagnicolous, whereas rheophilous species represent only a minority. With respect to quality of data, there is a bit inconsistency in-between the individual countries. Whereas countries in the north of the range (PL, CZ, SK, HU) have relatively good and ample datasets, countries in the south and east (UA, RO, RS) show deÞ cit of knowledge or even locally profound lack of data. This fact showed up most visibly in Serbia, where the species have been classified either LC, or DD, nd no other categories came to use. There also seems to be some variability in interpretation of the IUCN methodology among individual experts, resulting in a rather different classification of the same species in the individual countries, that cannot be always and fully explained only by differences of the species populations, trends, areas etc. Taking all this information into account, the submitted list can only be considered the very Þ rst version of the Carpathian Red List of Dragonflies. A lot of effort still has to be put into research, statistical analysis and providing and maintaining consistent set of data before the Red List, strictly following the IUCN rules, can be compiled. Overview of the status of dragonflies of the Carpathians is in Table 1." (Authors)] Address: Šácha, D., Podtatranského 31, SK – 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

21355. Voronova, N.V.; Vershinina, V.Y. (2014): The fauna of dragonflies on Khortytsia Island. Current issues of biology, ecology and chemistry 7(1): 5-15. (in Ukrainian, with Russian and English summaries) [Ukraine, Zaporizhzhya region. The following species were recorded: Calopteryx splendens, Lestes sponsa, Ischnura elegans, Coenagrion pulchellum, Orthetrum cancellatum, Aeshna mixta, A. juncea, Libellula depressa, Sympetrum vulgatum, S. sanguineum.] Address: Voronova N.V., Zaporizhzhya National Univ., 69600, Zaporizhzhya, Zhukovskogo Str. 66, Ukraine

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21356. Frati, F.; Piersanti, S.; Rebora, M.; Salerno, G. (2016): Volatile cues can drive the oviposition behavior in Odonata. Journal of Insect Physiology 91-92: 34-38. (in English) ["Highlights: •The role of olfactory cues during oviposition in Odonata is overlooked. •The use of olfaction in oviposition by I. elegans was tested in choice assays. •elegans prefers to oviposit in larval rearing water than in distilled water. •Female EAG response was stimulated by rearing water. •elegans may rely on conspecific or food odour for oviposition site selection. Abstract: Selection for the oviposition site represents the criterion for the behavioural process of habitat selection for the next generation. It is well known that in Odonata the most general cues are detected visually, but laboratory investigations on the coenagrionid Ischnura elegans showed through behavioural and electrophysiological assays that adults were attracted by olfactory cues emitted by prey and that males of the same species are attracted by female odor. The results of the present behavioural and electrophysiological investigations on I. elegans suggest the involvement of antennal olfactory sensilla in oviposition behaviour. In particular, I. elegans females laid in the laboratory significantly more eggs in water from larval rearing aquaria than in distilled or tap water. Moreover, the lack of preference between rearing water and tap water with plankton suggests a role of volatiles related to conspecific and plankton presence in the oviposition site choice. I. elegans may rely on food odour for oviposition site selection, thus supporting the predictions of the “mother knows best” theory. These behavioural data are partially supported by electroantennographic responses. These findings confirm a possible role of olfaction in crucial aspects of Odonata biology." (Authors)] Address: Piersanti, Silvana, Dipto di Chimica, Biologia e Biotecnologie, Univ. of Perugia, Via Elce di Sotto, 06123 Perugia, Italy. E-mail: silvanapiersanti@tiscali.it

21357. Futahashi, R. (2016): Color vision and color formation in dragonflies. Current Opinion in Insect Science 17: 32-39. (in English) ["Highlights: •Dragonflies have a remarkable number of opsin genes. •Opsin genes are differentially expressed between stages and regions in dragonflies. •Multilayer structure is widely detected among iridescent coloured dragonflies. •Wrinkles or wax crystals enhances multilayer structural colour in some dragonflies. •Colour change

in red dragonflies is regulated by redox states of ommochrome pigments. Dragonflies including damselflies are colourful and large-eyed insects, which show remarkable sexual dimorphism, colour transition, and color polymorphism. Recent comprehensive visual transcriptomics has unveiled an extraordinary diversity of opsin genes within the lineage of dragonflies. These opsin genes are differentially expressed between aquatic larvae and terrestrial adults, as well as between dorsal and ventral regions of adult compound eyes. Recent topics of colour formation in dragonflies are also outlined. Non-iridescent blue colour is caused by coherent light scattering from the quasiordered nanostructures, whereas iridescent colour is produced by multilayer structures. Wrinkles or wax crystals sometimes enhances multilayer structural colours. Sex-specific and stage-specific colour differences in red dragonflies is attributed to redox states of ommochrome pigments." (Author)] Address: Futahashi, R., Bioproduction Res. Institute, Nat. Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566, Japan. E-mail: ryo-futahashi@aist.go.jp

21358. Ichter, J.; Krieg-Jacquier, R.; de Knijf, G. (2016): The dragonfly fauna of the Aude department (France): contribution of the ECOO 2014 post-congress field trip. Martinia 32(1): 9-24. (in English, with French summary) ["After the third European Congress of Odonatology (ECOO) which took place from 11 to 17 July in Montpellier (France), 21 odonatologists from six countries participated in the week-long field trip that was organised in the Aude department. This area was chosen as it is undersurveyed and offered the participants the possibility to discover the Languedoc-Roussillon region and the dragonfly fauna of southern France. In summary, 43 sites were investigated involving 385 records and 45 dragonfly species. These records could be added to the regional database. No less than five species mentioned in the Habitats Directive (Coenagrion mercuriale, Gomphus flavipes, G. graslinii, Macromia splendens and Oxygastra curtisii) and three regionally important species (G. simillimus, Onychogomphus uncatus and Cordulegaster bidentata) could be observed and are discussed. Several populations of these species were discovered: G. graslinii and M. splendens, considered as very rare prior to our investigations, were especially found in the western Corbières and in the middle course of the Aude River. Furthermore many new populations of Oxygastra curtisii were detected. A small population of C. mercuriale was found in a drainage ditch in a peat land in the Montagne Noire at 850 m a.s.l, in the northern Aude. One of the most remarkable observations was the finding of an exuvia of G. flavipes along the Aude River, ca 30 km to the west from the hitherto only record of this species for the department, proving the extension of the range of this species to the southwest. Range extension was also highlighted for Trithemis annulata, another increasing species in Europe." (Authors)] Address: Ichter, J., 11, rue Michelet, F-94200 Ivry-sur-Seine, France. E-mail: jean.ichter@gmail.com

21359. Ilg, C.; Oertli, B. (2016): Effectiveness of amphibians as biodiversity surrogates in pond conservation. Conservation Biology 31(2): 437-445. (in English, with Spanish summary) ["Amphibian decline has led to worldwide conservation efforts, including the identification and designation of sites for their protection. These sites could also potentially play an important role in the conservation of other freshwater taxa. We assessed the effectiveness of amphibians as surrogate for a selection of four taxonomic groups representative of the same freshwater habitats (dragonflies, aquatic beetles, aquatic gastropods and aquatic plants), in 89 ponds located in Switzerland, all characterized by their high value for amphibian conservation. We tested whether these ponds could also contribute to the conservation of other taxonomic groups. Amphibians showed a weak congruency with the other taxonomic groups for the three metrics of biodiversity assessed: species richness, conservation value and community composition. Paired comparisons for the five groups considered also showed that, for each metric, amphibians presented the lowest degree of congruence. These results imply that site designation for amphibian conservation do not necessarily provide protection for freshwater biodiversity as a whole. In order to provide adequate protection for freshwater species, we recommend that rather than using only amphibians as a surrogate group for site designation, other taxonomic groups should also be taken into account in the prioritization and site designation process." (Authors)] Address: Ilg, Christiane, Univ. Applied Sciences & Arts Western Switzerland, Hepia Geneva Technology, Architecture & Landscape, Jussy-Geneva, Switzerland. E-mail christiane.ilg-@hesge.ch

21360. Martins, F.A (2016): Determinants of odonata diversity in Brazil: a multi-scale approach. Tese (Doutorado em Ecologia e Evolução), Instituto de Ciências Biológicas, Universidade Federal de Goiás, Goiâni: 176 pp. (in Portuguese, with English summary) ["The interactions between the organisms and their physical environment and among the organisms themselves occur at definite spatial scales, and give rise to spatial patterns that may be assessed to a better understanding of these relationships. Thus, in order to understand the variation in species diversity, it is necessary to link the scale in which the variation is measured to the scale in which the processes operate. The main objective of this work is thus to identify the factors that best explain the diversity of dragonflies' tropical assemblages and determine how they interact across scales. The work is based on the Community Assembly conceptual framework that relies on the idea that community assembly is affected by spatial processes hierarchically arranged. Dragonflies are good models because they comprise two distinct groups of species regarding to body size, thermoregulatory responses and dispersal ability. Due to their ecological differences, they may respond differently to local as well as to regional environmental conditions. Despite of their ecological differences, our results suggest that richness patterns for both groups are affected by the same factors, i.e., they respond in a similar fashion to the analysed factors. In regional scales, environmental filters, such as temperature seasonality, affect species richness. The abundance is the main predictor of local species richness. Nevertheless, the assemblages' compositional patterns are different. Comparatively, Zygoptera (low-dispersal group) assemblages are more affected by local scale processes than Anisoptera. Our results suggest a better integration of metacommunity theory (focused on the role of dispersal shaping different spatial dynamics in the assemblages) and community assembly theory. The fact that the dispersal processes is more important at smaller scales indicate the potential importance of occupancy dynamics at this scale, calling for explicitly incorporating dispersal, affecting the spatial dynamics at different spatial scales. Furthermore, our results suggest that rather than being mutually exclusive, neutral and deterministic processes acts jointly on community assembly." (Author)] Address: Martins, F.A., Lab. de Ecologia Comportamental e Interações, Inst. Biologia, Univde Federal de Uberlândia, Rua Ceará, s/nº Bloco 2D - Campus Umuarama, 38400-902, Uberlândia, MG - Brasil - Caixa Postal: 593. E-mail: fernandaalvesmartins@yahoo.com.br

21361. Pereira Martínez, J.M.; Otero, J.C. (2016): Nuevo registro del caballito del diablo protegido Coenagrion scitulum (Rambur, 1842) (Odonata, Coenagrionidae) en la Comunidad de Cantabria (España). Boln. Asoc. esp. Ent. 40(3-4): 507-510. (in Spanish, with English title) ["On June 8, 2016, a population of C. scitulum was located in the "Elsedo Palace" (huso 30, 435442E-4800812N, Cantabria). This new finding is of great interest since it is the second Cantabrian locality known to date with the presence of the species." (Authors)] Address: Pereira Martínez, J.M., Deparo de Zoología y Antropología Física. Facultad de Biología. Univ. de Santiago de Compostela (USC), A Coruña, Spain Email: josse33@hotmail.es

21362. Rajabi, H.; Ghoroubi, N.; Malaki, M.; Darvizeh, A.; Gorb, S.N. (2016): Basal complex and basal venation of Odonata wings: Structural diversity and potential role in the wing deformation. PLoS ONE 11(8): e0160610. doi: 10.1371-/journal.pone.0160610: 17 pp. (in English) ["Odonata are known to be excellent fliers with versatile flight capabilities. The ability to fly over a wide range of speeds, high manoeuvrability and great agility are a few characteristics of their flight. The architecture of the wings and their structural elements have been found to play a major role in this regard. However, the precise influence of individual wing components on the flight performance of these insects remains unknown. The design of the wing basis (so called basal complex) and the venation of this part are responsible for particular deformability and specific shape of the wing blade. However, the wing bases are rather different in representatives of different odonate groups. This presumably reflects the dimensions of the wings on one hand, and different flight characteristics on the other hand. In this article, we develop the first three-dimensional (3D) finite element (FE) models of the proximal part of the wings of typical representatives of five dragonflies and damselflies families. Using a combination of the basic material properties of insect cuticle, a linear elastic material model and a nonlinear geometric analysis, we simulate the mechanical behaviour of the wing bases. The results reveal that although both the basal venation and the basal complex influence the structural stiffness of the wings, it is only the latter which significantly affects their deformation patterns. The use of numerical simulations enabled us to address the role of various wing components such as the arculus, discoidal cell and triangle on the camber formation in flight. Our study further provides a detailed representation of the stress concentration in the models. The numerical analysis presented in this study is not only of importance for understanding structure-function relationship of insect wings, but also might help to improve the design of the wings for biomimetic micro-air vehicles (MAVs)." (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology and Biomechanics, Kiel University, Kiel, Germany. E-mail: hrajabi@zoologie.uni-kiel.de

21363. Reynolds, A.M.; Reynolds, D.R.; Sane, S.P.; Hu, G.; Chapman, J.W. (2016): Orientation in high-flying migrant insects in relation to flows: mechanisms and strategies. Phil. Trans. R. Soc. B 371: 20150392: 12 pp. (in English) ["High-flying insect migrants have been shown to display sophisticated flight orientations that can, for example, maximize distance travelled by exploiting tailwinds, and reduce drift from seasonally optimal directions. Here, we provide a comprehensive overview of the theoretical and empirical evidence for the mechanisms underlying the selection and maintenance of the observed flight headings, and the detection of wind direction and speed, for insects flying hundreds of metres above the ground. Different mechanisms may be used — visual perception of the apparent ground movement or mechanosensory cues maintained by intrinsic features of the wind—depending on circumstances (e.g. day or night migrations). In addition to putative turbulence-induced velocity, acceleration and temperature cues, we present a new mathematical analysis which shows that 'jerks' (the time-derivative of accelerations) can provide indicators of wind direction at altitude. The adaptive benefits of the different orientation strategies are briefly discussed, and we place these newfindings for insects within a wider context by comparisons with the latest research on other flying and swimming organisms." (Authors)] Address: Chapman, J.W., Environment & Sustainability Inst., Univ. Exeter, Penryn, Cornwall TR10 9EZ, UK. E-mail: jason.chapman@rothamsted.ac.uk

21364. Shanku, A.G. (2016): Insights Into evolution and adaptation using computational methods and next generation sequencing. Ph.D., Rutgers, The State University of New Jersey: xxxiv, 244 pp. (in English) ["Historically, much of the research in evolutionary biology and population genetics has involved analysis at the level of either a single locus or a few number thereof. However, Next Generation sequencing technology has opened the floodgates with respect to both the sheer volume and quality of sequence data that researchers have long needed to address and answer long-standing questions in their fields. Scientists are now, by and large, no longer hampered in their efforts by technological hurdles to obtain data, but are in fact facing the problem of how best to use the vast amount of data that are accumulating at an ever-increasing rate. This is a good problem to have. The following research described in this dissertation is an attempt to derive answers to questions in the fields of population genetics and evolutionary biology that, until recently, have been either intractable or, at best, extremely difficult to address. In the first chapter I provide an introduction and a brief historical look at the research efforts that have proceeded my own. In the second chapter I describe how modern sequencing methods and computational analysis can be used to study, analyze, and answer evolutionary questions about the non-model organism, Enallagma hageni, in order to 1) determine this organism's phylogenetic position within Arthropoda, 2) provide answers and insight into the evolutionary history of the protein-encoding genes in the Enallagma transcriptome, and 3) give functional annotation to these expressed proteins. In the third chapter I examine how natural selection acts on the genome and derive a method that can accurately determine the evolutionary cause of nucleotide fixations, having occurred either through positive selection or neutral processes. I then apply the methodology to North American populations of Drosophila melanogaster, providing further evidence as to how adaptive evolution proceeds in a newly established population. This is an important question, for though there have been multiple approaches devised to determine the targets and modes of evolution in the genome, to date there has not emerged a definitive method which can determine both the location and type of a selective process, and as a result, the picture of how and where adaptive evolution proceeds in the genome has remained opaque. In the forth chapter I examine how levels of natural selection within the genome have the potential to inhibit the ability to accurately learn population demographic history. Using a number of modern algorithms and extensive simulations, I first examine whether or not demographic histories that are learned under simple biological assumptions will yield accurate results when the actual data itself does not adhere to these assumptions. Further, I go on to examine more complicated models of demographic history, looking specifically at how

positive selection biases inference, which directions these biases occur, and at what levels of selection do inference methods fail to be robust. Finally, I describe potential evolutionary scenarios where these inference methods may be more prone to fail, as well as methods which might mitigate positive selection's effects, thus allowing for more accurate histories to be inferred. The work contained in this dissertation, at the broadest scale, is an effort to marry state-of-the-art techniques in statistics, computer science, and machine learning algorithms to the technological advances of next generation sequencing; the potent combination of these technologies has provided a means with which to derive answers to multiple, long-standing questions in population genetics and evolutionary biology." (Author)] Address: unknown

21365. Slim, M.; Zouaki, N.; Lougraimzi, H.; Elghali, L.; Zidane, L.; Fadli, M. (2016): Diversity, composition and systematic structure of the terrestrial entomofauna of a Ramsar site: The biological reserve of Sidi Boughaba, Mehdia (Morocco). Journal of Entomology and Zoology Studies 4(4): 975-982. (in English) ["The region of Sidi Boughaba which is an important biological reserve (Northwest of Mehdia, Morocco) offers a favorable conditions for the development of diversity of the wildlife. It is characterized by a sub-humid bioclimate and a mild winter. The objective of the present study is to make an entomological inventory in five different areas of floristic cortege perspective (herbaceous, shrub) and other medium (soil, water). A statistical study was performed by environmental indices of composition and structure. Sampling was done from mid-April 2013 to December 2013. The analysis of the entomofauna revealed the existence of 73 species distributed in 7 systematic orders and 28 families. Beetles are represented by 19 species, Orthoptera by 13, Diptera by 12 species; Hemiptera, Hymenoptera and Lepidoptera are represented by 8 species for each; Odonata come in last place with 5 species [Anax parthenope, A. ephippiger, Orthetrum trinacria, Lestes virens, Ischnura graellsii]. Similarly, the results showed that the values of Shannon-Weaver diversity vary between 2.654 and 3.411 which express the diversity of the sampled population." (Authors)] Address: Slim, M., Lab. Nutrition, Health & Environ., Dept Biol., Fac. Sci., Univ. IbnTofail, Kenitra, Morocco

21366. Verzijden, M.N.; Svensson, E.I. (2016): Interspecific interactions and learning variability jointly drive geographic differences in mate preferences. Evolution 70(8): 1896-1903. (in English) ["Co-occurrence of closely related species can cause behavioral interference in mating and increase hybridization risk. Theoretically, this could lead to the evolution of more species-specific mate preferences and sexual signaling traits. Alternatively, females can learn to reject heterospecific males, to avoid male sexual interference from closely related species. Such learned mate discrimination could also affect conspecific mate preferences if females generalize from between species differences to prefer more species-specific mating signals. Female damselflies of Calopteryx splendens learn to reject heterospecific males of C. virgo through direct pre-mating interactions. These two species co-occur in a geographic mosaic of sympatric and microallopatric populations. Whereas C. virgo males have fully melanized wings, male C. splendens wings are partly melanized. We show that C. splendens females in sympatry with C. virgo prefer smaller male wing patches in conspecific males after learning to reject heterospecific males. In contrast, allopatric C. splendens females with experimentally induced experience with C. virgo males did not discriminate against larger male wing patches. Wing patch size might indicate conspecific male quality in allopatry. Co-occurrence with C. virgo therefore causes females to prefer conspecific male traits that are more species-specific, contributing to population divergence and geographic variation in female mate preferences." (Authors)] Address: Verzijden, Machteld, Aarhus Institute of Advanced Studies, Aarhus Univ. 8000 Aarhus, Denmark. Email: Machteldverzijden@aias.au.dk

2017

21367. Bastos, R.C. (2017): Implicações das condições ambientais de riachos e déficit Wallaceano sobre Odonata no Nordeste, Brasil. Universidade Federal do Maranhão: 37 pp, Annex. (in Portuguese, with English summary) ["Implications of the environmental conditions of streams and Wallaceano deficit on Odonata in Northeast Brazil: Alterations in land use resulting from anthropogenic actions modify biotic and abiotic conditions due to loss of environmental quality. This is worrying in regions where knowledge of biodiversity is derisory. Considering this scenario, the present study's objectives were to evaluate the effects of anthropogenic alteration on the integrity of stream habitat in the eastern region of Maranhão, Northeast Brazil (i); to verify how these stream conditions affect Odonata species (ii); and to evaluate the known distribution of the species recorded in this study and discuss knowledge gaps on Odonata (iii). A total of 269 specimens, represented by 17 genera and 30 species were collected. Of the 30 species collected, 17 are new records for the state of Maranhão; of these, 47.05% are geographically widespread species, occurring in practically all regions of Brazil. Considering the records in the literature, there was a 68% increase in the number of Odonata species known for Maranhão. In addition to demonstrating the alteration of stream environmental quality, our work contributes to reducing the Wallacean shortfall in a transition area between the Cerrado-Caatinga biomes, an area severely threatened by the advance of the region's agricultural frontier." (Author)] Address: Bastos, R.C., Graduate Program in Ecology, Federal Univde Federal do Pará, Rua Augusto Correia, Nº 1, Bairro Guamá, CEP: 66.075-110, Belém, Pará, Brazil. Email: bastosrc.bio@gmail.com

21368. Bode-Oke, A.T.; Zeyghami, S. Dong, H. (2017): Aerodynamics and flow features of a damselfly in takeoff flight. Bioinspiration & Biomimetics 12(5). 056006. doi: 10.1088/-1748-3190/aa7f52. PMID: 28699620.: (in English) ["Flight initiation is fundamental for survival, escape from predators and lifting payload from one place to another in biological fliers and can be broadly classified into jumping and non-jumping takeoffs. During jumping takeoffs, the legs generate most of the initial impulse. Whereas the wings generate most of the forces in non-jumping takeoffs, which are usually voluntary, slow, and stable. It is of great interest to understand how these non-jumping takeoffs occur and what strategies insects use to generate large amount of forces required for this highly demanding flight initiation mode. Here, for the first time, we report accurate wing and body kinematics measurements of a damselfly during a non-jumping takeoff. Furthermore, using a high fidelity computational fluid dynamics simulation, we identify the 3D flow features and compute the wing aerodynamics forces to unravel the key mechanisms responsible for generating large flight forces. Our numerical results show that a damselfly generates about three times its body weight during the first half-stroke for liftoff. In generating these forces, the wings flap through a steeply inclined stroke plane with respect to the horizon, slicing through the air at high angles of attack (45º-50º). Consequently, a Leading Edge Vortex (LEV) is formed during both the downstroke and upstroke on all the four wings. The formation of

the LEV, however, is inhibited in the subsequent upstrokes following takeoff. Accordingly, we observe a drastic reduction in the magnitude of the aerodynamic force, signifying the importance of LEV in augmenting force production. Our analysis also shows that forewing-hindwing interaction plays a favorable role in enhancing both lift and thrust production during takeoff." (Authors)] Address: Bode-Oke, A.T., Mechanical and Aerospace Engineering, University of Virginia, Charlottesville, VA 22903, USA

21369. Catling, P.M., Kostiuk, B.; Kuja, S.; Kuja, A. (2017): Migrations and unidirectional movements of dragonflies in northeastern North America. Toronto Entomoloists' Association, Occasional Publication: 69 pp. (in English) ["This guide addresses questions concerning dragonfly migration and movement in northeastern North America such as: (1) which dragonflies migrate? (2) when? (3) how can they be identified? (4) how many? (5) in what direction? and (6) under what conditions? It includes illustrations and information for: (1) 8 species of dragonflies known to be migratory including: Anax junius, Epiaeschna heros Libellula pulchella, L. semifasciata, Pantala flavescens, P. hymenaea, Tramea carolina, T. lacerata; (2) Other species for which unidirectional movements have been observed including: Aeshna constricta, A. eremita, A. interrupta lineata, Celithemis elisa, Pachydiplax longipennis, Sympetrum corruptum, S. rubicundulum, S. vicinum; and (3) Two species for which more information is needed including: Aeshna sitchensis, and Sympetrum danae. Information is provided for six excluded species. The term "migration" is used in the strict sense to refer to a regular and predictable mass movement of most members of a population in a particular direction from an emergence area to a reproductive area, followed by a return trip to the emergence area. The term "unidirectional movement" can be used for observations that do not quite fit the strict definition of migration. Sudden appearance of a species in the absence of a local adult population of that species is circumstantial evidence of migration. Migrations and other movements may occur to (1) to avoid mortality due to dry season or cold periods, (2) in response to a dense population, or (3) in response to parasites. Autumn migrations often follow the passage of a cold front (as in bird migration), and spring migrations have been associated with drought and long periods of winds from the south. The number of dragonfly individuals in a migration varies from less than a hundred to millions. Direction is partly governed by topography and coastlines but reorientation may occur in the presence of obstacles such as large bodies of open water. There are approx. 200 species of dragonflies in northeastern North America and 17 are reported to migrate or undertake unidirectional flights. Dragonflies make good environmental monitors because they inhabit both aquatic and terrestrial habitats, but monitoring migrations is particularly useful because they represent large areas. Migration may be of much greater ecological significance than is currently imagined and much remains to be understood." (Authors)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

21370. Kalogianni, E.; Vourka, A.; Karaouzas, I.; Vardakas, L.; Laschou, S.; Skoulikidis, N.T. (2017): Combined effects ofwater stress and pollution on macroinvertebrate and fish assemblages in a Mediterranean intermittent river. Science of the Total Environment 603–604: 639-650. (in English) ["Highlights: • The effects of multiple stressors on aquatic biota are still poorly understood. • Intermittent rivers are highly susceptible to chemical stress and water scarcity. • We compared biotic responses to different levels of water stress and pollution. • Combined stressors affect negatively macroinvertebrates and fish. • Future efforts should focus on untangling stressors interactions. Abstract: Water stress is a key stressor in Mediterranean intermittent rivers exacerbating the negative effects of other stressors, such as pollutants, with multiple effects on different river biota. The current study aimed to determine the response of macroinvertebrate and fish assemblages to in stream habitat and water chemistry, at the microhabitat scale and at different levels of water stress and pollution, in an intermittent Mediterranean river. Sampling was conducted at high and low summer discharge, at two consecutive years, and included four reaches that were targeted for their different levels of water stress and pollution. Overall, the macroinvertebrate fauna of Evrotas River indicated high resilience to intermittency, however, variation in community structure and composition occurred under acute water stress, due to habitat alteration and change in water physico-chemistry, i.e. water temperature increase. The combined effects of pollution and high water stress had, however, pronounced effects on species richness, abundance and community structure in the pollution impacted reach, where pollution sensitive taxa were almost extirpated. Fish response to drought, in reaches free of pollution, consisted of an increase in the abundance of the two small limnophilic species, coupled with their shift to faster flowing riffle habitats, and a reduction in the abundance of the larger, rheophilic species. In the pollution impacted reach, however, the combination of pollution and high water stress led to hypoxic conditions assumed to be the leading cause of the almost complete elimination of the fish assemblage. In contrast, the perennial Evrotas reaches with relatively stable physicochemical conditions, though affected hydrologically by drought, appear to function as refugia for fish during high water stress. When comparing the response of the two biotic groups to combined acute water stress and pollution, it is evident that macroinvertebrates were negatively impacted, but fish were virtually eliminated under the two combined stressors." (Authors) Taxa are treated at order level.] Address: Kalogianni, E., Institute of Inland Waters, Hellenic Centre for Marine Research, 46.7 km Athinon — Souniou Av., P.O. Box 712, 190 13 Anavissos, Greece. E-mail: ekalog@ath.hcmr.gr

21371. Katatani, N. (2017): Comparison of form of I. rapax (Rambur,1842) and Ictinogomphus pertinax (Selys, 1854), and distribution of these species. Aeschna 53: 1-10. (in Japanese, with English summary) ["Comparison of the forms of I. rapax (Rambur,1842) and I. pertinax (Selys,1854) and their distribution were investigated. The author compared the forms of individuals of I. pertinax from Laos, Vietnam, Hong Kong, Taiwan and Japan, and I. rapax from Bangladesh. As a result, both species can be divided by the difference in the penile shape, the difference in yellow spots on the metepimeron of thorax and the eighth segment of abdomen. I. pertinax is distributed only in Laos, Vietnam, China, Taiwan and Japan. In Laos and Vietnam, the boundary line of the distribution between I. pertinax and I. decoratus melaenops is thought to be along the Annan mountain range. On the other hand, according to the literature records, I. rapax is considered to be distributed in India, Sri Lanka, Bangladesh, Nepal, Myanmar and the northwest of Thailand." (Author)] Address: not stated

21372. Labat, F. (2017): A new method to estimate aquatic invertebrate diversity in French shallow lakes and ponds. Ecological Indicators 81: 401-408. (in English) ["Shallow lakes and ponds are valuable ecosystems for conservation

management. Aquatic invertebrates constitute a large proportion of diversity in these ecosystems, but their assessment is potentially time consuming and requires great expertise. The use of indicator taxa to estimate invertebrate diversity may resolve part of these difficulties. These indicators are rarely identified or their reliability is uncertain, i.e. they are based on partial inventories, neglecting groups with high diversity. In this study, invertebrate richness was assessed from 46 sites in France in various altitudinal, climatic, geological, human-impacted, and hydro-morphological contexts. Invertebrate identification was performed as accurately as possible in all taxonomic groups. Several potential indicators of diversity based on five key criteria were tested: strong direct correlation, identification facilities, strong cross-taxon congruence, low complementarity of the sampled habitats, and ubiquity for selected indicators. Three approaches were proposed to define these indicator groups: (1) a single taxonomic group as indicator, (2) a combination of targeted groups, and (3) a holistic inventory at low taxonomic resolution as a classical rapid assessment method for freshwater ecosystems. Results show that it is not recommended to use only one indicator group. The choice of several targeted groups could be a good intermediate solution but is not without bias. The rapid assessment inventory proposed is the most valuable method, and allows the estimation of invertebrate richness with a quasi-perfect correlation." (Author) Taxa are treated at order level.] Address: Labata, F., Research and Development Pole, Aquabio, rue Hector Guimard 63800 Cournon d'Auvergne, France. Email: frederic.labat@aquabio-conseil.fr.

21373. Leaute, J. (2017): Analyse de l'influence du paysage terrestre sur la composition des communautés d'Odonates de l'Indre-et-Loire. 2016-2017. Rapport de stage, Master 2 Mention Génie Ecologique, Université de Poitiers, U.F.R. Sciences Fondamentales et Appliquées: 51 pp. (in French, with English summary) ["This study takes its origins in the Od'Spot project, leaded by both Caudalis naturalistic association and the Research Institute for Insect Biology. This project includes the creation of an Odonata Atlas repartition in Indre-et-Loire department (France), and researches about this taxa's movements, landscapes' structure and territory occupancy. This study aims to: 1. Improve knowledges on links between Odonata and the terrestrial landscapes surrounding their home site, and highlight the interactions between the different landscapes components that have the greatest impact on these Damselflies' and Dragonflies' communities. 2. Suggest an analytic method that allows to use opportunistic data like Atlas's data, which are easy-to-collect and without constraints data. Results shows negative interactions between agricultural landscape (homogenous and heterogenous structure) and species richness under 800m radius near studied sites, and positive relationship of number of rivers on species richness under 400m. Effect of site quality on species richness is also found. Use of statistical models to analyse these non-protocoled data is successful, and could be improved by including some additional parameters like reproduction indicators." (Author)] Address: not stated

21374. van Grunsven, R.; De Knijf, G. (2017): Gaffellibel. Brachytron 19(2): 125-127. (in Dutch) ["Ophiogomphus cecilia recolonised the Netherlands but is now restricted to small rivers and does not occur in the river Meuse where it was found in the beginning of the last century." (Authors)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsven@vlinderstichting.nl

2018

21375. Chovanec, A. (2018): Libellenkundliche Untersuchungen am restrukturierten Unterlauf der Naarn (Oberösterreich) im Jahr 2018. im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Wasserwirtschaft: 46 pp. ["In 2018, the restructuring measures carried out between 2008 and 2016 on the 11.5 km long lower reaches of the Naarn were evaluated from a dragonfly perspective. The applied assessment approach is based on the length-zonal classification of the dragonflies according to biocenotic regions and on checking the occurrence of water body type-specific reference species (indicative and accompanying species). In accordance with the national water body management plan, the Naarn is assigned to the middle epipotamal water body (barbel region) in this area of the Bavarian-Austrian Alpine foothills bioregion, for which the following rheophilic and rheobiontic indicator species were defined as part of this study: Calopteryx splendens, Gomphus vulgatissimus, Onychogomphus forcipatus and Ophiogomphus cecilia. In addition, five first-order types of accompaniment and 18 second-order types of accompaniment were also defined. Eight test sections, each 100 m long, were mapped in five restructuring areas: Perg/Kickenau: 3 sections, Hauswiesen: 2, Naarn at the mouth of the Tobra Canal: 1, Labing/Kaindlau: 1 and mouth: 1. The number and selection of the routes were based on the type of hydraulic engineering design types realized and thus on the structural heterogeneity of the study areas. Another route was chosen in a regulated area of water (Haid). Between 10.5. and 29.8.2018 the nine routes were committed on five dates. The dragonfly ecological status of the investigation areas Hauswiesen, Naarn at the mouth of the Tobra Canal, Labing/Kaindlau and mouth was rated as "good", that of the Perg/Kickenau area as "very good", which proves the success of the measures. The radiation effect of the restructured areas led to a "good" dragonfly ecological status in the Haid area. The green river damsel, which is protected throughout Europe and listed in Annexes II and IV of the EU Fauna-Flora-Habitat Directive, was definitely or probably native to five of the six test sections located directly on the main channel of the Naarn. The results were also analyzed for each mapped habitat type: river: six stretches; side arm connected on two sides: one section, side arm connected on one side: one section; Bay: a stretch. The inspections of the investigation stretches located directly on the main channel (habitat type river) yielded the highest total number of species and the highest number of definitely and probably native species. Only in the bay habitat type were (possibly) native reference species sighted that were not observed on the river itself: Libellula depressa and Orthetrum albistylum. The creation of this habitat type is therefore a suitable measure to promote the accompanying limnophilic species. The side arm connected on two sides was the investigation section on which reliable native habitation of the common damsel damsel and the lesser pincer dragonfly was demonstrated in the Perg/Kickenau area. Calopteryx virgo is the indicator species of the hyporhithral and companion species of the epipotamal. The development of their abundances in the course of the entire lower reaches of the Naarn proves a rhithral aspect that reaches far into the lower reaches of the Naarn and thus a rhithral / potamal transitional character. The hydraulic rehabilitation measures in the Perg/Kickenau area were completed in 2016. The evidence of an exuvia of the common damsel damsel and a freshly hatched individual of the small pincer dragonfly on the tributary connected on both sides in the Perg/Kickenau area prove how quickly dragonflies ac-

cept newly created, suitable habitats. Both types have a development time of two to three years; This means that the area was already colonized by the two species in the year the construction work was completed and reproductive behavior took place. In addition to the specific ecological requirements, the rapid reaction of dragonflies to changed habitat conditions underpins their importance as indicators for typological characterization and for the assessment of the ecological status of water bodies." (Author/Google translate)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bmnt.gv.at

21376. Frank, M. (2018): Zwerglibelle (Nehalennia speciosa Charpentier, 1840) – Libelle des Jahres 2018 (Odonata: Coenagrionidae) und ihre Verbreitung in Mecklenburg-Vorpommern. Virgo 20(1): 65-66. (in German) [The distribution map of N. speciosa in the German federal state Mecklenburg-Vorpommern is presented basing on data up to 31-XII-2012.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

21377. Hu, F.-S.; Ma, C.-H. (2018): Notes on communal roosting behavior in Potamarcha congener (Odonata: Libellulidae) in Taiwan. Taiwanese Journal of Entomological Studies 3(1): 27-31. (in Chinese, with English summary) ["The present study firstly reports the communal roosting behavior of Potamarcha congener (Rambur, 1842) in Taiwan. The information on the habitat, posture, and adult-instar are described as well. Meanwhile, this paper is also the first formal record of P. congener occurring in northern Taiwan." (Authors)] Address: Hu, F.-S., National Luodong Senior High School, No. 324, Zhongzheng Rd., Luodong Township 265, Taiwan. Email: allenhu1999925@gmail.com

21378. Kleijn, D.; Bink, R.J.; ter Braak, C.J.F.; van Grunsven, R.; Ozinga, W.A.;. Roessink, I.; Scheper, J.A.; Schmidt, A.M.; Wallis de Vries, M.F.; Wegman, R.; van der Zee, F.F.; Zeegers, T. (2018): Achteruitgang insectenpopulaties in Nederland: trends, oorzaken en kennislacunes. Wageningen Environmental Research, Rapport 2871. 86 blz.; 9 fig.; 8 tab.; 322 ref.: 86 pp. (in Dutch, with English summary) ["In October 2017, a scientific study showed that in nature reserves in Germany the total biomass of flying insects had declined by 76% in a 27 year period. This report assesses to what extent the results of the German study can be extrapolated to the Netherlands. Furthermore, insect (monitoring) studies that have been done or are being carried out in the Netherlands are reviewed and the main results are presented and discussed. Results of a literature review of the main factors driving changes in insect communities are presented. Finally knowledge gaps are identified and recommendations are made with respect to future research into insect trends." (Authors)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsven@vlinderstichting.nl

21379. Ouimette, S. (2018): Thermal limits across life stages do not predict contemporary geographic distributions. M.Sc. thesis, Faculty of Arts and Science, Biology, Concordia University: 45 pp. (in English) ["Rapid and ongoing climate change is causing a complete redistribution of life on Earth. To predict species' geographic responses to climate change, it is critical that we establish the role of species' thermal tolerances in shaping their climatic envelopes. Using experimentally-derived measures of thermal limits and a database of georeferenced occurrence records, we test whether thermal limits can predict the hottest and coldest temperatures experienced within the geographic distributions of 13 North American odonate species. We measure thermal limits in both odonate larvae and adults to account for potential life stage-related differences. Lastly, we use a time-calibrated phylogeny of North American odonates to estimate the effects of evolutionary history on the relationship between species' thermal and climatic limits. We find that, even after accounting for ontogenetic differences and phylogeny, thermal limits do not translate into climatic limits. Further, we determine that species' thermal limits are constrained by phylogeny, while climatic limits appear to have evolved free from phylogenetic associations. This suggests that the evolvability of odonates' thermal limits is limited and that currently, species are in disequilibrium with their environment. Additionally, other traits or processes, such as biotic interactions, are potentially shaping odonates' geographic distributions. In the face of climate change, odonates are unlikely to adapt to novel environmental conditions and thus will likely have to continue to shift their geographic distributions in order to track their ancestral thermal niches. Further, purely climate-based models will likely be insufficient for predicting odonates' geographic responses to climate change." (Author) Figure 1: Geographic distributions of the 13 North American odonate species included in this study. Observations were used to estimate the heat and cold limits of species' climatic envelopes. (A) Aeshna umbrosa; (B) A. canadensis; (C) A. interrupta (D) A. eremita; (E) Hagenius brevistylus; (F) Cordulia shurtleffii; (G) Ladona julia; (H) Leucorrhinia proxima; (I) Lestes congener; (J) L. disjunctus; (K) Enallagma boreale; (L) E. ebrium; (M) Ischnura verticalis.] Address: not stated

21380. Ramamonjisoa, N.; Rakotonoely, H.; Natuhara, Y. (2018): Defense investments and growth responses under different predation risks and gape-limitation predation threats in a tadpole prey. Behavioral Ecology and Sociobiology 72:144: (in English) "Theories on growth and defense investments in prey have typically revolved around predators' traits (gape and foraging tactics) and the level of predation risk in the environment, yet how these factors interact on prey responses remains poorly understood. We examined the phenotypic investments and growth rates of Rhacophorus arboreus tadpoles when exposed to "full cues" (predator present in aquaria) and to "chemical cues" (predator rearing water only) from gape-constrained newt and gape-unconstrained large Anax dragonfly larva predators at intermediate food level in a controlled laboratory experiment. Investments in behavioral defense were higher in the presence of dragonfly larvae although both predators were equally dangerous for the tadpoles. Predator identity interacted with cues level to affect defense investments but not growth in the tadpoles. Morphological changes were predator-specific: a larger tail fin in the presence of dragonfly larvae and a thicker tail muscle in the presence of newts. Investments in behavioral and morphological defenses increased from predator chemical cues to full cues. Our results provide weak support to prevailing theoretical predictions: no growth depression in the tadpoles despite strong investments in defense in the presence of dragonfly larvae and no evidence of growth acceleration in the presence of gape-limited newts. The tadpoles, however, accelerated growth when exposed to chemical cues from dragonfly larvae, but this trait disappeared in the full cues treatment when investments in defense increased. Our results indicate that predators' gape may not necessarily predict life-history responses in prey; instead, local selection regime and the level of

predation risk might modulate these responses. Significance statement: Multiple theories predict the evolution of growth and defense in prey in response to predator's gape and the level of risk in the environment. At high predation risk, an investment in defense at the cost of growth is anticipated in the presence of gape-unconstrained predators, whereas a rapid growth strategy could be advantageous in the presence of gape-limited predators. We exposed tadpole prey to different cue levels of gape-constrained newt and gape-unconstrained aeshnid dragonfly larva predators. Predator identity and cue level interacted on tadpole defensive phenotypes, but not on growth. The tadpoles accelerated growth when exposed to lower concentration cues of dragonfly larvae but prioritized defense at higher cue concentration, indicating that cue level can influence prey decision on whether to invest in growth or defense. Growth responses did not follow any theoretical predictions, but could be more related to the local selection regime than to predator's gape." (Authors)] Address: Ramamonjisoa, N., Graduate School of Environmental Studies, Nagoya University, Nagoya, Japan. E-mail: noelikanto@gmail.com

21381. Sánchez-Montoya, M.M.; von Schiller, D.; Barberá, G.G.; Diaz, A.M.; Arce, M.I.; del Campo, R.; Trockner, K. (2018): Understanding the effects of predictability, duration, and spatial pattern of drying on benthic invertebrate assemblages in two contrasting intermittent streams. PLoS ONE 13(3): e0193933. https://doi.org/10.1371/journal.pone.0193933: 17 pp. (in English) ["In the present study, we examined the effects of different drying conditions on the composition, structure and function of benthic invertebrate assemblages. We approached this objective by comparing invertebrate assemblages in perennial and intermittent sites along two intermittent Mediterranean streams with contrasting predictability, duration, and spatial patterns of drying: Fuirosos (high predictability, short duration, downstream drying pattern) and Rogativa (low predictability, long duration, patchy drying pattern). Specifically, we quantified the contribution of individual taxa to those differences, the degree of nestedness, and shifts in the composition, structure and function of benthic invertebrate assemblages along flow intermittence gradients. We observed greater effects of drying on the benthic invertebrate composition in Fuirosos than in Rogativa, resulting in a higher dissimilarity of assemblages between perennial and intermittent sites, as well as a lower degree of nestedness. Furthermore, a higher number of biotic metrics related to richness, abundance and biological traits were significantly different between perennial and intermittent sites in Fuirosos, despite a shorter dry period compared to Rogativa. At the same time, slightly different responses were detected during post-drying (autumn) than pre-drying (spring) conditions in this stream. In Rogativa, shifts in benthic invertebrate assemblages along increasing gradients of flow intermittence were found for three metrics (Ephemeroptera, Plecoptera and Trichoptera (EPT) and Odonata, Coleoptera and Heteroptera (OCH) abundances and aerial active dispersal. Furthermore, we demonstrated that combined gradients of dry period duration and distance to nearest perennial reach can generate complex, and different, responses of benthic invertebrate assemblages, depending on the flow intermittence metric. Our study advances the notion that special attention should be paid to the predictability, duration and spatial patterns of drying in intermittent streams in order to disentangle the effects of drying on benthic invertebrate assemblages, in particular in areas subject to high spatial heterogeneity and temporal variability in drying conditions." (Authors)] Address: Sánchez-Montoya, María Mar, Leibniz-Institute of Freshwater Ecology & Inland Fisheries (IGB), Berlin, Germany. Email: marsanch-@um.es

21382. Srilopan, S.; Bumrungsri, S.; Jantarit, S. (2018): The wrinkle-lipped free-tailed bat (Chaerephon plicatus Buchannan, 1800) feeds mainly on brown planthoppers in rice fields of central Thailand. Acta Chiropterologica 20(1): 207-219. (in English) ["The brown planthopper (Nilaparvata lugens) is one of the major insect pests of rice fields in Southeast Asia. They have been widely acknowledged for causing significant rice yield losses. However, the wrinkle-lipped free-tailed bat (Chaerephon plicatus Buchannan, 1800) is a known agent of pest suppression for white-backed planthoppers (Sogatella furcifera), and may also suppress brown planthopper populations. Hence, it is important to investigate the diet of C. plicatus in areas where brown planthoppers are common to determine whether these bats feed on these insects. To accomplish this objective, we analyzed the diet of C. plicatus from two caves that differed in the percentage of surrounding land area occupied by rice fields (70% versus 22%). Bat fecal pellets were collected monthly for a year. A total of 720 fecal pellets were analyzed, and the results revealed that C. plicatus feeds on at least eight insect orders, including Coleoptera, Homoptera, Hemiptera, Diptera, Lepidoptera, Odonata, Hymenoptera and Orthoptera. Specifically, homopterans comprised the greatest diet volume in the rice growing season, whereas coleopterans were most abundant in the diet when rice fields were fallow. Moreover, most homopterans were identified as brown planthoppers. To estimate the relative numbers of brown planthoppers consumed during each month, the number of genitalia of male brown planthoppers was counted. We recorded the greatest numbers of genitalia during the rice planting period, with an average of four genitalia per fecal pellet. Examining both the percent volume and percent frequency of each insect order in the diet of C. plicatus revealed that the two study caves were no significantly different, even though the proportion of surrounding active rice fields was different. Our results suggest that tens of millions of brown planthoppers are consumed by this bat species each night. The similar diets of the two study colonies may be due to their high altitude foraging and preference for migratory insects. Our results indicate that the wrinkle-lipped freetailed bat is an important biological suppression agent of brown planthoppers in rice fields." (Authors)] Address: Bumrungsri, S., Dept of Biology, Fac. Science, Prince of Songkla Univ., Hat Yai, Songkhla, Thailand. E-mail: sara.b@psu.ac.th

21383. Van Tol, J.; Günther, A. (2018): The Odonata of Sulawesi and adjacent islands. Part 8. Revision of the genus Rhinocypha Rambur, 1842 (Chlorocyphidae). Odonatologica 47(3/4): 299-386. (in English) ["All known species of the genus Rhinocypha Rambur (Odonata: Chlorocyphidae) from Sulawesi and adjacent islands are revised, with descriptions of both sexes, illustrations of key characters, distribution maps and a key to the species. This revision is mainly based on material held in Naturalis Biodiversity Center, Leiden. These specimens were collected from localities in many parts of Sulawesi by the authors during the 1980s and 1990s. Eight species are distinguished, of which five are new to science, namely, Rhinocypha flavipoda sp. nov. (Central Sulawesi), R. pelengensis sp. nov. (Peleng Islands), R. sangihensis sp. nov. (Sangihe Islands), R. togeanensis sp. nov. (Togian Islands) and R. virgulata sp. nov. (Central Sulawesi); and one new subspecies, R. frontalis sulselensis ssp. nov. (south-western Sulawesi). We also discuss the status, morphological variation and distribution of the previously described species and present a concise analysis of the

phylogenetic relationships of the Sulawesi clade within the so-called R. tincta-complex based partly on molecular characters." (Authors)] Address: van Tol, J., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: jan.vantol@naturalis.nl

2019

21384. Chou, Y.-C. (2019): Notes on laying behavior of Anisogomphus maacki (Selys, 1872) (Odonata: Gomphidae) from Taiwan. Taiwanese Journal of Entomological Studies 4(4): 41-42. (in Chinese, with English summary) ["This paper reviews the observation records of A. maacki in Taiwan, and provides the first description of the egg-laying environment and behavior of this species in Taiwan." (Author)] Address: Chou, Y.-C., Taiwan Forestry Research Institute, Lienhuachih Research Center, No 43, Hualong Ln., Wucheng Vil., Yuchi Township, Nantou County 555, Taiwan (R.O.C.). Email: b01605031@gmail.com

21385. Garrison, R.W.; von Ellenrieder, N. (2019): An annotated list of the types of Odonata housed at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA. International Dragonfly Fund - Report 134: 1-147. (in English) ["The Odonata collection deposited at the Museum of Comparative Zoology (MCZ) includes specimens of 634 taxa labeled as types. Fifteen of these have been incorrectly labeled as types (pseudotypes) and eight are apparently lost, leaving a total of 611 types currently deposited at MCZ. From these, 489 represent primary namebearing types (syntype/s, holotype, lectotype and neotype), 21 are probable primary types, and 101 are secondary types (paratype/s, paralectotype/s)." (Authors)] Address: Garrison, R.W., California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, California 95832, USA. Email: argiavivida@gmail.com

21386. Martínez Saura, C.; López Barquero, P.; Ferrandez Sempere, M.; Sánchez-Balibrea, J. (Coord.) (2019): Atlas de Odonatos de la Región de Murcia. ANSE. Asociación de Naturalistas del Sureste: 132 pp. (in Spanish) [48 odonate species are recorded and documented: https://odonatosdealmeria.com/blog/atlas-de-odonatos-de-la-region-de-murcia/] Address: Martínez Saura, Carmen M., Asociación de Naturalistas del Sureste, Plaza Pintor José María Párraga, 11, bajo, Spain. Email: c.martinez@asociacionanse.org

21387. Nuraeni, S.; Budiaman; Yaspeta, S. (2019): Identification of dragonfly and damselfly species around Mahaka river, Hasanuddin university teaching forest. IOP Conf. Series: Earth and Environmental Science 343 (2019) 012052: 9 pp. (in English) ["This research was held in October 2018. Observation and retrieval of oidonate data were carried out using the line transect and plot method. The samples were taken from 3 zones with the distance between zones is 15 meters. The results showed that there were 12 odonata species found, namely Libellulidae (n=8), Chlorocyphidae (n=1), and Coenagrionidae (n=3). The highest number of Odonata is founded zone I and sequently found in zone II and zone III. The most frequency of appearance is found in the morning observations, and sequently found in the afternoon and evening observations." (Authors) Some of the identifications must be wrong, including e.g. Ischnura hastata.] Address: Nuraeni, S., Forest Protection and Insect Laboratory, Faculty of Forestry, Hasanuddin University, Makassar, Indonesia. Email: nuraenisitti@gmail.com

21388. Phan, Q.T.; Ngo, Q.P. (2019): Checklist of damselflies (Odonata: Zygoptera) from Kon Ka Kinh National Park of the Central Highlands of Vietnam. International Dragonfly Fund - Report 133: 1-18. (in English) ["A checklist of 49 damselfly species from 12 families (Odonata: Zygoptera) recorded from Kon Ka Kinh National Park is provided. A first description of the female Protosticta socculus Phan & Kompier, 2016, is given. Burmargiolestes cf. laidlawi Lieftinck, 1960 and three apparently new species, two Coeliccia and one Protosticta species, are recorded, all of which are to be described in the future." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research and Training of Medicine, Biology & Pharmacy, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

21389. Radkova, K. (2019): Diverzita vodního hmyzu Nové Kaledonie. Diversity of aquatic insects in New Caledonia. MSc thesis, Faculty of Science, Masaryk University, Department of Botany and Zoology: 79 pp. (in Czech, with English summary) ["This thesis deals with the diversity of aquatic insects, with a special focus on mayflies (Ephemeroptera), on Pacific archipelago New Caledonia, mainly on the biggest island Grande Terre. New Caledonia belongs to 25 endangered regions with exceptional biodiversity connected with unique environmental diversity, specific geomorphological and geographical characteristics of the landscape. Literature research of the thesis was devoted to general introduction of New Caledonia and its tectonic history playing important role in high endemism of this archipelago. Further, history of settlement, exceptional biota, and anthropogenic influences changing the landscape of New Caledonia in an unprecedented way were described. Diversity and endemism of aquatic insects of New Caledonia, including Ephemeroptera, Odonata, Heteroptera, Trichoptera, Coleoptera, and Diptera, were summarized. Practical part of the thesis dealt with the mayflies of New Caledonia. A database of all published and available unpublished records of mayfly species from 1949, 1966, 1968, 1972, and 1997-2000 was prepared. In total, 643 records of 46 species belonging to 19 genera were assembled from Grande Terre and Île de Pins. They were collected by seven researchers and their teams: L. E. Cheesman, J. Ulies, F. Starmühlner and team, W. L. Peters and team, and N. Mary. Species richness of sites, species frequency and abundance, and distribution of all species were evaluated based on these data. Distribution of all species was shown on maps. … 5.2 Odonata The first information about the dragonflies of New Caledonia comes from the first half of the last century (CAMPION 1921; SCHMIDT 1938), when 27 species were known from New Caledonia. New information about the diversity of dragonflies was brought in 1965 by prof. Starmühlner and the aforementioned expedition from 1972, when dragonflies were found in 34 locations. The list of species found expanded to 40, of which 18 species were from the suborder Zygoptera and 22 species from the suborder Anisoptera (LIEFTINCK 1975, 1976). Of the total, 14 species were found only on Grande Terre and 16 species were recorded from Grande Terre and the Loyauté Archipelago. In 2014, a key to the identification of all known species of adult dragonflies occurring in New Caledonia (Grande Terre and Ile de Pins) and Wallis and Futuna was published, which also tabulated all known species and their distribution (GRAND et et al. 2014). 55 species from 8 families are known from the island of Grande Terre and Ile de Pins, of which Zygoptera include representatives of Lestidae (2 species), Argiolestidae (6), Isostictidae (5), Coenagrionidae (4) and among Anisoptera species of the following families: Aeshnidae (6), Corduliidae

(3), Libelluloidea (8) and Synthemistidae (8) (GRAND et al. 2014). There are a total of 55 species on the island of Grande Terre, 6 species on the island of Ouvéa, 7 species on the ile de Pins and 9 species on the Lifou (GRAND ET A L . 2014). Almost 45% of the representatives are locally or regionally endemic, with all representatives from the families in bold being endemic exclusively to Grande Terre. A total of 23 species are considered endemic to New Caledonia, for example: Caledopteryx sarasini, Trineuragrion percostale, Caledopteryx maculata (Argiolestidae), Isosticta humilior, I. spinipes (Isostictidae), Ischnura pamelae (Coenagrionidae), Aeshna brevistyla, Oreaeschna dominatrix (Aeshnidae), Metaphya elongata (Corduliidae), Synthemis miranda and S. pamelae (Synthemistidae)." (Author)] Address: not stated

21390. Smith-Patten, B.D. (2019): Odonate species richness in the United States and Canada. Argia 31(1): 12-17. (in English) ["This article is the first of a new series aimed at assessing odonate species richness in the United States and Canada. Each year I will present an updated accounting of the total number of species known from each U.S. state and the District of Columbia, as well as for the provinces and territories of Canada. A previous accounting for the U.S. (Smith-Patten & Patten, 2017) provided the impetus and foundation for the present effort." (Author)] Address: Brenda D. Smith-Patten, Oklahoma Natural Heritage Inventory, Oklahoma Biological Survey, University of Oklahoma <argia@ou.edu>

2020

21391. Arias, S.L.; Devorkin, J.; Spear, J.C.; Civantos, A.; Allain, J.P. (2020): Bacterial Envelope Damage Inflicted by Bioinspired Nanostructures Grown in a Hydrogel. ACS Applied Bio Materials 3(11): 7974-7988. (in English) ["Surface-associated bacterial communities, known as biofilms, are responsible for a broad spectrum of infections in humans. Recent studies have indicated that surfaces containing nanoscale protrusions, like those in dragonfly wings, create a hostile niche for bacterial colonization and biofilm growth. This functionality has been mimicked on metals and semiconductors by creating nanopillars and other high aspect ratio nanostructures at the interface of these materials. However, bactericidal topographies have not been reported on clinically relevant hydrogels and highly compliant polymers, mostly because of the complexity of fabricating nanopatterns in hydrogels with precise control of the size that can also resist aqueous immersion. Here, we report the fabrication of bioinspired bactericidal nanostructures in bacterial cellulose (BC) hydrogels using low-energy ion beam irradiation. By challenging the currently accepted view, we show that the nanostructures grown in BC affect preferentially stiff membranes like those of the Gram-positive bacteria Bacillus subtilis in a time-dependent manner and, to a lesser extent, the more deformable and softer membrane of Escherichia coli. Moreover, the nanostructures in BC did not affect the viability of murine preosteoblasts. Using single-cell analysis, we demonstrate that indeed B. subtilis requires less force than E. coli to be penetrated by nanoprobes with dimensions comparable to those of the nanostructured BC, providing the first direct experimental evidence validating a mechanical model of membrane rupture via a tension-induced mechanism within the activation energy theory. Our findings bridge the gap between mechano-bactericidal surfaces and low-dimensional materials, including single-walled carbon nanotubes and graphene nanosheets, in which a higher bactericidal activity toward Gram-positive bacteria has been extensively reported. Our results also demonstrate the ability to confer bactericidal properties to a hydrogel by only altering its topography at the nanoscale and contribute to a better understanding of the bacterial mechanobiology, which is fundamental for the rational design bactericidal topographies." (Authors) The publication includes references to "dragonfleis".] Address: Arias, Sandra, Dept Bioengineering, Univ. of Illinois at Urbana-Champaign, Urbana, Illinois 61801, United States. Email: slarias@cornell.edu

21392. Futahashi, R. (2020): Diversity of UV reflection patterns in Odonata. Front. Ecol. Evol. 8(Article 201): 8 pp. (in English) ["Odonata are large-eyed diurnal insects that exhibit a variety of color patterns on their wings and/or bodies. Because Odonata can perceive light with wavelengths extending from ultraviolet (UV) to red, the color patterns with UV reflection can be visually recognized by each other. The UV reflection patterns of Odonata have been investigated by using a UV camera and optically measuring the reflectance of body and wing surfaces. The UV reflection of Odonata can be classified into three classes, namely, iridescent UV reflection, wax-based UV reflection, and UV reflection by epidermal granules. In this review, I present UV images of these three classes and representative examples of reflectance. Among the Odonata with colorful iridescent wings consisting of multilayer structures, some species (e.g., Chalcopteryx scintillans) predominantly reflect UV light, whereas other species (e.g., Calopteryx japonica) mostly reflect light at wavelengths above 400 nm. Whitish wax (called pruinescence) on the body and/or wing surface strongly reflects light including UV, due to the light-scattering fine structures produced by the wax. The chemical composition of the dragonfly's abdominal UV-reflective wax differs from previously identified waxes of other organisms. The Ischnura species exhibit immature-adult-specific UV reflection by the pteridine pigment-based selective light scattering and absorption. Iridescent coloration and wax-based color changes are generally important for mate recognition and male–male competition in Odonata, although the ecological importance of UV reflection remains largely unknown except for few examples in damselflies." (Author)] Address: Futahashi, R., Bioproduction Research Institute, National Inst.of Advanced Industrial Science & Technology (AIST), Tsukuba, Japan

21393. Green, E.A.; Klassen, J.L. (2020): Draft genome sequence of Spiroplasma platyhelix ATCC 51748, isolated from a dragonfly. MicrobiologyResoure Announcements 9(47) e00422-20: 2 pp. (in English) ["Spiroplasma platyhelix is a helical bacterium belonging to the class Mollicutes. First isolated from a Pachydiplax longipennis dragonfly, it has the smallest reported Spiroplasma genome size of 740 kbp. Here, we report the genome sequence of S. platyhelix ATCC 51748." (Authors)] Address: Klassen, J.L., Dept of Molecular & Cell Biology, University of Connecticut, Storrs, Connecticut, USA. Email: jonathan.klassen@uconn.edu.

21394. Gutiérrez, D.E.B. (2020): Evaluación del estado ecológico de diez quebradas ubicadas en Tarrazú, zona de Los Santos, San José, Costa Rica, mediante la ecología de náyades de Odonata (Insecta) y uso del suelo. Tesis de Licenciatura, Universidad Nacional, Heredia, Costa Rica: VIII + 58 pp. (in Spanish) ["The Odonata larvae allow us to acquire a greater knowledge of the ecological state of the ten streams investigated. In addition, it is possible to evaluate to what extent the riparian forest and the shaded coffee have an important role in the preservation of the ecological integrity of streams surrounding the coffee plantations. The objective of this study was to evaluate the ecological status

of 10 streams located in Tarrazú, Los Santos area, San José, Costa Rica, by studying the ecology of dragonfly naiads, and land use, during April, July, and October 2015. The dragonfly naiads were collected in 10 streams at three points 30 m apart. Physical analyses were made of the water, maximum flow, and number of trees in the riparian forest in the streams, and for soil use two categories were taken: 1) forest patches, and 2) shaded coffee cultivation. The Visual Evaluation Protocol for Ravines was also used. A total of 527 dragonfly naiads were collected from 6 families and 12 genera. The genus Hetaerina was the most abundant (248 individuals); while Archilestes, Brachymesia?, Cordulegaster, and Micrathyria were the least abundant (n=1). The highest values of diversity (H'=1.58) and dominance (D=0.75) were reported in Quebrada 1, with forest patches of 4% and shaded coffee cultivation of 15%. The number of streams that had wooded patches with low canopy cover was 7, and 5 streams had medium shade coffee cover. A PERMANOVA was carried out which determined significant differences between the months of sampling for all the streams. Based on the physical variables of the water evaluated, no values harmful to the development of the dragonfly populations were determined. As the percentage of wooded patches in the ravines increased, the total diversity decreased. The highest total dominance of dragonfly naiads occurred in those streams that had patches of forest with medium canopy cover. 20% of the streams had a "Poor" ecological status; only the Reference Stream presented an "Excellent" ecological status. Overall, it is important to implement actions that promote the conservation of the lotic aquatic environments investigated, such as proposing the maintenance of the average tree cover (=15-39%), both in the forest patches and in the shaded coffee cultivation." Translated with www.DeepL.com/Translator (free version)] Address: not stated

21395. Jedro, G.; Jedro, M.; Goc, M. (2020): Current records of the "southern" insect species in the Slowinski National Park - dragonflies, damselflies (Odonata) and orthopterans (Orthoptera). Odonatrix 1619 (2020): 13 pp. (in Polish, with English summary) ["Climate warming in recent decades has brought about dramatic changes in insect populations, for example, in their geographical distributions. While the ranges of many vulnerable and stenotopic species are shrinking, those of thermophilic species are expanding beyond their native habitats. The Slowinski National Park is situated in the far north of Poland and increasing numbers of thermophilic insect species have been observed there in the last ten years. From 2016 to 2019, six "southern" dragonflies…)." (Authors) Erythromma viridulum, Lestes barbarus, Orthetrum albistylum, O. brunneum, Crocothemis erythraea, Sympetrum fonscolombii, Phaneroptera falcata] Address: Jedro, G., Slowinski Park Narodowy, ul. Bohaterow Warszawy 1A, 76-214 Smoldzino, Poland. E-mail: rufinus@o2.pl

21396. Jolivet, S.; Lambret, P.; Vanappelghem, C. (2020): Création du groupe Opie-odonates. insectes n°197 juin 2020: 37-38. (in French) ["A new Opie working group was created in 2019 following discussions between the Opie Board of Directors and that of the French Society of Odonatology (SfO), a long-standing partner of our association. After almost 30 years of exemplary actions in favor of odonatology, the SfO no longer found the necessary resources to manage its operations and pursue its missions in good conditions; it therefore declared its dissolution in March 2019, ensuring with Opie the sustainability of its main actions." (Authors/Google translate)] Address: Vanappelghem, C., 14, rue Brûle Maison, 59000 Lille, France. E-mail: cedvana@free.fr

21397. Leong, C.-M.; Chang, K.; Wong, I.-K. (2020): Rediscovery of the smallest damselfly in Macao, Agriocnemis pygmaea (Odonata: Coenagrionidae). Taiwanese Journal of Entomological Studies 5(2): 31-35. In Chinese, with English summary ["A. pygmaea is the smallest species of Odonata in Macao. There are no further records of this species in Macao after 1993. The present study provides an account of the rediscovery of this species after 27 years, and discusses their literature records, distribution and seasonal activity in Macao." (Authors)] Address: Macao Entomological Society, R/C F, Ed. Kou Kio, 11-Aa Avenida, Coronel Mesquita, Macao. Email: mo.ent.soc@gmail.com

21398. Leong, C.-M.; Chang, K.; Wong, I.-K. (2020): Mortonagrion hirosei (Odonata: Coenagrionidae): a damselfly on the IUCN Red List observed in Macao wetland. Taiwanese Journal of Entomological Studies 5(3): 38-40. In Chinese, with English summary [M. hirosei "is the one of only a few East Asian odonates on the International Union for Conservation of Nature (IUCN) Red List. Our study provides photographic evidence of M. hirosei in Macao, and we note its distribution within this territory." (Authors)] Address: Macao Entomological Society, R/C F, Ed. Kou Kio, 11-Aa Avenida, Coronel Mesquita, Macao. Email: mo.ent.soc@gmail.com

21399. Murakami, H.; Hisamatsu, S.; Takechi, R.; Kurokawa, Y.; Matsui, H. (2020): Effects of water management of reservoirs on nymphal development in Sympetrum uniforme in Tyuyo, Ehime Prefecture, Japan. Japanese Journal of Conservation Ecology 25(1): 279- 286. In Japanese, with English summary ["Some dragonflies in East Asia have adapted to traditional paddy cultivation by matching their phenology to the paddy growth cycle, water regime, and the forest and grassland landscapes surrounding the paddy fields. An endangered dragonfly, Sympertrum uniforme, lays eggs in reservoirs that supply water to paddy fields and is highly influenced by traditional water management regimes. Here, we studied the effects of water management of reservoirs on S. uniforme in Ehime Prefecture, Japan. The water-level management regimes and adult abundances (mature and immature) were surveyed at selected reservoirs. Samples of sand and gravel were collected at each reservoir just below the maximum water level. The samples were kept dry throughout the winter, watered the next spring, and larvae that hatched were counted. Many larvae hatched from the sand and gravel samples, which were collected from areas that dry out in winter. For one reservoir, although the water management regime and spawning rate were similar to those at other reservoirs, few larvae hatched, and the adult emergence rate was low." (Authors)] Address: Murakami, H., Ehime Prefectural Inst. of Public Health & Environmental Science, 8-234, Sanban-cho, Matsuyama, Ehime, 790-0003, Japan. E-mail: Fmurakamihiroshi1@pref.ehime.lg.jp

21400. Palacino-Rodríguez, F.; Brito, J.; Calvao, L.B.; Gonzalez, A.S.; Juen, L. (2020): In Neotropical savannas, altitude affects the diversity of the Anisoptera but not the Zygoptera (Insecta: Odonata). Marine and Freshwater Research 72(6): 766-773. (in English) ["Lentic and lotic habitats, combined with varying altitudes, may have differential effects on communities of the Order Odonata. We sampled adult odonates at 94 waterbodies of the Orinoquía region of eastern Colombia. Our hypothesis was that species composition and richness, as well as abundance, would be affected by

both altitude and habitat. Overall, 70 of the 100 species recorded in the study were sampled in both lotic and lentic environments, with 16 species (5 in the Suborder Zygoptera and 11 in the Suborder Anisoptera) occurring only in lentic habitats and 14 occurring exclusively in lotic habitats (13 Zygoptera, 1 Anisoptera). The results of the analysis indicated that the species richness and abundance of anisopterans were affected by altitude, whereas the diversity of zygopterans was not affected in any way. Despite these mixed findings, the results for anisopterans were consistent with the results of previous studies, which have indicated altitude as a primary determinant of the Odonata diversity through its effect on the dynamics of water flow and the shift from lentic to more lotic environments. Further studies over a more ample altitudinal gradient should provide more conclusive evidence, particularly regarding the role played by both altitude and habitat on the local diversity of odonates." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Biología, Departamento de Biología, Universidad El Bosque Avenida. Carrera 9 No. 131A–02, C.P. 110121 Bogotá, Colombia. E-mail: odonata17@hotmail.com

21401. Šupina, S.; Bojková, J.; Boukal, D.S. (2020): Warming erodes individual-level variability in life history responses to predation risk in larvae of the mayfly Cloeon dipterum. Freshwater Biology 65(12): 2211-2223. (in English) ["1. Warming and predation risk are ubiquitous environmental factors that can modify life histories and population dynamics of aquatic ectotherms. While separate responses to each of these factors are well understood, their joint effects on individual life histories and population dynamics remain largely unexplored. Current theory predicts that the magnitude of prey behavioural, physiological, and life history responses to predation risk should diminish with warming due to the reduced metabolic scope. However, empirical support for this prediction remains equivocal, and experiments covering a substantial proportion of individual prey ontogeny until maturation are lacking. 2. To fill these gaps, we ran a laboratory experiment to investigate how warming and non-consumptive predation risk influence life history responses in the larvae of the mayfly Cloeon dipterum, an aquatic insect with highly plastic development. We reared larvae of varying initial sizes at three temperatures (21, 24, and 27°C) in a risk-free environment and under predation risk signalled by chemical cues from dragonfly larvae (Aeshna cyanea), and followed their individual survival, growth, and development until emergence. 3. Some C. dipterum larvae substantially prolonged their development and the proportion of these slow individuals declined rapidly with temperature and increased with predation risk. We attribute this response to cohort splitting, a common life history strategy of aquatic insects and other taxa in unpredictable environment. 4. Growth, development, and maturation varied predictably with temperature in the fast larvae that did not prolong their development. They grew and developed faster but matured at smaller sizes with increasing temperature. Predation risk tended to slow down individual growth and development in line with the reduced metabolic scope hypothesis, but the differences were relatively minor and observable only at 21°C. 5. Survival to subimago increased with predation risk, possibly due to indirect effects mediated by dissolved micronutrients, but did not vary significantly with temperature. Survival also tended to be higher in the slow individuals. This partly compensated for a smaller final size relative to the fast individuals and made both strategies comparable in overall fitness. 6. Our results show that warming may erode individual-level variability in life history responses to predation risk. This implies that warming can synchronise population dynamics and consequently make such populations more vulnerable to unpredictable disturbances." (Authors)] Address: Bojková, Jindriška, Department of Botany and Zoology, Faculty of Science, Masaryk University, Brno, Czech Republic. E-mail: bojkova@sci.muni.cz

21402. van Grunsven, R.; Bos, G.; Poot, M. (2020): Strong changes in Dutch dragonfly fauna. Covid-19 Special Issue - Agrion 24(2): 134-138. (in English) ["Conclusion: The Dutch dragonfly fauna is very dynamic with winners and losers over the last 30 years. Unexpectedly, critical species such as Leucorrhinia caudalis come back while very common species suddenly decline. Overall we can see differences in trends of species from different habitats. The improved water quality in running waters and the recovery of the dragonfly species of this habitat is a clear, positive example. A major driver of changes in the dragonfly fauna is climate change and this will very likely continue to be so. This is most obvious through the increase of thermophilic species but likely also plays a role in the decline of species of moorlands that prefer lower temperatures. These impacts will not only be through changes in temperature itself but also increasing extremes, in particular droughts. Thanks to the large numbers of citizen scientists that record dragonflies in the Netherlands, we can at least track these changes and aim conservation efforts where they are needed most." (Authors)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsven@vlinderstichting.nl

21403. Vermeulen, T. (2020): Dragonflies along the river tides-Durme. Brachytron 21: 38-52. (in Dutch, with English summary) ["The Odonata fauna along the river tides-Durme (Belgium) has been studied by comparing historical with recent observations between 1979 and 2019. Noteworthy is the increase of Libellula fulva and Platycnemis pennipes along the tides-Durme. Also new species such as Aeshna isoceles, Crocothemis erythraea, Cordulia aenea, Coenagrion pulchellum, Coenagrion scitulum and Sympecma fusca have colonized the valley of the Durme. The presence of Aeshna grandis however remains limited to the flood plain of the river Scheldt." (Author)] Address: Tom Vermeulen: Email: tomvermeulen@proximus.be

21404. Zandigiacomo, P.; Chiandetti, I.; Fiorenza, T.; Pontarini, R. (2020): Interesting records of Odonata in Friuli Venezia Giulia (North-eastern Italy) in the three-year period from 2016 to 2018. Gortania 42: 95-108. (in English, with Italian summary) ["Thanks to the surveys of B. Kiauta and I. Pecile, the Odonata fauna of Friuli Venezia Giulia was relatively well known until the mid 1980s. In recent years, an effort has been made to collect new information for the “Atlas of the Odonata of the Friuli Venezia Giulia region”, a project established in 2009. In this paper, the most striking results of the 2016-2018 period are reported. Two species, Coenagrion ornatum and Leucorrhinia pectoralis, must be inserted in the new regional list (with data collected since 2009), which now includes 64 species representing 67% of the Odonata fauna currently known for Italy. In particular, both C. ornatum and L. pectoralis are listed in the Annexes of the Habitats Directive. In addition, records relating to another 15 species are reported, among which are rare and threatened species or those of faunistic interest. The main factors threatening the survival of some species are discussed and the need to implement conservation projects is affirmed, in particular concerning: i) Nehalennia speciosa; ii) Cordulegaster heros; and iii) some alpine species, including Somatochlora alpestris and S. arctica." (Authors)] Address:

Zandigiacomo, P., Dipartimento di Scienze AgroAlimentari, Ambientali e Animali (Di4A) Entomologia, Università degli Studi di Udine, Via delle Scienze 206, I-33100 Udine, Italy. Email: pietro.zandigiacomo@uniud.it

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21405. Barling, N.T.; Heads, S.W.; Martill, D.M. (2021): Behavioural impacts on the taphonomy of dragonflies and damselflies (Odonata) from the Lower Cretaceous Crato Formation, Brazil. Palaeoentomology 4(2): 141-155. In English ["The relative completeness of Odonata fossils from the Crato Formation is investigated and compared to other fossil insect groups from the same formation. Tagma completeness is measured as present, partial, or absent, with some additional subdivision of body components (head, thorax, limbs, individual wings, anterior and posterior abdomen). These data are statistically explored for trends using principal coordinate analysis. While no definitive clustering is identified, most Crato Formation Odonata fossils plot positively on coordinate two, whereas the majority of non-odonatan insect fossils plot negatively on this coordinate. This shows that the Crato Formation odonates are less complete compared to other insect groups from the same beds. Specimens preserved as isolated wings and those preserved with damaged or lost abdomens are identified as contributing to this difference. The causes of these differences are discussed, highlighting collection bias, predation, carcass scavenging, physical conditions of the palaeoenvironment, as well as the autecology of odonates." (Authors)] Address: Barling, N.T., Camborne School of Mines, College of Engineering, Mathematics and Physical Sciences, University of Exeter, Penryn Campus, Treliever Road, Penryn, Cornwall, TR10 9EZ, UK. Email: Nathan.t.barling@gmail.com

21406. Bezerra, L.L.A.; Pereira da Cruz, R.; Roberto de Azevedo, F. (2021): Capacidade predatória de ninfas de líbelulas (Odonata) em larvas de Aedes aegypti (Diptera: Culicidae). Ciências agrárias, indicadores e sistemas de produção sustentáveis: 228-236. (in Portuguese, with English summary) ["As a result of the persistence of dengue and other arboviruses in Brazil, the government has intensified actions to combat the Aedes aegypti mosquito vector. The use of chemical products, the most widely used control method today, has numerous disadvantages in its use, as in addition to impacting human health and the environment, it induces mosquito resistance. Thus, studies in search of sustainable methodologies and promising attributes to nature and society are necessary in the current situation. In view of this, the use of dragonfly nymphs in the biological control of Aedes aegypti larvae has important and favorable characteristics, since these are skilled and competitive predators, colonizing different types of aquatic environments, whether with a large or small amount of water, perennial or temporary, show patrolling behavior and territorial defense, has a long nymph stage, which depending on the species can last up to two years, is a more accessible method of control due to its low cost, in addition to As much in its nymph stage as in adulthood, the consumption of mosquito larvae is part of its diet, being considered excellent ecological traps." (Authors)] Address: Bezerra, L.L.A., Universidade Federal do Cariri, Crato – CE, Brazil

21407. Biologische Station Gütersloh / Bielefeld (2021): Faunistische und floristische Dokumentation zum Heckrinderprojekt in der Johannisbachaue 2020. Biologische Station Gütersloh / Bielefeld e.V.: 130 pp. (in German) [Between 2011 and 2020, 12 odonate species were recorded, including Erythromma viridulum and Gomphus pulchellus.] Address: https://www.bielefeld.de/sites/default/files/datei/-2021/Monitoring2000.pdf

21408. Cerini, F.; Bombi, P.; Cannings, R.; Vignoli, L. (2021): Odonata metacommunity structure in northern ecosystems is driven by temperature and latitude. Insect Conservation and Diversity 14(5): 675-685. In English ["The metacommunity concept, defined as a set of local communities connected by species dispersal, provides deep understanding of large-scale ecological processes. The elements of the metacommunity structure (EMS) framework use occurrence data to differentiate among different patterns (i.e., checkerboard, nestedness, species turnover). Metacommunities of tropical Odonata show species turnover following latitude and temperature gradients but there are no such large-scale studies for other regions. We performed EMS analysis with data for the Odonata of British Columbia, Canada, testing the role of five environmental variables (temperature, latitude, altitude, precipitation, landcover typology) in structuring the metacommunities and their turnover. The suborder Anisoptera drives the general pattern, with the communities showing a Clementsian-type response (groups of species that replace each other along the environmental gradients) following temperature and latitude ordering. The Clementsian pattern determined by site temperatures reflects the turnover from a group of cold-adapted species to one of warm-adapted species, separated by many species with more generalised temperature requirements. Similarly, the Clementsian pattern associated with the latitude gradient indicates the substitution of a low-latitude group in the south with a high-latitude group in the north. The sites ordered by landcover did not show significant coherence and turnover. In a macro-scale framework, Odonata species assemblages seem to be sensitive to the climatic and geographic variables of local sites (i.e., temperature and latitude), regardless of the surrounding habitat typology. The role of such variables in shaping the assembly of Odonata communities should be considered in large-scale management and conservation projects." (Authors)] Address: Cerini, F., Dipto di Scienze, Università Roma Tre, Viale Marconi 446, Rome, Italy. E-mail: francesco.cerini@uniroma3.it

21409. Chovanec, A. (2021): Libellenkundliche Bewertung von Restrukturierungen der Trattnach in Schlüßlberg (Oberösterreich): Vergleich des Prae-Monitorings 2016 mit dem Post-Monitoring 2021. Im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Wasserwirtschaft: 54 pp. (in German) ["In 2019, an approximately 500 m long section of the Trattnach in Schlüßlberg (Upper Austria) was restructured. The aim of the dragonfly investigations in 2016 and 2021 was to evaluate this ecological improvement through pre- and post-monitoring. The improvement actions resulted in a doubling of the total number of species in the action section (from five to ten) and the number of certain, probable and possibly native species (from four to eight). In 2021, four of the five water body type-specific indicator species could be detected: Calopteryx splendens, C. virgo, Gomphus vulgatissimus and Onychogomphus forcipatus. The native occurrence of these species confirms the hyporhithral/epipotamal transitional character of the Trattnach in this area and indicates the development of suitable heterogeneous flow and substrate conditions as well as corresponding vegetation conditions in the bank area. The rheophilic species in particular were promoted by the hydraulic engineering interventions, water type-specific limnophilic accompanying species could only be detected in isolated cases. The finds of exuviae and sightings of freshly hatched

individuals of Gomphus vulgatissimus and Onychogomphus forcipatus prove that the entire section of the project was populated by these species with a development time of two years immediately after completion of the construction work. In 2016 only O. forcipatus was found on the downstream stretch; G. vulgatissimus was absent from the entire section. The restructuring led to an improvement in the dragonfly's ecological status: the affected section (formerly "moderate") was rated "good" in 2021, as were the three individual sections within it (formerly "unsatisfactory" and "moderate"). The dragonfly ecological status of a controlled stretch not affected by the upgrading measures and mapped in both years improved from "unsatisfactory" to "moderate". Radiation effects from the restructuring area are likely to be responsible for this." (Author/Google translate)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

21410. Deregnaucourt, I.; Bardin, J.; Anderson, J.M.; Béthoux, O. (2021): The wing venation of a new fossil species, reconstructed using geometric morphometrics, adds to the rare fossil record of Triassic Gondwanian Odonata. Arthropod Structure & Development 63(6):101056: (in English) ["Highlights: • New morphometric tool allowing reconstruction of incomplete fossil insect wing. • A new species of Triassic stem-Odonata displays an usual combination of traits. • Reconsideration of homology conjecture for the pillar, a particular wing structure. • A major group of Triassic Odonata proves to have been distributed worldwide. Abstract: Probably the most common rock-imprint fossil-insect remain is an incomplete isolated wing. This pitfall has been traditionally addressed by manually reconstructing missing parts, which is not ideal to comprehend long-term evolutionary trends in the group, in particular for morphological diversity (i.e., disparity) approaches. Herein we describe a new Triassic relative of dragon- and damselflies (Odonata), Moltenophlebia lindae gen. et sp. nov., from the Molteno Formation (Karoo Basin, South Africa), on the basis of three incomplete, isolated wings. In order to provide a reconstruction of the complete wing venation of the species, we formalized and applied a repeatable method aiming at inferring the missing parts of a given specimen. It is based on homologous veins automatically identified thanks to a standardized color-coding. The dedicated script can be applied broadly to the fossil record of insect wings. The species is identified as a member of the Zygophlebiida, within the Triadophlebiomorpha. This discovery, therefore, represents the first ascertained occurrence of the latter group in Gondwana, an area where the fossil record of Odonata is depauperate." (Authors)] Address: Deregnaucourt, Isabelle, Centre de Recherche en Paléontologie – Paris (CR2P), Sorbonne Université, MNHN, CNRS, 57 rue Cuvier, CP38, F-75005, Paris, France. E-mail: deregnaucourt.isa@gmail.com

21411. DiGiacopo, D.G.; Hua, J. (2021): The effects of novel leaf litter deposition on competitive, predator–prey and host–parasite interactions of American toad larvae. Aquatic Ecology 56(1): 59-73. (in English) ["Wetland plant communities are changing rapidly due to a wide range of human activities. The deposition of leaf litter from novel plant communities can alter both the chemical and physical habitat of aquatic ecosystems. Lesser understood are the ecological consequences of novel leaf litter inputs in aquatic communities. Toward this goal, we used two plant invasion scenarios (comparing native black huckleberry to exotic autumn olive and native swamp loosestrife to exotic purple loosestrife) to simulate a shift in wetland plant communities. In this study, we investigated the effects of novel leaf litter leachates on three aquatic ecological interactions: intraspecific competition, predation and parasitism. We examined how leaf litter leachates influence the interactions of American toad larvae (Anaxyrus americanus) with their conspecifics, a dragonfly predator (Anax spp.) and a trematode parasite (Echinostomatidae). We found that leaf litter type influenced competitive interactions only for the huckleberry versus autumn olive comparison. We did not detect any effects of leaf litter type on predator–prey interactions. Finally, litter type strongly influenced host–parasite interactions for both leaf litter comparisons, altering host susceptibility, parasite survival and net infection rates. These results highlight the breadth of potential ecological repercussions of shifting wetland plant communities for native ecosystems." (Authors)] Address: DiGiacopo, D.G., Biological Sciences Dept, Binghamton Univ. (SUNY), 4400 Vestal Parkway East, PO Box 6000, Binghamton, NY, 13902, USA

21412. Eitschberger, U.; Leiling, K. (2021): Nachruf auf Harald Heidemann. *1.IX.1935 - † 8.X.2021. Atalanta 52(4): 508-511. In German [Obituary for a well-known German odonatologist.] Address: Eitschberger, U., Humboldtstr. 13a, D-95168 Marktleuthen, Germany. Email: ulfei@t-online.de

21413. Evangelio Pinach, J.M. (2021): Macromia splendens (Pictet, 1843) (Odonata: Macromiidae): nueva especie para Castilla–La Mancha (centro–este de España). Zoolentia 1: 70-81. (in Spanish, with English summary) ["M. splendens: new species for Castilla–La Mancha region (central–eastern Spain). The discovery of the first breeding population of the Franco–Iberian endemism M. splendens in Castilla–La Mancha is reported, through the collection of exuviae and the finding of imagoes. It is considered one of the most endangered dragonflies of the European odonatofauna, whose peninsular populations are very dispersed. In addition, details about the behavior observed in adult individuals in the Cabriel River (Cuenca) are provided." (Author)] Address: Evangelio Pinach, J.M., Museu Valencià d'Història Natural e i\Biotaxa, l'Hort de Feliu–Alginet, Apto. 8460, E–46018 Valencia (España) y Sociedad Odonatológica de la Comunitat Valenciana, c/ Padre Vicente Cavanes, 5–12, E–46900 Torrent (Valencia), Spain. Email: jjevanach@hotmail.com

21414. Evangelio Pinach, J.M. (2021): Confirmación de la reproducción de Paragomphus genei (Selys, 1841) (Odonata: Gomphidae) en Castilla y León (España). Zoolentia 1: 89-94. (in Spanish, with English summary) ["Confirmation of the reproduction of Paragomphus genei (Selys, 1841) (Odonata: Gomphidae) in Castilla y León (Spain). The existence of the first breeding population of P. genei in Castilla y León is reported by observing adults and collecting exuviae. It is an African dragonfly whose known range of distribution has expanded in the Iberian Peninsula, having been cited in Castilla y León sporadically." (Author)] Address: Evangelio Pinach, J.M., Museu Valencià d'Història Natural e i\Biotaxa, l'Hort de Feliu–Alginet, Apto. 8460, E–46018 Valencia (España) y Sociedad Odonatológica de la Comunitat Valenciana, c/ Padre Vicente Cavanes, 5–12, E–46900 Torrent (Valencia), Spain. Email: jjevanach@hotmail.com

21415. Fabian, S.T.; Zhou, R.; Lin, H.-T. (2021): Dragondrop: a novel passive mechanism for aerial righting in the dragonfly. Proc. R. Soc. B 288: 20202676.: 8 pp. (in English) ["Dragonflies perform dramatic aerial manoeuvres when chasing targets but glide for periods during cruising flights. This makes dragonflies a great system to explore the role of passive stabilizing mechanisms that do not compromise manoeuvrability. We challenged dragonflies by dropping them from

selected inverted attitudes and collected 6-degrees-of-freedom aerial recovery kinematics via custom motion capture techniques. From these kinematic data, we performed rigid-body inverse dynamics to reconstruct the forces and torques involved in righting behaviour. We found that inverted dragonflies typically recover themselves with the shortest rotation from the initial body inclination. Additionally, they exhibited a strong tendency to pitch-up with their head leading out of the manoeuvre, despite the lower moment of inertia in the roll axis. Surprisingly, anaesthetized dragonflies could also complete aerial righting reliably. Such passive righting disappeared in recently dead dragonflies but could be partially recovered by waxing their wings to the anaesthetised posture. Our kinematics data, inverse dynamics model and wind-tunnel experiments suggest that the dragonfly's long abdomen and wing posture generate a rotational tendency and passive attitude recovery mechanism during falling. This work demonstrates an aerodynamically stable body configuration in a flying insect and raises new questions in sensorimotor control for small flying systems." (Authors)] Address: Lin, H.-T., Dept Bioengineering, Imperial College London, London SW7 2AZ, UK. E-mail: h.lin@imperial.ac.uk

21416. French, S.K.; Leite, L.M.S.N.; McCauley, S.J.; Searcy, C.A. (2021): Forest edges and their effects on the arrival of dragonflies at north-temperate experimental ponds. International Journal of Odonatology 24: 38-50. (in English) ["The matrix, an environment in the landscape that individuals move through but do not reside in, can affect species dispersal and the arrival of individuals at habitat patches. Elements around this matrix that provide refuge or resources may shape the arrival of animals at habitat patches, even when those patches are equivalent in quality. Adult Anisoptera frequently use open terrestrial environments during movement and dispersal in north-temperate regions; however, they can also roost along forest edges. Because of the potential value of forest edges to adult dragonflies, we tested whether pond proximity (i. e., connectivity) to multiple forest edges was positively related to the abundance or diversity of arriving dragonflies. We observed dragonflies arriving at 9 experimental pond sites located within an open field landscape in Ontario, Canada. Experimental ponds differed in their distance to source ponds and to forest edges, a potential refuge for dragonflies. We found no effect of connectivity to forest edges or distance to source ponds on the abundance or diversity of dragonflies arriving at a site. Dragonfly dispersal was therefore not limited at the spatial scale of our study (<305 m to source ponds). In addition, dragonflies did not seem to discriminate among sites based on the amount of nearby forest edge, although all sites within the generally open landscape had at least some forest edge in close proximity (10–79 m). Our results provide greater insight regarding the decisions that dragonflies make in response to landscape elements while dispersing to reproductive habitats." (Authors)] Address: French, Sarah, Dept Biology, York Univ., 4700 Keele Street, Toronto, Ontario, Canada M3J 1P3. E-mail: sarahkathrynfrench@gmail.com

21417. Garrison, R.W. (2021): Preparation of preserved field collected dried damselfly specimens for character illustrations. International Dragonfly Fund - Report 166: 1-7. (in English) ["Describing new species of odonates almost always involves illustrating primary and secondary reproductive structures that may ordinarily be hidden in preserved field collected material. It is therefore important to illustrate these structures (pronotum, mesostigmal plates, genital ligula, male caudal appendages) so that all characters may be seen. In this paper, I outline procedures I use to relax, manipulate and later preserve specimens for illustration or photographing purposes." (Author)] Address: Garrison, R.W., Plant Pest Diagnostic Center, California Dept of Food & Agriculture 3294 Meadowview Road, Sacramento, CA 958321488, U.S.A. Email: argiavivida@gmail.com

21418. Garrison, R.W. (2021): Imaging preserved damselflies for scientific publications. International Dragonfly Fund - Report 166: 9-20. (in English) ["Preserved Zygoptera are stick-like insects that do not normally render themselves for illustrating color details suitable for scientific publications. Many of the colours in life include shades of blue and green and suffer from postmortem preservation. Especially disappointing is the lack of preservation of the delicate eye colours that are seen in life. In this article, I will show how one can obtain images that mimic as close as possible the life-like colours of specimens that are suitable for publication in scientific papers." (Author)] Address: Garrison, R.W., Plant Pest Diagnostic Center, California Dept Food & Agriculture 3294 Meadowview Road, Sacramento, CA 958321488, U.S.A. Email: argiavivida@gmail.com

21419. Gómez-Tolosa, M.; Rivera-Velázquez, G.; Rioja-Paradela, T.M.; Mendoza-Cuenca, L.F.; Tejeda-Cruz, C.; López, S. (2021): The use of Odonata species for environmental assessment: a meta-analysis for the Neotropical region. Environmental Science and Pollution Research 28: 1381-1396. (in English) ["The order Odonata has been regularly used as an indicator of the ecosystem's condition. The objective of this review was to analyze the importance of Odonata for environmental assessments (assessment types, statistical approach, life stages, and sampling method, or particular metric), summarizing the current state, the trends, and identifying related research issues in the Neotropical region. Therefore, we selected 62 articles from 2007 to 2018 based on published research to monitor Odonata assessments in the Neotropical region. We compiled a database and ran statistical analyses for the observed frequencies. We found that ecosystem health was the most frequent assessment type and quality the most used objective. In the case of statistical tests and metrics, multivariate analyses and species richness were most used in these papers. However, because there is a great diversity of habitats in this region, there is no unique monitoring protocol to assess the quality of ecosystem health and it is needed to create a proposal for a standard evaluation protocol. Consequently, guidelines for monitoring are presented, and we suggest three stages to establish a specific protocol for each site, which records the set of species most sensitive to the exchange rate evaluated, as well as the use of rarefaction methods, the index of diversity based on the area under the curve, and multivariate analysis, among other recommendations." (Authors)] Address: Gómez-Tolosa, María, Programa de Doctorado en Ciencias en Biodiversidad y Conservación de Ecosistemas Tropicales, Instituto de Ciencias Biológicas, Universidad de Ciencias y Artes de Chiapas, Libramiento Norte-Poniente 1150, 29018 Tuxtla Gutiérrez, Chiapas, México. Email: malugomeztolosa@gmail.com

21420. Gould, J. (2021): Hauling up a hefty meal: Long-Jawed spider (Araneae, Tetragnathidae) uses silk lines to transport large prey vertically through the air in the absence of a web. Ethology 127(5): 438-442. (in English) ["The most well-known use of silk among spiders is the formation of webs to capture flying prey. However, spiders have evolved many different foraging strategies involving silk, including the capture and subsequent manipulate of prey prior to consumption. Herein, I report on the use of silk lines by a long-

jawed spider from the Tetragnatha genus to move a large prey item vertically through the air. Field observations revealed a long-jawed spider attaching multiple silk lines across the body of an adult dragonfly that had recently emerged from its final moult and attaching these threads to overlying vegetation to incrementally haul the prey item from the surface of a waterbody. My observations suggest that some Tetragnatha spiders are able to move large prey items that are much heavier then themselves using a series of silk lines that allow lift to be accomplished in a gradual and controlled manner. This is an interesting finding, given that other individuals from the same population were using web structures to passively catch much smaller, flying prey. This indicates that some Tetragnatha spiders not only participate in the mobile pursuit of prey but that they possess multiple foraging strategies that may allow them to exploit a larger number of prey types." (Author)] Address: Gould, J., School of Environmental & Life Sci., Univ. of Newcastle, Callaghan, 2308 NSW, Australia. Email: john.gould@uon.edu.au

21421. Halassi, I.; Elafri, A.; Halassi, I.; Amari, H.; Houhamdi, M. (2021): Phenotypic plasticity and parental effect on rearing of two diverse habitat environment for laboratory reared Sympetrum meridionale. Journal of Bioresource Management 8 (2). DOI: https://doi.org/10.35691/JBM.1202.-0186: 120-130. (in English) ["Laboratory observations on rearing experiment of Odonata serve to answer many evolutionary and ecological questions. In order to evidences the role of species parental habitat provenience in the development behaviour of their offspring, we surveyed several life history traits of two rearing populations of S. meridionale, coming from two different habitats across north-eastern Algeria. The first one is a RAMSAR wetland called 'Mekhada' (a perennial water body), and the second one is a temporary pond located at "Maouna" Mountain (1400 m altitude). Overall, the development patterns of the two populations of dragonflies vary with the type of habitat the parental generation of the species occupy (Factorial ANCOVA: all $p < 0.05$). Firstly, egg mortality was very low in dragonfly population inhabiting the RAMSAR wetland compared of those belonging to Maouna Mountain. Secondly new-borne larvae stemming from females inhabiting the Mekhada wetland develop more slowly than did those coming from the "Maouna" Mountain pond. Finally, larvae of S. meridionale stemming from females inhabiting the temporary wetland were heavier than those inhabiting the perennial wetland. Such studies will ads considerably to our understanding of the mechanisms that are responsible for possible effects of environmental changes on life history traits of dragonflies across the southern part of their distribution range." (Authors)] Address: Halassi, I., Biology, Water & Environment Lab., Faculty SNV-STU, University 8 May 1945 Guelma, BO. 401 24000 Guelma, Algeria

21422. Hammel, S.; Hammel, U. (2021): Nachweis der Kleinen Zangenlibelle (Onychogomphus forcipatus Linnaeus 1758) an der Würm. Jahreshefte der Gesellschaft für Naturkunde in Württemberg 177: 399-402. (in German) ["O. forcipatus was newly found on the banks of the Würm near Weil der Stadt. This is the first record for the northern Upper Gäue and the district of Böblingen." (Authors/DeepL)] Address: unknown

21423. Harmon, J.J.; Smith, G.R. (2021): Invasive fish (Gambusia affinis) as an ecological filter for macroinvertebrate colonization of experimental ponds. Freshwater Science 40(1): 151-161. (in English) ["Invasive predators might serve as ecological filters for prey communities, either through non-consumptive or consumptive effects. The Western Mosquitofish (Gambusia affinis [Baird & Girard, 1853]) is an invasive non-native fish that affects native aquatic communities, potentially because of effects on oviposition or initial colonization of habitats (non-consumptive effects), post-colonization effects (i.e., consumptive effects), or a combination of both non-consumptive and consumptive effects. We conducted a mesocosm experiment to examine non-consumptive and consumptive effects of G. affinis on colonization of experimental ponds by native macroinvertebrates. We predicted that, if G. affinis affects macroinvertebrates through non-consumptive effects, there would be lower abundances in both the non-lethal (caged G. affinis) and lethal (free-ranging G. affinis) treatments compared to the control (no G. affinis), whereas, if the effect of G. affinis is primarily due to consumptive effects, there would be lower abundances of macroinvertebrates in the lethal treatment compared to the non-lethal and control treatments. Most macroinvertebrate taxa (dytiscid beetles, baetid Ephemeroptera, corixid and gerrid hemipterans, libellulid odonates) were less abundant, or even absent, in the presence of G. affinis in the lethal treatment compared to their abundance in the non-lethal G. affinis treatment; however, notonectids were not affected by treatment. The invasive fish predator, G. affinis, therefore, can act as an ecological filter for macroinvertebrates in invaded aquatic habitats, primarily through lethal consumptive effects." (Authors)] Address: Harmon, Johaana; jharmon7@gmail.com

21424. Hauteclair, P.; Seleck, M.; Taymans, J.; Gauquie, B.; Mathelart, C.; Mahy, G. (2021): Rapport synthétique de suivi de la biodiversité du projet Life in Quarries - LIFE14 NAT/BE/000364. Université de Liège, Gembloux Agro-Bio Tech: 94 pp. (in French) [" This final report summarizes the LIFE project's biological monitoring in quarries. After the first inventories of the 27 participating quarries, mainly targeting 5 biological groups (Flora, Birds, Amphibians, Reptilians and Odonates), the biological surveillance focused on the 14 Phase I sites, which were the subject of new inventories, 2018 and then 2020, are aligned with LIFE measures and allow for the assessment of biodiversity development after these measures." (Google Translate) Information on Odonata focus on Sympecma fusca, Ischnura pumilio, Orthetrum coerulescens and O. brunneum.] Address: https://orbi.uliege.be/handle/2268/266063

21425. Hermans, J.T. (2021): The Dainty damselfly (Coenagrion scitulum) in the Dutch province of Limburg (Odonata: Coenagrionidae). The expansion of a southern damselfly. Naturhist. maandbl. 110(3): 39-49. (in Dutch, with English summary) ["C. scitulum has a disjunct, mainly southwestern Mediterranean distribution. To the east its distribution becomes more patchy. Since the 1990s it has shown a strong northward expansion and has colonised north-eastern France, south-eastern England, Belgium, Germany and the Netherlands. In 2003, the first male was observed in the Dutch province of Limburg, followed by the discovery of an established population in 2010 in the southern part. From then on it quickly colonised many places, mainly in the southern and central parts of the province. The present distribution in Limburg of this delicate blue damselfly has been thoroughly recorded, as has detailed information on its habitat and preferred vegetation structure. In most of the areas studied in central Limburg it is found around sunny, small and shallow water bodies rich in hydrophytes, where it seems to prefer bankside vegetation dominated by Common Spike-rush (Eleocharis palustris). In view of this successful expansion it is expected that it will spread further to the northernmost

parts of the province, which should be carefully followed and monitored." (Author)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands. Email: jthermans21-@gmail.com

21426. Kanke, E.; Suzuki, K.; Sekiné, K.; Suzuki, T.; Hatta, K.; Yang, M.-M.; Tojo, K. (2021): Unexpected population genetic structure in two closely related euphaeid damselflies from the Yaeyama and Taiwan Islands (Odonata: Euphaeidae). Biological Journal of the Linnean Society 134(1): 214-228. (in English) ["In general, population genetics theory predicts that a fragmented smaller population will contain relatively less genetic diversity than a larger population, and so will have a higher rate of genetic fixation due to random genetic drift or inbreeding. However, in this study, having analysed the genetic structure of the mitochondrial DNA COI region between two closely related euphaeid damselflies, we obtained unexpected results which contradict the theoretically expected patterns. Despite their geographical proximity, Euphaea yayeyamana was clearly genetically isolated on Ishigaki and Iriomote Islands, and no haplotype crossovers were observed. Even within each island, several diverse haplotypes were observed, indicating a significantly high haplotype intra-island diversity. However, the genetic diversity within Taiwan's population of Euphaea formosa was significantly lower than that within either Ishigaki or Iriomote Island, even though Taiwan is significantly larger, with high mountain ranges that reach c. 4000 m a.s.l. and an abundance of habitats, all factors that should contribute to high genetic diversity. The current low diversity status for Taiwan's population may be due to genetic bottleneck effects. In contrast, despite the very small population sizes of Ishigaki and Iriomote Islands coupled with the effects of glacial and interglacial geological events, they have maintained markedly high genetic diversity." (Authors)] Address: Tojo, K., Dept Biol., Fac. Sci., Shinshu Univ., Asahi 3-1-1, Matsumoto, Nagano 390-8621, Japan. E-mail: ktojo@shinshu-u.ac.jp

21427. Kleinsteuber, W. (2021): Reproduktionsnachweise der Pokaljungfer Erythromma lindeni (Selys, 1840) in der Weißen Elster im südlichen Sachsen-Anhalt (Insecta: Odonata, Coenagrionidae). Entomologische Mitteilungen Sachsen-Anhalt 29(2): 78-85. (in German) ["E. lindenii could be observed on the White Elster River between 2017 and 2021 on a total flow lenght of about 23 km. Larval detections have demonstrated successful reproduction of the species for at least five years. Thus, E. lindenii currently reaches its southernmost and easternmost distribution limit in Saxony-Anhalt." (Author)] Address: Kleinsteuber, W., Hirtenweg 15, 04425 Taucha, Germany. E-mail: aquahet@gmx.net

21428. Kring, T. (2021): Die Bestandserhebung der Libellenfauna im Naturschutzgroßprojekt Baar. Naturschutz und Landschaftspflege Baden-Württemberg 80: 3-14. (in German) ["As part of the creation of the management plan for the Baar Nature Conservation Project (NGP Baar), studies of the dragonfly fauna were carried out at 31 sample waters in nine of the 17 funded areas. A total of 35 of the 75 dragonfly species found in Baden-Württemberg (Germany) were detected. Of the mapped species, nine dragonflies are on the Red Lists and Forewarned Lists of Germany and/or Baden-Württemberg. From these, six species were selected as target species for the Baar NGP." (Author/DeepL).] Address: Kring, T., Landratsamt Schwarzwald-Baar-Kreis, Naturschutzgroßprojekt Baar, Möglingshöhe, Neckarstraße 120, 78056 Villingen-Schwenningen, Germany. Email: t.kring-@lrasbk.de

21429. Lam, Y.T.; Kamarudin, K.R.; Zakaria, M.Z.; Omar, M.S.S.; Tokiman, L.; Jahari, S.; Mohd Salleh, F. (2021): Mitochondrial barcodes of dragonflies and damselflies originated from Taman Negara Endau Rompin, Johor, Malaysia. IOP Conference Series: Earth and Environmental Science 736 012032: 5 pp. (in English) ["Odonata are important biological indicators in freshwater ecosystems. However, identification among Odonates is often challenging due to their similar morphological features. Therefore, the incorporation of morphological identification by taxonomists and validation using mitochondrial barcodes such as cytochrome c oxidase subunit I (COI) can be a more reliable approach to enhance the accuracy in species identification. In this study, four COI barcodes for Malaysian dragonflies (Neurothemis fluctuans) and damselflies (Neurobasis chinensis, Aristocypha fenestrella and Sundacypha petiolata) were generated. Three of the generated barcodes (D2 COI, D4 COI and D5 COI) supported the species identified by taxonomists meanwhile D3 COI deduced that the damselfly species was misidentified due to the very similar morphology between the same genus of damselfly. All of the COI barcodes are now available in the GenBank with the accession numbers of MT266926.1 (D2 COI), MT266925.1 (D3 COI), MT266976.1 (D4 COI) and MT266924.1 (D5 COI)." (Authors)] Address: Jahari, P.N.S., Department of Biosciences, Faculty of Science, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia. Email: puterijahari22@gmail.com

21430. Lambret, P.; Janssens, L.; Stoks, R. (2021): The impact of salinity on a saline water insect: contrasting survival and energy budget. Journal of Insect Physiology 131(1764): 104224: (in English) ["Highlights: • Salinity has no effect on Lestes macrostigma egg hatching success. • Larval growth rate decreased with increasing salinity. • Survival to metamorphosis increased with salinity up to 8 g/L and declines at 16 g/L. • Increasing salinity in the larval stage decreased the energy budget in the adult. • Negative sublethal effects of salinity bridged metamorphosis. Abstract: Water salinity is a major driver of aquatic insects' distribution. Saline species are usually generalists with high survival and performance at both low and high salinity levels. Yet, costs of high salinity may be underestimated as these are most often measured in terms of larval life history traits, while effects of larval stressors may only be detectable when looking at physiological traits and traits in the adult stage. Here, we assessed the lethal and sublethal physiological effects of embryonic and larval exposure to a range of salinity levels in the damselfly Lestes macrostigma, both during and after metamorphosis. This species inhabits temporary freshwaters where salinity increases during the drying phase. Salinity had no effect on egg hatching success within the range 2-9.5 g/L sea salt (conductivity range 3.45-14.52 mS/cm). With increasing salinity (up to 16 g/L, 23.35 µS/cm), growth rate decreased and larvae took longer to emerge and did so at a smaller size. Larval survival to metamorphosis increased with salinity up to 8 g/L (12.45 mS/cm) and then declined at 16 g/L. Exposure to salinity in the larval stage had no effect across metamorphosis on both the adult thorax muscle mass and flight performance, and the investment in immune function. Increasing salinity in the larval stage also had no effect on the energy available but increased the energy consumption in the adult stage, resulting in a lower net energy budget. These negative sublethal effects of increasing salinity hence bridged metamorphosis and contrasted with the mortality data, suggesting that the higher mortality at the low salinity levels selected for larvae with the best body condition. Our results highlight the importance of taking into account other life-history and physiological

traits, besides mortality, ideally across different life stages, to better understand and predict consequences of increasing salinization on freshwater insects." (Authors)] Address: Lambret, P., Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Le Sambuc, 13200 Arles, France. Email: lambret@tourduvalat.org

21431. Maggioni, D.; Assandri, G.; Ramazzotti, F.; Magnani, D.; Pellegrino, I.; Valsecchi, E.; Galimberti, A. (2021): Differential genetic variability at two mtDNA COI regions does not imply mismatches in Odonata molecular identification performances. The European Zoological Journal 88(1): 425-435. (in English) ["Molecular-based approaches for species identification and delimitation strongly rely, in terms of universality and efficiency, on the selected markers. Conventionally, when adopting a DNA barcoding approach to discriminate (or identify) metazoans species, the marker choice falls on the 658 base pair region at the 5' end of the mitochondrial COI gene. However, a growing number of studies suggest to use alternative and more variable genetic regions, even from the same gene, such as the 3' end of the COI. In this work, we compared the identification performance of the 5' and 3' end COI regions on a large sequence dataset of odonate species, an order of arthropods among the most studied in terms of conservation importance for aquatic ecosystems. The genetic datasets comprised a total of 236 specimens, 113 species, 51 genera and 12 families spanning the two odonate suborders Zygoptera and Anisoptera, and were analysed under an integrative multiple approach including descriptive statistics and variability of the sequences, phylogenetic reconstructions, DNA-based species delimitations, genetic distances, identification of diagnostic characters and saturation plots. All analyses were congruent in recovering the COI-3' region to be slightly more variable than the COI-5' one, and both regions showed a saturation of transversion at the third codon position. However, phylogenetic reconstructions, genetic distances, and diagnostic characters identification resulted in a similar discrimination power for the two COI regions. Therefore, the COI-3' region does not add much information to the standard COI-5' barcode region, which has in turn largely been demonstrated to successfully delineate invertebrate communities through DNA and eDNA metabarcoding, and to have a much more extensive taxonomic coverage in public databases. Overall, the DNA barcoding inventory assembled in this study will provide valuable insights into the systematics and conservation of many odonate species with implications for future DNA and eDNA monitoring-based studies." (Authors)] Address: Maggioni, D., Dept Environ. & Earth Sci. (DISAT), Univ. of Milano - Bicocca, Milan, Italy

21432. McEachin, S.C. (2021): Microhabitat selection and interspecific aggression in rubyspot damselflies (Hetaerina). PhD thesis, Biology, University of California, Los Angeles: xvii, 126 pp. (in English) ["Interspecific aggression is a complex interaction with important evolutionary and ecological implications. While it can be an adaptive response to reproductive interference, it bears costs including energy expenditure, loss of territory, and missed mating opportunities. Consequently, species may diverge in habitat preferences or exhibit spatial partitioning, which reduce the costs of fighting. However, empirical evidence of such shifts is lacking. I studied the relationship between interspecific aggression, habitat partitioning, and spatial segregation in interspecifically aggressive species of rubyspot (Hetaerina) damselflies. In Chapter 1, I explored whether species differences in microhabitat use reduce the frequency of interspecific fighting in 25 sympatric population pairs. I found that almost all population pairs had lower observed rates of interspecific fighting relative to chance expectations. Reduced rates of interspecific fighting were explained by competitor recognition, species differences in microhabitat use, and spatial segregation. I also found strong positive correlations between heterospecific aggression and species differences in microhabitat use, likely explained by competitive displacement and/or agonistic character displacement, and between heterospecific aggression and spatial segregation. These correlations were explored further in Chapters 2 and 3. In Chapter 2, I tested the competitive displacement hypothesis using removal experiments. If competitive displacement occurs, territory holders of the subordinate species should shift their microhabitat use to that of the dominant species in the absence of the dominant species. However, I found no evidence of such shifts. I therefore reject the competitive displacement hypothesis and conclude that species have likely evolved divergent microhabitat preferences through agonistic character displacement. In Chapter 3, I examined the correlation between heterospecific aggression and spatial segregation. Spatial partitioning is common among competing species, but there are numerous mechanisms that can cause species to be spatially segregated. Conspecific attraction is a widespread habitat selection mechanism, but the potential for it to cause spatial partitioning between interspecifically aggressive species is unknown. I explored this question by comparing the clustering of territories to a model that simulates territory settlement from microhabitat availability. I found that both conspecific attraction and microhabitat preferences contribute to the spatial partitioning between interspecifically aggressive species." (Author) Hetaerina americana, H. vulnerata, H. sempronia, H. capitalis, H. cruentata, H. majuscula, H. occisa, H. miniata, H. fuscoguttata.] Address: McEachin, S., Dept Ecol. & Evol. Biology, Univ. of California Los Angeles, 621 Charles Young Drive South, Los Angeles, CA 90095–1606, USA

21433. Mercado Costa, N.G.; Melo, C.M.; Melo, A.H.; Silva de Araújo, R.I.; Soares Vieira, L.J. (2021): Ordem Odonata como bioindicadores em biomonitormento no Brasil: Uma revisao sistemáta - Odonata order as bioindicators in biomonitoring in Brazil: A systematic review. South American Journal of Basic Education, Technical and Technological 8(1): 22 pp. (in Portuguese, with English summary) ["Odonata's life history has a number of characteristics that make these insects important in detecting the effects of changes in environmental integrity. In Brazil there are about 828 species distributed in 14 families and 140 genera of the order Odonatas. Thus, the present work aimed to perform a systematic review of the main studies that used the Odonata Order as bioindicators in Brazil. A literature review was performed in the Scientific Electronic Library Online (SCIELO), National Institute of Health (PUBMED), Web Of Science and SCOPUS databases, using the following descriptors: ‘‘biomonitoring,'' ‘‘Odonata,’’ ‘‘bioindicators.’’ A total of 35 articles were selected, where they were organized in a descriptive table, presenting information related to the works. According to the results obtained, it was noted that the different families of the studied order present particularities and show great potential as environmental bioindicators." (Authors)] Address: Melo, Caroline, Discente no Programa de Pós-Graduação em Ciência, Inovação e Tecnologia para a Amazônia Ocidental (CITA), Universidade Federal do Acre (UFAC), Brasil. E-mail: carolinnemm@gmail.com

21434. Mitchell, A.; Ware, J.L.; Theischinger, G. (2021): Molecular phylogenetics of Petalura Leach, 1815 (Odonata: Petaluridae). Odonatologica 50(1): 143-158. (in English) ["DNA

sequence data was derived for all five described species of Petalura Leach, 1815, for eight gene fragments from the mitochondrial and nuclear genomes. Phylogenetic analyses suggest that there are only four clearly distinct species in the genus. They are Petalura gigantea, P. hesperia, P. ingentissima, and P. litorea. Petalura pulcherrima Tillyard, 1913, is found to group with P. ingentissima Tillyard, 1908, and is formally synonymized with this species." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

21435. Moore, M.P. (2021): Larval habitats impose trait-dependent limits on the direction and rate of adult evolution in dragonflies. Biology Letter 17(5): 5 pp. (in English) ["Natural selection on juveniles is often invoked as a constraint on adult evolution, but it remains unclear when such restrictions will have their greatest impact. Selection on juveniles could, for example, mainly limit the evolution of adult traits that mostly develop prior to maturity. Alternatively, selection on juveniles might primarily constrain the evolution of adult traits that experience weak or context-dependent selection in the adult stage. Using a comparative study of dragonflies, I tested these hypotheses by examining how a species' larval habitat was related to the evolution of two adult traits that differ in development and exposure to selection: adult size and male ornamentation. Whereas adult size is fixed at metamorphosis and experiences consistent positive selection in the adult stage, ornaments develop throughout adulthood and provide context-dependent fitness benefits. My results show that species that develop in less stable larval habitats have smaller adult sizes and slower rates of adult size evolution. However, these risky larval habitats do not limit ornament expression or rates of ornament evolution. Selection on juveniles may therefore primarily affect the evolution of adult traits that mostly develop prior to maturity." (Author) Electronic supplementary material is available online at https://doi.org/10.6084/m9.figshare.c.5412042.] Address: Moore, M.P., Living Earth Collaborative, Washington Univ., St Louis, MO 63130, USA. Email: moore.evo.eco@gmail.com

21436. Mosquera-Murillo, Z.; Mosquera-Mosquera, M. M. (2021): Riqueza genérica y distribución de los odonatos (Insecta: Odonata) del departamento del Chocó, Colombia. Bol. Cient. Mus. Hist. Nat. U. de Caldas 25(1): 191-205. (in Spanish, with English summary) ["Generic richness and distribution of Odonates (Insecta: Odonata) in the department of Chocó, Colombia. Abstract: Objective. To contribute to the taxonomic knowledge and distribution of Odonates in the Department of Chocó and in Colombia. Scope. To present a preliminary record on the richness and distribution of Odonata in the Dept of Chocó. Methodology. Specimens are deposited in the Choco Limnological Collection, CLCH-Insec (Universidad Tecnologica del Chocó), collected between 2004 and 2019 were reviewed. Main results. A total of 1,344 individuals were counted corresponding to 11 families and 29 genera, associated with 97 water currents of different order and 18 lentic ecosystems of the Atrato, San Juan and Baudó river basins located in 20 municipalities of the Department of Choco. Coenagrionidae is the most abundant family and Libellulidae the one with the largest distribution while Gomphidae exhibits the greatest generic richness. The genera Coryphaeschna, Aeschnosoma, Aphylla, Ophiogomphus, Erpetogomphus, Orthemis, Telebasis, Acanthagrion and Heteropodagrion are new records for the department of Chocó. The greatest taxonomic richness is found in the Atrato river basin, followed by San Juan and Baudó. The stone substrate is the one with the highest specific richness. Conclusions. The first preliminary inventory of the generic richness and distribution of the order Odonata in the department of Chocó is established, which made it possible to demonstrate the diversity of the order in the region." (Authors) Boyeria and Ophiogomphus don't occur in Columbia.] Address: Mosquera-Murillo, Zuleyma, Fac. Cien. Naturales. Grupo de Limnología. Univ. Tecnológica del Chocó. Chocó Colombia. E-mail: zuleyma.mosquera@utch.edu.co

21437. Nicolla, A.C.; Irsyad, A.N.; Firdasia, W.; Sarifah, Z.; Nilamsari, E.I.; Umah, N.; Daradwinta, R.; Sukirno, S. (2021): Comparison of damselfly (Odonata: Zygoptera) diversity in wet dune slack habitat with canopied and non-canopied areas of Gumuk Pasir Parangkusumo, Yogyakarta, Indonesia. IOP Conference Series: Earth and Environmental Science 736: 10 pp. (in English) ["Gumuk Pasir Parangkusumo is one of the unique eolian ecosystem in Yogyakarta. This place which mostly formed by dune which in the rainy season is flooded by water, thus forming a pool called wet dune slack. Zygoptera are closely related to the occurrence of water. The aim of this research is to compare the diversity of damselflies in canopied and non-canopied areas on Gumuk Pasir Parangkusumo, Yogyakarta, Indonesia. The method which used in this research was the descriptive method with active exploration techniques around the wet dune slack to the vegetation formation. The result showed that there are 4 species of damselflies in canopied area and 5 species of damselflies in non-canopied area. The diversity index (H') is 1.18 in canopied area and 1.01 in non-canopied area. The highest relative abundance of the species in canopied area is Ischnura senegalensis (45,65%) whereas in non-canopied area is Agriocnemis pygmaea (62,34%). The non-canopied areas has conditions more suitable for damselflies's life." (Authors) Agriocnemis femina, A. pygmaea, Ischnura senegalensis, Pseudagrion microcephalum, Lestes praemorsus] Address: Nicolla, A.C., Faculty of Biology, Universitas Gadjah Mada, Yogyakarta, Indonesia. Email: andracarel99@mail.ugm.ac.id

21438. Palacio, A. del (2021): Revisión filogenética del Grupo Connata del Género Erythrodiplax Brauer, 1868 (Odonata: Libellulidae). Tesis de doctorado, Ciencias Naturales, Universidad Nacional de La Plata: 302 pp. (in Spanish, with English abstract) ["The genus Erythrodiplax was established by Brauer (1868), to gather ten American species (order as follows): E. fusca, E. confusa, E. chloropleura, E. anomala, E. umbrata, E. superba, E. distinguenda, E. plebeja, E. leontina and E. connata. It is currently the most speciose libellulid genus in the American continent, and presently it comprises 58 species distributed from the south of Canada up to 45 ° S in Patagonia. Its species are inhabitants of different types of wetlands, and many of them may be abundant in lentic habitats like temporary pools, salt marshes and river ponds. Species of the genus can be small to medium (20–50 mm) and are characterized by: brown red or black colored head, with or without a metallic blue reflection; pterothorax yellow/brown to black and covered with bluish pruinescence in mature males. Hyaline wings with black, red or orange spots; last antenodal vein of front wing incomplete (except in some specimens of E. tenuis); generally 1 bridge crossvein (rarely 2-3) and 1 cubitoanal crossvein (rarely 2-4); generally with free triangles; medial supplemental vein (Mspl) indistinct, although some species with up to 1 or 2 rows of cells. Posterior lobe of prothorax curved caudally. Abdomen triangular in cross section. Male genitalia with anterior lamina entire; posterior hammule bifid, with the inner branch smaller than the outer branch; distal segment of the vesica spermalis long and cylindrical, with

complex and largely hidden distal lobes, gradually widening to the rounded or bluntly angulated tip except for some specimens of E. berenice. Female with vulvar lamina scoop-shaped and ventrally directed. In 1942 Borror made the only available review of the genus Erythrodiplax. It offers a complete generic characterization, taxonomic lists, keys, the description of more than one dozen new species and provides a formal division of the genus into 12 groups of species: Connata (10 species), Castanea (two species), Attenuata (three species), Longitudinalis (three species), Unimaculata (10 species), Famula (two species), Umbrata (one species), Funerea (one species), Basalis (11 species), Nigricans (one species), Juliana (one species)) and Acantha (one species). However, the characters used to differentiate between the groups are unclear, and many species described after Borror's work have not been formally assigned to any of the groups. The Connata group is the most specious of the genus, and is currently made up of the following 14 species, E. abjecta, E. atroterminata, E. basifusca, E. bromeliicola, E. cauca, E. cleopatra, E. connata, E. fusca, E. ines, E. justiniana, E. media, E. melanorubra, E. minuscula and E. paraguayensis. The group is characterized by the following combination of characters: wide antehumeral stripe, outer branch of the hammule larger than or as long as the inner one, 10-15 spines in femur III, vulvar laminar 2/3 of the width of segment 9, among others. These characters present a certain degree of interspecific variation, therefore, the delimitation of groups is based mainly on characters derived from male genitalia. The main characters derived from the vesica spermalis that define the Connata group are: generally with apical tubercle, small and rounded lateral lobes, medium process overlapping the lateral lobes and erectile lobe, apex of middle process with bristles, small and erectile posterior lobe, apical lobe shorter than lateral lobes. The species of this group are relatively abundant in national and international collections. However, its correct identification is extremely complicated mainly due to the morphological and color similarities, and the difficult observation of the characters derived from the lobes of the vesica spermalis. The main objective of this work is to clarify the taxonomic status of the species of the Connata group. To this end, a systematic review of the Connata group was carried out for which the redescriptions of the species of this group were provided, the variability of the characters derived from the color pattern was determined, a detailed study of the structures derived from the fourth segment of the vesica spermalis was done, and finally a cladistic analysis of the Connata group was also done, including representatives of the remaining groups proposed by Borror, in order to redefine and re-diagnose the stability and composition of groups, based on modern systematic methods. The results verify that the characters derived from the ultrastructure of the vesica spermalis are fundamental in the systematic study of the species of the genus Erythrodiplax. The methodology developed for the preparation of vesicas is of utmost importance for the observation of the characters and their correct interpretation. On the other hand, the cladistic analysis discards the monophyly of the genus Erythrodiplax. When considering both Uracis and Rhodopygia as outgroups, the species belonging to the Castanea, Famula and Umbrata groups are basal to the Uracis/ Rhodopygia + the remaining species of Erythrodiplax. However, the monophyly of the Connata group is supported, although the relationships between its species could not be resolved. Finally a diagnosis of all species within the genus, data on geographical distribution and keys in particular for the species included within the Connata group are provided." (Author)] Address: Palacino-Rodriguez, F., Grupo de Investigación en Biología (GRIB), Depto de Biología, Univ. El Bosque Av. Cra. 9 No. 131ª-02, Colombia. E-mail: odonata17@hotmail.com

21439. Petzold, F. (2021): Rote Liste der Libellen (Insecta: Odonata) Thüringens. 5. Fassung, Stand: 11/2020. Naturschutzreport 30: 94-98. (in German) [Red List of Odonata, Thuringia, Germany] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: petzold.falk@googlemail.com

21440. Romero, G.Q., Moi, D.A., Nash, L.N., Antiqueira, P.A.P., Mormul, R.P.; Kratina, P. (2021): Pervasive decline of subtropical aquatic insects over 20 years driven by water transparency, non-native fish and stoichiometric imbalance. Biol. Lett.172021013720210137. http://doi.org/10.1098/rsbl.2021.0137: 8 pp. (in English) ["Insect abundance and diversity are declining worldwide. Although recent research found freshwater insect populations to be increasing in some regions, there is a critical lack of data from tropical and subtropical regions. Here, we examine a 20-year monitoring dataset of freshwater insects from a subtropical floodplain comprising a diverse suite of rivers, shallow lakes, channels and backwaters. We found a pervasive decline in abundance of all major insect orders (Odonata, Ephemeroptera, Trichoptera, Megaloptera, Coleoptera, Hemiptera and Diptera) and families, regardless of their functional role or body size. Similarly, Chironomidae species richness decreased over the same time period. The main drivers of this pervasive insect decline were increased concurrent invasions of non-native insectivorous fish, water transparency and changes to water stoichiometry (i.e. N : P ratios) over time. All these drivers represent human impacts caused by reservoir construction. This work sheds light on the importance of long-term studies for a deeper understanding of human-induced impacts on aquatic insects. We highlight that extended anthropogenic impact monitoring and mitigation actions are pivotal in maintaining freshwater ecosystem integrity." (Authors)] Address: Romero, G.Q., Lab. of Multitrophic Interactions & Biodiversity, Dept Animal Biology, Inst. Biol., Univ. of Campinas (UNICAMP), Campinas, SP 13083-862, Brazil. Email: gqromero@unicamp.br

21441. Rusu-Stiévenard, A.; Houard, X. (2021): Agir en faveur des libellules: poursuite du plan national. insectes n°202 septembre 2021: 29-33. (in French) ["The new National Action Plan dedicated to dragonflies will ensure for ten years the consolidation of the actions implemented by the first plan as well as the development of new initiatives over a longer period. The experience acquired previously has made it possible to establish new lines of action, always based on regional variations. Among the new initiatives, a monitoring program for Odonata gomphidae and priority Anisoptera will be effective from 2022."(Author/Google translate)] Address: Amélie Rusu-Stievenard. Email: amelie.rusu-stievenard@insectes.org

21442. Ware, J.L. (2021): Odonata. Current Biology 31(2): R58-R59. (in English) [Brief introduction into odonatology: https://www.cell.com/current-biology/pdf/S0960-9822(20)-31677-8.pdf] Address: Ware, Jessica, American Museum of Natural History, New York, NY10024, USA. E-mail: jware@amnh.org

21443. Zheng, D.; Jarzembowski, E.A.; Zhuo, D.; Nel.A. (2021): Protohemiphlebiidae fam. nov., a stem hemiphlebioid damselfly from Cretaceous amber in Kachin. Geological Society London Special Publications 521: 171-184. (in English) ["Hemiphlebiidae are the most basal lestomorphan family following the latest phylogenetic analysis of the

Zygoptera: this unique damselfly family today contains one relict species found in the wetlands of Australia. It was, however, very diverse and widespread during the Mesozoic. Nevertheless, very few species were known obscuring the origination and early evolution of the family. Here we propose a new stem hemiphlebioid taxon (Protohemiphlebiidae Zheng, Jarzembowski & Nel, fam. nov.) based on a new genus and two species: Protohemiphlebia zhangi Zheng, Jarzembowski & Nel, sp. nov. and Protohemiphlebia meiyingae Zheng, Jarzembowski & Nel, sp. nov. The new family shares the characters of both Hemiphlebiidae and Coenagrionoidea, but it is more closely related to Hemiphlebiidae in having the pterostigma with a 'star-shaped' microsculpture, and AA originating from the wing base slightly distal of Ax0. Protohemiphlebia Zheng, Jarzembowski & Nel, gen. nov. is further considered to belong to the stem group of Hemiphlebioidea, instead of belonging to the Hemiphlebiidae, in possessing pretibial combs and a weakly kinked RP1 below the Pt-brace. The new damselflies will help to calibrate the origin of Hemiphlebiidae, which could be earlier than their current oldest records in the Kimmeridgean (Late Jurassic)." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.-mnhn.fr

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21444. Adak, R.; Mandal, A.; Saha, S. (2022): Aerodynamic performance of a tandem wing configuration inspired from dragonfly gliding flight for MAV application. Proceedings of the 9th International and 49th National Conference on Fluid Mechanics and Fluid Power (FMFP). December 14-16, 2022, IIT Roorkee, Roorkee-247667, Uttarakhand, India, FMFP2022-3398. 5 pp. In English ["The design of micro air vehicles (MAVs) introduces aerodynamic performance challenges due to the small size and, consequently, the low Reynolds number (O(104-5)). Natural fliers are naturally optimized and are comparable in size to MAVs, making them a potent candidate to mimic for the design of MAVs. The dragonfly frequently uses a gliding mode of flight relative to the other small fliers and operates at a range of O(102-4). The literature suggests that the corrugated profile improves the aerodynamic efficiency around Re at 104. It allows us to investigate the aerodynamic advantages of tandem corrugated airfoil inspired by the dragonfly wing. In this paper, we perform direct numerical simulations of flow past bio-inspired corrugated wing to understand the impact of the tandem wing configuration. The horizontal distance between the wings is fixed, and the vertical distance varies. The results reveal that the forewing/hindwing interaction increases the lift of the forewing relative to the isolated wing for all the case studies. The combined drag coefficient drops by ≈7%, and overall efficiency drops by ≈13% relative to an isolated wing for a case study with zero vertical spacing between forewing and hindwing at 3? angle of attack, fixed for both wings. With no vertical gap, the aerodynamic efficiency matches close to the isolated wing with the decrease in tandem wing combined drag coefficient compared to an isolated wing." (Authors)] Address: Adak, R., Dept Aerospace Engineering, IIT Kharagpur, Kharagpur-721302, India

21445. Adu, B.W.; Ileke, K.D.; Olorunmeke, O.A. (2022): A preliminary study of biodiversity and biomonitoring potential of Odonates of Benin-Owena River Basin catchment, Igbara-Oke, Ondo State, Nigeria. International Journal of Tropical Insect Science 42: 2853-2864. (in English) ["Ecologically, Odonata are good indicators of aquatic and terrestrial ecosystem. They are abundant and important members of the vicinity of inland waters. This study was carried out at Benin – Owena Basin catchment, Igbara-Oke, Nigeria. Sampling was carried out at three water bodies within the catchment of Rivers Aro, Elemo and Owena Dam. The water bodies were selected based on types of water body and prevailing anthropogenic activities around their vicinity. Sampling of specimens was randomly carried out once a month from 9am$_{-2}$ pm between June, 2017 and July, 2018. Odonata naiads were collected using Kick net. Species composition, distribution and richness of the study sites were calculated using diversity indices (Shannon–Wiener, Simpson, Margalef, Evenness and Equitability). Monthly collections of odonates revealed that January 2018 had the highest number of species while the least was in April 2018. Two anisopterans, Neodythemis klingi and Orthetrum julia both with 30 individuals, were the dominant odonate species. Pseudagrion kersteni (19 individuals) was the dominant zygopteran while Africallagma subtile (2 individuals) was the least represented odonate in this study. From the diversity indices analyses, Owena Dam was the richest (Shannon (H`) = 3.12, Simpson = 0.9521, Margalef = 4.42). The site was also the best in terms of distribution and spread of odonate species (Equitability = 0.9693). Similarity in odonate community structure among the 3 study sites was determined using Jaccard Coefficient (Coefficient of Community: CC), The CC analysis showed Elemo Stream and Owena Dam as the sites with similar community structure; and the diversity indices revealed Owena Dam as the richest site with the best species distribution." (Authors)] Address: Ileke, K.D., Dept Biology, School Science, Federal Univ. Technology, Ondo State, PMB 704, Akure, Nigeria

21446. Almeida, T.R. de; Salomoni, S.; Vilela, D.S.; Guillermo-Ferreira, R. (2022): Male agility in relation to mating success in two non-territorial damselflies. Austral Ecology 47(8): 1569-1577. (in English) ["Male body size is usually correlated with mating success in insects. For non-territorial species, the small male advantage hypothesis predicts that smaller males may be favoured in sexual selection because small body size may predict agility and manoeuvrability. Consequently, selection for male size may drive the evolution of female-biased sexual size dimorphism (SSD). Nevertheless, recent evidence shows that non-territorial male damselflies that actively search for females may be larger and more agile than those that perch and wait for females to appear. Thus, here we addressed whether the male size is an indicator of male agility and if it may be used to predict male reproductive success in two non-territorial damselflies. To this end, we conducted a field study with Acanthagrion truncatum Selys, 1876 and A. lancea Selys, 1876 (Zygoptera, Coenagrionidae). Males of A. truncatum adopt a sit-and-wait mating strategy, while the males actively search for females in A. lancea. Hence, we expected different selective forces acting on male body size and agility in these species. We compared the body size and wing length of mated and unmated males, and between sexes, to describe their patterns of SSD. Our results suggest that wing length can be used as a proxy for male body size and agility in both species. However, we have found no evidence for the small male advantage that could explain wing dimorphism in A. truncatum, nor selection for larger males in A. lancea. In conclusion, this study corroborates other studies that suggest agility cannot explain SSD in non-territorial damselflies and fail to support the small male advantage hypothesis." (Authors)] Address: Guillermo-Ferreira, R., Lestes Lab, Federal Univ. of Triangulo Mineiro – UFTM, Uberaba, Brazil. Email: rhainerguillermo@gmail.com

21447. Amann, P. (2022): Heuschrecken (Orthoptera) und Libellen (Odonata) im Kleinwalsertal (Vorarlberg, Österreich). inatura - Forschung online 104: 17 pp. (in Geman) ["Due to its isolated location, Kleinwalsertal has been somewhat neglected by Vorarlberg naturalists. The aim of this research project is to provide up-to-date information on species structure and distribution for the two animal groups grasshoppers and dragonflies. In a first step, based on the biotope inventory, areas were selected that could be expected to have a species-rich and characteristic fauna for Kleinwalsertal. A total of 30 grasshopper sites and 16 sites for dragonflies were selected, although these could also be identical. In the summer of 2022, the sites were visited in mid-June, mid-July and mid-August and the species were documented. The focus of the recordings in June was on dragonfly observations; in August, the subalpine areas of the Schwarzwasserhütte and Hohen Ifen were also examined for their fauna. The recordings were marked by a hot summer. In all 3 recording months, average temperatures prevailed that were significantly above the long-term average. For example, the temperature in July was about 5 degrees Celsius warmer than the long-term average. This month also had very little precipitation. As a result, the moors were very dry: In many cases, swales and depressions were dried out, and it was rare to get wet. 17 dragonfly species were recorded in the study area, including Aeshna subarctica [also Somatochlora alpestris and S. arctica] "threatened with extinction" in Vorarlberg. 5 species were newly documented for Kleinwalsertal. … The subsequent discussion of the grasshopper and dragonfly species found (with information on their protection status) is followed by an attempt to assess the species on the basis of their protection status. A final assessment of the Kleinwalsertal valley as a dragonfly and grasshopper habitat as well as a discussion on responsibility round off the work.) (Author/DeepL)] Address: Amann, P., Wiesenbachweg 8, 6824 Schlins, Austria. Email: paul.amann-begle@outlook.com

21448. Battisti, A.; Bosio, G. (2022): The dragonflies (Odonata) of the Mont Avic and Mont Emilius massif (NW- Italy): reflections on the evolution of the community and focus on the genera Leucorrhinia and Somatochlora. Rev. Valdôtaine Hist. Nat. 76: 69-87. In Italian, with English summary ["The surveys carried out in the years 2019 – 2021 permit to improve the knowledge of the dragonflies of the Special Protection Area IT1202020 “Mont Avic and Mont Emilius” (Aosta valley). New populations of Somatochlora arctica and Leucorrhinia dubia were discovered. The new population of S. arctica is located in the Mont Avic Natural Park and represents the southernmost population of the Italian Alps, with confirmation of the species between 1.729 m and 2.053 m of altitude, in habitats shared with Somatochlora alpestris. The new population of L. dubia is located at 1.700 m, in a small acid lake with the presence of alien fish species (Salvelinus fontinalis and Salmo trutta) which threaten the entire dragonfly community present here. A detailed distribution of S. arctica, S. alpestris and L. dubia in the SPA IT1202020 is reported, together with first results from semi-quantitative monitoring for these species. The checklist of the Odonata of the SPA IT1202020 is updated; three species are added (Coenagrion puella, S. arctica and Sympetrum fonscolombii) and the highest breeding Italian altitudinal records for Enallagma cyathigerum (2.289 m) and L. dubia (2.316 m) were reported. Main threats and pressures affecting the dragonfly community are discussed. The presence of alien fish species seems to be the main direct threat for dragonflies in the area. Finally, a preliminary mapping of the wetlands of the study area is provided." (Authors)] Address: Battisti, A., Parco Naturale Mont Avic. Loc. Covarey, 21, 11020 Champdepraz (AO). Italy. Email: andre.battisti@gmail.com

21449. Bellstedt, R.; Krebs, D. (2022): Bericht zur Gemeinschaftsexkursion des Thüringer Entomologenverbandes e.V. (TEV) im Juni 2022 im Landkreis Gotha. MItteilungen des Thüringer Entomologenverbandes 29(2): 135-200. (in German) [On page 153, Coenagrion puella, Enallagma cyathigerum and Pyrrhosoma nymphula are listed.] Address: Bellstedt, R., Brühl 2, 99867 Gotha, Germany. Email: ronald.bellsted@t-online.de

21450. Boieiro, M.; Antunes, S.; Figueiredo, H.; Soares, A.; Lopes, A.; Monteiro, E.; Garcia Pereira, P.; Rego, C.; Conde, J.; Borges, P.A.V.; Serrano, A.R.M. (2022): Standardised inventories of lepidopterans and odonates from Serra da Estrela Natural Park (Portugal) - setting the scene for mountain biodiversity monitoring. Biodiversity Data Journal 11: e99558: 22 pp. (in English) ["Background: Mountain insect biodiversity is unique, but is menaced by different drivers, particularly climate and land-use changes. In mainland Portugal, the highest mountain - Serra da Estrela - is one of the most important biodiversity hotspots, being classified as Natural Park since 1976. Many lepidopteran and odonate species, including rare and protected species, are known to occur in Serra da Estrela, but basic knowledge on their abundance, distribution and ecology is still lacking. Standardised sampling of these communities iscrucial to provide valuable biological information to support short-term decision-making for conservation management, setting simultaneously the standards for mountain biodiversity monitoring aiming to tackle the effects of environmental change in the long-term. New information: This study reports novel information on lepidopteran and odonate species diversity, distribution and abundance from Serra da Estrela Natural Park (Portugal). Seventy-two lepidopteran and 26 odonate species were sampled in this protected area, including the first findings of Apatura ilia (Denis & Schiffermüller, 1775), Macromia splendens (Pictet, 1843) and Vanessa virginiensis (Drury, 1773). New populations of Euphydryas aurinia (Rottemburg, 1775) and Oxygastra curtisii (Dale, 1834), protected species under the Habitats Directive, were found in this Natural Park and novel distribution and ecological data were collected for most species, including several rare species and subspecies [e.g. Aeshna juncea (Linnaeus, 1758), Coenonympha glycerion iphioides Staudinger, 1870, Cyaniris semiargus (Rottemburg, 1775) and Sympetrum flaveolum (Linnaeus, 1758)]. All data were collected using standardised sampling allowing its use as a baseline for biodiversity monitoring in Serra da Estrela." (Authors)] Address: Mário Boieiro, M., Centre for Ecology, Evolution and Environmental Changes (cE3c)/Azorean Biodiversity Group, CHANGE – Global Change and Sustainability Institute, Fac. of Agricultural Sciences & Environment, Univ. of the Azores, Angra do Heroísmo, Azores, Portugal. Email: mrboieiro@fc.ul.pt

21451. Bos, G. (2022): Het libellenmeetnet bestaat 25 jaar! Vlinders 3 2022: 4-6. (in Dutch) ["The year 2022 marks the twenty-fifth counting season of the dragonfly monitoring network. A milestone that we dwell on at length in this issue of Butterflies. Because together we have achieved a lot. After eight years of growth, enthusiasm initially seemed to wane. But since 2016, the number of routes has been on the rise again. Presumably, increasing attention to insect decline has contributed to this. After all, only long-term monitoring can capture such a trend. And that is exactly what we are doing with our dedicated dragonfly counters!" Translated

with www.DeepL.com/Translator (free version)] Address: not stated

21452. Casanueva, P.; Santamaría, T.; Sánchez -Sastre, L.F.; Hernández, A.A.; Campos, F. (2022): Distribución de especies del género Sympetrum Newman, 1833 (Odonata, Libellulidae) en Castilla y León, NW de España - Distribution of species of the Sympetrum Newman, 1833 genus (Odonata, Libellulidae) in Castilla and León, NW Spain. Boln. Asoc. Esp. Ent. 46(3-4): 283-290. (in Spanish, with English summary) ["The geographic distribution of dragonflies in the Iberian Peninsula has been abundantly analyzed in recent years, though a vast area of the NW has been little studied to date. This paper presents the distribution of species of the Sympetrum genus (Odonata, Libellulidae) in the basin of the Duero River, Spain, where many variations in climate and orographic conditions are found. Six species have been recorded: S. fonscolombii, S. meridionale, S. sanguineum, S. striolatum, S. vulgatum and S. flaveolum. A generalized linear model with data of altitude above sea level, latitude, mean air temperature, and annual rainfall obtained in 25 sampling points showed that these four factors together explain the distribution of S. fonscolombii, S. striolatum and, above all, S. sanguineum. The distribution of S. meridionale is influenced by latitude and annual rainfall. In the area of study, the species S. vulgatum and S. flaveolum are associated above all with mountain zones." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, 47012 Valladolid, Spain. E-mail PC: pcasanueva@uemc.es

21453. Castillo-Pérez, U.; Suárez-Tovar, C.M.; González-Tokman, D.; Schondube, J.E.; Córdoba-Aguilar, A. (2022): Insect thermal limits in warm and perturbed habitats: Dragonflies and damselflies as study cases. Journal of Thermal Biology 103, 103164: (in English) ["Highlights: • Loss of plant cover increases ambient temperature thereby affecting insect survival. We compared temperature and thermal limit in odonates related to body size, “conserved” vs “perturbed” habitat and suborder. Anisopterans had a higher temperature than zygopterans, with no difference between habitats. Zygopterans had higher thermal limits in a perturbed site while anisopterans had the opposite trend. Zygopterans appear more strongly affected by ambient temperature than anisopterans. Abstract: Disturbance (e.g. loss of plant cover) increases ambient temperature which can be lethal for ectotherm insects especially in hot places. We compared the thorax temperatures of 26 odonate species as a function of body size, habitat quality (“conserved” and cooler vs “perturbed” and warmer) and suborder (Anisoptera vs Zygoptera), as well as critical thermal maximum (CTmax) and as a function of habitat quality in Argia pulla (Zygoptera) and Orthemis ferruginea (Anisoptera). We expected thorax temperatures to differ between suborders based on their differences in body size and habitat quality status, and that populations in perturbed sites would have higher critical thermal maxima compared to those in conserved sites. This study was done in a tropical region with high ambient temperatures. Anisopterans had a higher body temperature than zygopterans, with no difference between habitats. Thoracic and air temperature were positively related, yet body temperatures were higher than the ambient temperature. A. pulla had higher CTmax in the perturbed sites, while O. ferruginea showed the opposite trend. Microenvironmental changes increase the ambient temperature, perhaps filtering insect species. The apparent resilience of odonates to disturbance should be examined more closely (using more species), especially in small species like the zygopterans which appear to be more strongly affected by ambient temperature." (Authors)] Address: Córdoba-Aguilar, A., Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Circuito Exterior, Ciudad Universitaria, Coyoacán, 04510, México City, Mexico. Email: acordoba@iecologia.unam.mx

21454. DeBlieux, T.S.; Hoverman, J.T. (2022): Pathogens and predators: examining the separate and combined effects of natural enemies on assemblage structure. Oecologia 200: 307-322. (in English) ["Natural enemy ecology strives to unify predator–prey and host–pathogen interactions under a common framework to gain insights into community- and ecosystem-level processes. To address this goal, ecologists need a greater emphasis on: (1) quantifying pathogen-mediated effects on community structure to enable comparisons with predator-mediated effects and (2) determining the interactive effects of combined natural enemies on communities. We conducted a mesocosm experiment to assess the individual and combined effects of predators (dragonfly larvae and adult water bugs) and a pathogen (ranavirus) on the abundance and composition of a larval amphibian assemblage. We found that our three natural enemies structured victim assemblages in unique ways, producing distinct assemblages. Additionally, we found that in combination treatments, predators mainly drove assemblage structure such that the assemblages most closely resembled their respective predator treatments. We also found that predators reduced infection prevalence in combination treatments, and that the magnitude of this effect was dependent on predator identity. Compared to virus-alone treatments, the presence of dragonflies and water bugs reduced infection prevalence by 79% and 63%, respectively. Additionally, the presence of dragonflies eliminated ranavirus infection in two species, which demonstrates the prominent role of predators in disease dynamics in this system. Overall, this work demonstrates the importance of considering natural enemies in community ecology, as each enemy can elicit a unique structural change. Additionally, this study provides a unique empirical test of the healthy herds hypothesis for multi-species assemblages and underscores the importance of advancing our understanding of multi-enemy interactions within communities." (Authors)] Address: DeBlieux, T.S., Department of Biology, Indiana University, Bloomington, IN, 47405, USA

21455. Elaev, E.N.; Burdukovsky, E.N. (2022): [Amur Falcon Falco amurensis in southwestern Transbaikalia. Second edition. First publication in 2003]. Russian Journal of Ornithology 31, Express Issue 2258: 5477-5479. (in Russian) ["Arthropods in the diet are mainly represented by insects, spiders make up 25.0% of all arthropod remains. The determination of insects by the remains, carried out by T.Kh. Nikitina, showed the presence in the diet of representatives of Odonata, Orthoptera, Coleoptera (Elateridae, Carabidae, Scarabidae, Cerambicidae, etc.), which the falcons catch mainly on the fly, rarely take from the ground." (Authors)] Address: not stated

21456. Eslami, Z.; Sadeghi, S.; Ebrahimi, M. (2022): Demographic characteristics of Ischnura elegans (Vander Linden, 1820) (Odonata: Coenagrionidae) in arid regions: sex and female morphs differences in survival and capture probabilities, space use patterns and spatial density. Aquatic Insects 44(1): 64-78. (in English) ["We used the mark-recapture method to gather fundamental information on the population dynamics of I. elegans in an arid region of central

Iran. I. elegans expresses female-limited colour polymorphism. We investigated sex and female morphs differences in survival and capture probabilities, space use patterns, and spatial density. We used Cormack–Jolly–Seber and spatial capture-recapture models. The estimated capture probability for males was lower than females. The survival probability was not different between either males and females or gynomorphs and andromorphs. We found support for sex differences in density and detection probability, and female morphs differences in density, space use and detection probability. Based on our results the extreme conditions of arid regions can lead to a male-biased dispersal. Our findings also confirm the existence of behavioral differences between andromorph and gynomorph females and suggest a within species spatial habitat partitioning." (Author)] Address: Eslami, Zohre, Dept Biology, Fac. Sciences, Shiraz Univ., Shiraz, Iran. Email: eslami.zohre86@gmail.com

21457. Fischer, S. (2022): Vorkommen von Libellen (Odonata) an Gräben im Zerbster Ackerland (Sachsen-Anhalt). Entomol. Mitt. Sachsen-Anhalt 30(2): 85-102. (in German, with English summary) ["Occurence of Odonata at ditches in the Zerbst farmland (Saxony-Anhalt). During surveys of ditches in the intensively farmed Zerbst Land (district of Anhalt-Bitterfeld) between 2018 and 2021, a total of 26 Odonata species was found. Of these, nine were certainly native and four others were probably native. Compared to the dragonfly atlas for Saxony-Anhalt, there were new records of 13 species for the TK 25 sheet 4038. Outstanding were the occurrences of Coenagrion mercuriale, Ischnura pumilio and Orthetrum coerulescens. As the occurrence of C. mercuriale is one of only a few east of the Elbe river, a search for this species was conducted in the vicinity of the study area and on further ditches within the study area in 2021 and 2022, whereby a larger occurrence was found near Leitzkau (district of Jerichower Land) and single specimen near Zerbst and Mühlstedt, respectively.] Address: Fischer, S., Unter den Eichen 1a, 14641 Paulinenaue, Germany. Email: fischer@dda-web.de

21458. Gazzola, A.; Guadin, B.; Balestrieri, A.; Pellitteri-Rosa, D. (2022): Multimodal cues do not improve predator recognition in Green Toad Tadpoles. Animals 2022, 12, 2603. 10 pp. (in English) ["Simple Summary: Tadpoles are known to use their sense of smell to detect the presence of predators, but some studies showed their reliance on vision during social interaction, suggesting that vision might have a role in predatory contexts as well. Here, we investigated how chemical or visual cues of a native predator, or a combination of both, influence the defensive behaviour of green toad tadpoles. We expected tadpoles to reduce their activity when exposed to chemical cues and avoid the area of the experimental arena near to the caged predator when exposed to the visual ones. With both cues, we expected tadpoles to show both responses and with greater intensity. Our results indicate that visual cues alone do not elicit any apparent defensive response, suggesting that tadpoles mainly rely on chemical cues to assess predation risk. Abstract: The anti-predator behaviour of green toad (Bufotes balearicus) tadpoles was investigated by exposing them to only the visual or chemical cues, or a combination of both, of a native predator, Aeshna cyanea. We collected green toad egg strings in the field and tadpoles did not receive any predatory stimulus before the onset of the experiment. To manipulate chemical and visual cues independently, dragonfly larvae were caged inside a transparent plastic container, while chemical cues (odour of tadpole-fed dragonfly larvae) were injected into the surrounding arena. An empty container and water were used, respectively, as controls. The behaviour of individually tested tadpoles was videorecorded for 40 min, of which 20 were before their exposure to stimuli. Five second-distance frames were compared to assess both tadpole activity and position within the arena with respect to the visual stimulus. The tadpole level of activity strongly decreased after exposure to either chemical cues alone or in combination with visual cues, while visual cues alone apparently did not elicit any defensive response. The position of tadpoles inside the arena was not affected by visual cues, suggesting that green toad tadpoles mainly rely on olfactory cues to assess the level of predation risk." (Authors)] Address: Pellitteri-Rosa, D., Department of Earth & Environmental Sciences, Univ. of Pavia, 27100 Pavia, Italy. Emai: daniele.pellitterirosa@unipv.it

21459. Goshami, G.; Halder, M.; Mahfuz, I.; Mahdi, S.H.A. (2022): Relative abundance and diversity of arthropods in the maize (Zea mays L.) field of Kharkhari, Rajshahi, Bangladesh. International Journal of Entomology Research 7(12): 153-160. (in English) ["Maize represents the most important grain crop. Abundance and diversity of arthropods in the maize field of Kharkhari, Rajshahi were studied from February 2019 to May 2019 which allows a closer look in biodiversity in maize crops. In the study area, a total of 1103 specimens were recorded under 11 Orders. The total number of identified specimen (N) and their relative abundance (%) were recorded as in Odonata (39, 3.54 %), Lepidoptera (74, 6.71 %), Coleoptera (181, 16.41 %), Hymenoptera (363, 32.91 %), Diptera (178, 16.14 %), Dermaptera (20, 1.81 %), Araneae (52, 4.71 %), Hemiptera (33, 2.99 %), Orthoptera (55, 4.99 %), Blattodea (1, 0.09 %) and Diplopoda (107, 9.70%). Among the collected specimen the status of Coleoptera, Hymenoptera, Diptera and Diplopoda were very common (VC); Lepidoptera, Orthoptera and Araneae were common (C); Odonata and Hemiptera were fairly common (FC); Dermaptera was rare (R) and Blattodea was very rare (VR). Diversity indices of Shannon (H), Simpson (1-D) and Margalef (DMg) were 1.96, 0.82 and 1.43, respectively. Menhinick richness (DMn), Berger-Parker dominance (d) and Pielous evenness index (J) were 0.33, 0.33 and 0.82, respectively. As the dragonfly and damselfly are excellent bio-indicator, survey of their populations at regular intervals may provide important biological information about the ecological condition of the study area. " (Authors)] Address: Mahfuz, I., Dep Zool., Fac. of Biological Sciences, Univ. of Rajshahi, Bangladesh

21460. Hemnani, M.; Campos Guimarães, I.S.; Kaefer, I.L.; Pires, T.H. (2022): Alarm reaction depends on multiple chemical cues in tadpoles of the cane toad (Rhinella marina). Ethology Ecology & Evolution 35(3): 363-375. (in English) ["Early detection of predators is fundamental for the survival of the prey. Predator detection can occur by perception of the chemical substances released by predators or injured conspecifics, granting prey the opportunity to avoid the attack. However, overreacting to cues can generate false alarm reactions that result in fruitless energetic costs. Given that chemical cues in natural habitats rarely occur singly, individuals can benefit from obtaining information from multiple sources, such as the combined chemical cues from predators and conspecifics. We experimentally tested the movement reaction of cane toad (Rhinella marina) tadpoles when in contact with isolated chemical cues from a conspecific, a predator (dragonfly larvae), and the combination of these two substances. We quantified duration of swimming activity before and after the exposure to the chemical cues and compared it to a control group. A significant reduction in swimming activity was only observed

when the tadpoles were exposed to the combination of both cue types. Our results suggest that the tadpoles can recognise the chemical cues from conspecifics and predators, but a behavioural response is only elicited when both stimuli are detected simultaneously. We suggest that behavioural change in response to predation threat in R. marina is a compromise between early detection of predators and avoidance of unnecessary energetic expenditures." (Authors)] Address: Hemnani, Mahima, Depto de Biologia, Universidade Federal do Amazonas, Instituto de Ciências Biológicas, Programa de Pós-Graduação em Zoologia, Manaus, Brasil. Email: hemnanimahi@gmail.com

21461. Houghton, D.C.; Flaherty, E.; Sollie, D.; Lardner, R. (2022): Seasonal changes of benthic macroinvertebrate functional feeding group biomass within forest and meadow habitats of a first-order Michigan (USA) stream. The Great Lakes Entomologist 55(2): 66-75. (in English) ["Little is known about seasonal changes in stream benthic macroinvertebrate assemblages. We determined the ash-free dry mass of macroinvertebrates within a forested and a meadow reach of Fairbanks Creek in northern Lower Michigan throughout all seasons of 2018 and 2019. The macroinvertebrate assemblage of the forested reach was dominated by invertebrates in the shredder functional feeding group (FFG), whereas the meadow reach was composed primarily of scrapers and filtering collectors. Regardless of reach, the biomass of all FFGs was low during the winter and early spring, peaked in May or June, and gradually declined throughout the summer and fall. General trends in biomass were the same for both years of the study, although 2018 had overall higher biomass despite being a slightly cooler year." (Authors) Aeshnidae, Corduliidae, Libellulidae] Address: Houghton, D.C., Dept of Biol., Hillsdale Coll., 33 East College Street, Hillsdale, MI 49242 USA. Email: dhoughton@hillsdale.edu

21462. Khare, V.; Kamle, S. (2022): Biomimicking and evaluation of dragonfly wing morphology with polypropylene nanocomposites. Acta Mechanica Sinica 38(121431): (in English) ["Dragonfly hindwing inspired two different flapping wing morphologies are investigated for flexible flapping wing micro air vehicles (FWMAV) applications. The Wing skin is developed using 1% functionalized carbon nanotubes reinforced polypropylene nanocomposites with carbon fiber epoxy composite strands as venation pattern. The resonance frequencies are the fundamental information for biomimicking and were calculated theoretically from stiffness data. Bending dominated first natural frequency was obtained from flexural stiffness data and found close to the flapping frequency of natural dragonfly hindwing. Twisting dominated second natural frequency was obtained from torsional stiffness which revealed that the artificial wings can be fabricated thinner. The flapping frequency of artificial wings is unaffected by the twisting deformation. The bending and twisting dominated mode shapes are also studied using DIC system. To verify the static and dynamic results, finite element simulations are performed that agree with experimental findings. It was found that proposed flexible nanocomposite wing skin can control the bending and twisting dominated frequencies by tailoring the wing morphology and without affecting the mode shapes of deformation." (Authors)] Address: Khare, V., Advanced Materials & Structures Laboratory, Department of Aerospace Engineering, Indian Institute of Technology Kanpur, India-208002. E-mail: vivekkh@iitk.ac.in

21463. Liu, Y. (2022): Aquatic assemblages: improving dragonfly habitat and water quality in an urban park. MSc. thesis, Landscape Architecture, Department of Landscape Architecture of the Rhode Island School of Design, Providence, Rhode Island.: 41 pp. (in English) ["Many scientists have claimed that we are entering into the sixth mass extinction. According to IUCN, about 16% of the 6,016 species of dragonflies and damselflies are at risk of extinction. Dragonfly occupies an essential link in the food chain. Fluctuations in dragonfly numbers can affect the numbers of other species, such as mosquitoes and birds. Dragonflies are also closely related to the health of the water environment. Healthy water bodies can attract more and different species of dragonflies and other aquatic animals. Dragonflies' decline is a symptom of widespread loss of the marshes, swamps, and free-flowing rivers they breed in, driven mainly by the expansion of unsustainable agriculture and urbanization around the globe. In addition to impacting habitat, urbanization has led to severe stormwater issues that impair the health of our rivers and oceans. My thesis aims to address three interrelated issues: restoration of aquatic insect habitat in urban areas, stormwater runoff, and education about species decline. To explore these issues, I focus on Roger Williams park, which has the potential to be high-quality habitat for dragonflies and other animals. However, currently the ponds in the park lack ecological diversity and have serious water quality issues due to stormwater runoff. To address these issues, I propose a series of rock berms in the ponds that change the direction of the water fl ow. Wetland plants along the berms will help clean the water as it flows through them. In addition, the berms will allow people to walk out into the pond to experience the wetlands and an educational installation that lists species of dragonflies that have gone extinct to help raise awareness about biodiversity loss. Ultimately, rock berms could be developed into a solution to urban stormwater and provide habitats for insects and other aquatic animals in different places." (Author)] Address: not stated

21464. Louboutin, B.; Krieg-Jacquier, R.; Ruffoni, A. (2022): Journées odonatologiques 2022 dans les Hautes-Pyrénées. Insectes 206: 30-32. (in French) [https://www.insectes.org/-blog/les-journees-odonatologiques-dans-les-hautes-pyrenees-en-2022-n46] Address: Krieg-Jacquier, R., 18 rue de la Maçonne, 73000 Barberaz, France. E-mail: regis.krieg.jacquier@gmail.com

21465. Monzo, J.C.; Verdu, J.R. (2022): Effects of restoration and management of Mediterranean traditional water systems on Odonata alpha diversity: a long-term monitoring survey. Biodiversity and Conservation 31: 227-243. (in English) ["The progressive abandonment and disappearance of traditional water uses and management of wetlands during the twentieth century has led not only to a loss of identity, heritage, and landscape values, but also to significant declines in the diversity and abundance of many organisms. Here, we take advantage of an existing project for the restoration and management of traditional irrigation infrastructures in the wetland of El Prado (Pinoso, SE Spain) to evaluate the spatio-temporal effect of this action on the alpha diversity and abundance of Odonata. The wetland was organized in different sectors according to the coverage of riparian and aquatic vegetation, width and depth of watercourses, ditches and ponds, water flow, and restoration and management. Odonates were sampled every month for ten years. We used alpha diversity to measure biodiversity using Hill's number diversity. To analyse how alpha diversity measures varied across all sectors sampled over the years, we determined diversity-time relationships. To assess the effects of the different variables on odonate biodiversity we used partial least squares regressions. Our results showed

that restoration of traditional water infrastructures, encouraging the increase of aquatic vegetation cover, an adequate and regular management of riparian vegetation naturalizing the margins, as well as reducing speed of water flow have a positive effect on odonate diversity and abundance. Our study provides useful information for conservation and management of semi-arid wetlands and its associated water infrastructures by showing which actions are most successful to enhance biodiversity in one of the priority habitats for conservation in Europe." (Authors)] Address: Verdú, J.R., Research Institute CIBIO, Universidad de Alicante, San Vicente del Raspeig, 03690, Alicante, Spain

21466. Moreno-Domínguez, R.; Maccracken, A.; Santos, A.A. de; Wappler, T. (2022): Plant–insect interactions from the Late Oligocene of Spain (La Val fossil site, Estadilla, Huesca) and their palaeoclimatological implications. Palaeogeography, Palaeoclimatology, Palaeoecology Volume 586, 15 January 2022, 110782: (in English) ["Highlights: •Reports plant–insect interactions from an Iberian Peninsula Oligocene deposit. •Herbivore interactions decrease in number and richness in the youngest horizons. •A decrease in galling diversity is also observed in the youngest horizons. •Changes in herbivory across horizons may reflect an increase in humidity through time. •The data provide context for previously reported European plant–insect associations. Abstract: Trace fossils of insect herbivory are an important tool, which provide evidence for palaeoecological and palaeoclimatic interpretations, as well as being a unique and direct record of the plant–insect interactions in the geologic past. In the Iberian Peninsula, these types of surveys have been scarce and purely descriptive. The La Val fossil site is an interesting, new megaflora assemblage from the Late Oligocene of Spain, which encompasses numerous plant–insect interactions and their palaeoclimatic and palaeoecological implications. A total of 1337 fossil specimens from 13 stratigraphic levels were analyzed for this study. We identified 28 different types of plant–insect interactions belonging to seven Functional Feeding Groups (FFGs). Hole feeding was the most common category of external-feeding insect damage, followed by margin feeding, skeletonization, and surface feeding. Among the internal-feeding FFGs, galling was the richest and most abundant FFG. All other internal-feeding FFGs were relatively uncommon: piercing/sucking, and incertae sedis (DT114). Among stratigraphic levels, the mean herbivory frequency was significantly greater at lower levels compared to the upper levels. La Val presents a marked drop in the diversity of plant–insect interactions through time, possibly due to changes in temperature or humidity levels. A marked decrease in galling diversity and a generalized decrease in interactions are observed at the youngest levels. This could be related to an increase in humidity though time in the La Val palaeoforest, since modern xeric environments favour the proliferation of galls." (Authors)] Address: Moreno-Domínguez, R., Área de Paleontología, Depto de Ciencias de la Tierra, Univ. de Zaragoza, Zaragoza, Spain. Email: rafaelmanuel.morenodominguez@gmail.com

21467. Nel, A. (2022): The second European representative of the epallagid genus Labandeiraia in the lowermost Eocene Oise amber (Odonata, Zygoptera). Palaeoentomology 5.6.3: 520-523. (in English) ["Among the calopteran damselflies, the family Epallagidae was clearly dominating the diversity of the Holarctic Cenozoic (11 described species in eight extinct genera), while the Calopterygidae were extremely rare at the same time (six Cenozoic species in two extant and one fossil genera) (Fossilworks database at http://www.fossilworks.org/cgi-bin/bridge.pl?action=home, consulted 21/10/2022). They mainly belonged to the extinct subfamily Eodichrominae Cockerell, 1923, and their most diverse genus was the early Eocene genus Labandeiraia Petrulevicius et al., 2007, known from compression fossils from the lacustrine Green River Formation (USA) and the marine Fur Formation in Denmark (Petrulevicius et al., 2007; Bechly et al., 2020)." (Author)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

21468. Nel, A.; Nam, G.-S.; Corentin, J. (2022): First representative of the odonatan superfamily Triassolestoidea (Odonatoptera: Parazygoptera) from the Upper Triassic of the Korean Peninsula. Alcheringa 46(3/4): 237-243. (in English) ["Koreatriassothemis elongatus gen. et sp. nov. is the first representative of the odonatan superfamily Triassolestoidea described from the Upper Triassic of the Republic of Korea. Despite close similarities with the genera Pseudotriassothemis and Triassoneura, exact affinities within Triassolestoidea remain uncertain, thus discoveries of more complete triassolestoid fossils are required to resolve relationships. The identification of K. elongatus gen. et sp. nov. shows that Odonatoptera and Triassolestoidea diversity was high during the Late Triassic and is currently underestimated. A 'Samarura-like' odonatopteran nymph is also identified from the same Upper Triassic outcrop, and may be referable to K. elongatus gen. et sp. nov." (Authors)] Address: Nam, Gi-Soo, Gongju Nat. Univ. Education, Gongju, Chungcheongnamdo 32553, Republic of Korea. Email: nks33@naver.com

21469. Nel, A. (2022): Revision of the two small damselflies Eopodagrion scudderi Cockerell, 1921 and Eopodagrion 'Podagrion' abortivum (Scudder, 1878) (Odonata, Zygoptera) from the lower Eocene of Green River Formation (USA). Palaeoentomology 5.6.3: 537-544. (in English) ["Two early Eocene damselfly taxa Eopodagrion scudderi Cockerell, 1921 and Eopodagrion 'Podagrion' abortivum (Scudder, 1878) are redescribed and refigured. Their phylogenetic relationships are discussed. Although they could likely belong to the Coenagrionidae, their exact affinities remain uncertain because of the presence of homoplasies affecting crucial characters among the Zygoptera." (Author)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

21470. Palacino-Rodríguez, F.; Cordero-Rivera, A.; Palacino, D.A.; Penagos, A.C. (2022): Captive breeding of odonate larvae: effects of type of water, handling, and sex. Entomologia Experimentalis et Applicata 170(6): 505-512. (in English) "Basic information on life histories, ecology, and behaviour for aquatic stages in many species of insects is difficult to obtain in the field. Here, a method to breed and monitor Odonata individual larvae in captivity is proposed. In total, 3788 individuals of six Odonata species – Rhionaeschna marchali, Erythrodiplax abjecta, Sympetrum gilvum, Ischnura chingaza, I. cruzi, and Mesamphiagrion laterale – were reared individually in water-filled plastic containers, whose size was increased to fit larval growth, at ambient temperature (12–34 °C, 12 h light per day, ca. 300 lux, and ad libitum food). We tested the effects of water type (habitat, dechlorinated tap water, and drinking water), handling method, and sex on larval developmental time and number of instars. The number of instars was calculated as the mean number of moults for the individuals that successfully emerged as adults. Life cycle length was calculated by averaging the days over individuals that completed their development until emergence. The probability of achieving the adult stage was not significantly affected by the type of water, sex, or

handling method. On the other hand, the number of instars was affected by species identity, and type of water, with fewer instars in water from the natural habitat, but not affected by sex or handling method. The duration of the life cycle was bimodal in most species, and was affected by type of water, but in an idiosyncratic, species-specific way. The methodology proposed here allows monitoring and breeding large numbers of odonate larvae." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Odonatos y otros artrópodos de Colombia (GINOCO), Centro de Investigación en Acarología, Calle 152B # 55-45, Bogotá, Colombia. E-mail: odonata107@gmail.com

21471. Pawlaczyk, P.; Bednarek, P.; Dziadowiec, R.; Banaszak, K.; Grzesiak, K.; Jermaczek, A.; Krzysków, T.; Les, E.; Naks, P.; Sierakowski, P.; Zyla, P. (2022): Program ochrony Rzeki Bogadicy w województwie opolskim. Wydawnict wo Klubu Przyrodników, Opolskie: 124 pp. (in Polish, with English summary) ["The Bogacica River is ca 40 km long tributary of the Stobrawa in Odra river basin. The publication presents a program of river conservation measures, developed for the Opolskie Voivodeship - the local authority responsible, among others, for landscape protection, including protected areas: Stobrawa Landscape Park and the Stobrawsko-Turawskie Forests Protected Landscape Area, covering almost the entire course of the river. According to Polish law, the environmental objectives set by the Opolskie Voivodeship for these areas become, as far as the river is concerned, environmental objectives in the sense of the Water Law and are binding for the river manager (PGW Wody Polskie). The nature of the river varies; the river has been intensively transformed since the 19th century (chapter 4.1); currently, more natural sections alternate with more strongly transformed ones (photos 1-10, fig. 9, photos 12-14). The average flow is 1.01 m³/s, but it decreases in the long term (fig. 2), probably due to climate change and excessive water abstraction for fish ponds. The phenomenon of river flooding disappears. The river valley has maintained substantial natural values (Chapter 3). A section of the river is proposed to be designed as a nature reserve. Artificial fish ponds host (chapter 4.2) also significant natural values, although water intake for these ponds is a problem in river management. River management planning is currently based on the assessment of its ecological status according to the data of the National Water Monitoring, and the river is divided into two water bodies (RW600019132499, RW600017-132449). However, diagnostic monitoring was not carried out at all for the upper part of the river, and most of the required quality elements were not tested in the lower part, making the assessments unreliable. More detailed field studies (hydromorphology, macrophytes, fish, benthos - Chapter 2) show that the condition of individual elements varies along the course of the river and data from a single monitoring site are not representative for the entire river. The objectives of the program of conservation measures should include, in addition to general environmental objectives, the following: maintaining of natural values, maintaining of river flow, restoration of ecological continuity, achieving more natural hydromorphology, riverside afforestation and developing of buffer zones, ensuring self-maintenance of the river bed (chapter 6.2). The following measures are proposed: areal water retention and restoration of wetlands in the catchment (but not construction of reservoirs in the river course!), adjusting water abstraction permits to the requirement of maintenance of environmental flow, removing or mitigating lateral barriers, modification of the river maintenance scheme, introduction of trees on the banks, introduction of small structures imitating natural ones in the river bed, maintaining of the river's free migration corridor, point restoration of the function of the oxbow lake (chapter 6.3, fig. 31-33)." In the course of research on the odonatofauna of the in Opole, in 2015 and 2021, 16 species of dragonflies were found in the catchment area of Bogacica (Dragonflies Observation Database of the Nature Dept of the Museum of Opole Silesia in Opole - obser. Piotr Zablocki, Michal Wolny). Among the dragonflies associated with the river itself, two protected species deserve attention - Ophiogomphus cecilia and Cordulegaster boltonii. O. cecilia observed near Radomierowice, Swieciny and Domaradzka Kuznia is a species listed in Annex II of the Habitats Directive, while C. boltonii found near Swiecin is a species from the Polish Red Book (status VU; Glowacinski and Nowacki 2004). (Authors)] Address: https://www.opolskie.pl/wp-content/uploads/2023/01/Pawlaczyk_et_al_2022_Program_ochrony_Bogacicy.pdf

21472. Phan, Q.T.; Choong, C.Y.; Karube, H. (2022): Morphological features of Drepanosticta versicolor (Laidlaw, 1931) from Malaysian Borneo with notes on its allied species (Odonata: Zygoptera: Platystictidae). Tombo 64: 1-7. (in English, with Japanese summary) ["This paper provides detailed illustrations of male and female structures of D. versicolor from Malaysian Borneo with a morphological comparison with the allied species, D. monoceros Lieftinck, 1965 from Borneo and D. ceratophora Lieftinck, 1974 from Palawan, Philippines." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Inst.of Research &Training of Medicine, Biology & Pharmacy, Duy Tan Univ., Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

21473. Rodrigo de Araujo, B.; Pinto, A.P.; Padial, A.A. (2022): Influence of landscape homogenization due to river damming on dragonfly (Odonata) community structuring in a subtropical forest in the southern Atlantic Forest. Ecohydrology 15(3), e2419: (in English) ["Human activities affect the structure, dynamics, and energy flow of aquatic ecosystems. River damming, a common anthropic impact in Brazil, changes solar incidence, water flow, and temperature of waterbodies, thereby affecting their fauna. Due to their high sensitivity to environmental changes, the Odonata may be indicators of these impacts. We sampled two ecologically distinct sites, (1) a quasi-pristine forested area; and (2) a nearby human-impacted reservoir landscape, to evaluate the effects of damming on odonate community structure. The species composition of quasi-pristine communities was more heterogeneous and differed almost completely (indicating high turnover) from that of the reservoir-area communities. The capacity of the reservoir to maintain local fauna was almost nil. The communities in the changed landscape had the highest local diversity, which is related to the high occurrence of widespread generalist South American species. We also tested two recently proposed bioindication ratio tools based on the richness or abundance of high-level taxonomic categories; both effectively reflected the extent of the impacts of damming. The best performing ratios were Coenagrionidae/other Zygoptera richness ratio, Zygoptera-/Anisoptera abundance ratio, and Libellulidae/other Anisoptera richness ratio. The reservoir landscape promotes biotic homogenization. However, the water supply system entails the preservation of part of the native habitat in its surrounding areas, consequently maintaining forest-dependent biodiversity in quasi-pristine environments." (Authors)] Address: Rodrigo de Araujo, B., Laboratório de Sistemática de Insetos Aquáticos (LABSIA), Depto de Zoologia, Universidade Federal do Paraná, Caixa Postal 19020, 81531-980 Curitiba, PR, Brazil. Email: breno.rda94@gmail.com

21474. Sasamoto, A.; Kotabe, A.; Takuma, Y.; Kawashima, I., Okude, G.; Futahashi, R. (2022): Description of larva of Anax ephippiger (Burmeister, 1839) from Japan, including changes and developments in external morphology (Odonata: Aeshnidae). Tombo 65: 28-37. (in English, with Japanese summary) ["The external morphology of larva of A. ephippiger from Japan is described as follows: change of morphology and coloration/markings from 1st to final instar; the detail external morphology of final instar; developmental change of final instar larva. These are compared with the previous studies of this species, as well as other species of Anax." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shiki-gun, Nara Pref., Japan. Email: akssmt@sea.plala.or.jp

21475. Setyawati, M.; Triatmanto, D. (2022): Keanekaragaman capung (Odonata) di Kawasan Gunung Api Purba Nglanggeran, Kabupaten Gunungkidul. Bioscientist 10(2): 809-817. (in Indonesian, with English summary) ["This study aims to determine the types of dragonflies and the level of diversity of dragonfly species in the Nglanggeran Ancient Volcano Area, Patuk Kapanewon, Gunungkidul Regency. This research is a descriptive observational study, with accidental sampling technique. The research was conducted in March-May 2021 in the Nglanggeran Ancient Volcano Area, Patuk Kapanewon, Gunungkidul Regency. Observations were made at 08.00-16.00 WITA. The results found 11 species: Gynacantha subinterrupta, Agrionoptera insignis, Diplacodes trivialis, Lathrecista asiatica, Neurothemis rambutii, Neurothemis terminata, Orthertrum sabina, Pantala flavescens, Potamarcha congener, and Zyxomma obtusum, and Copera marginipes. The diversity level of dragonflies in the Nglanggeran Ancient Volcano Region according to the Shanon-Whiener (H') diversity index is in the medium category, with a value of 1.65." (Authors)] Address: Setyawati, M., Program Studi Biologi, FMIPA, Univ. Negeri Yogyakarta, Indonesia. Email: megasetyawati.2017@student.uny.ac.id

21476. Smallshire, D.; Swach, A. (auteurs); Koenig, O. (trad.) (2022): Guide photo des Libellules d'Europe. Guide Delachaux, Del. & Niestl., Paris: 360 pp. (in French) [https:/ /www.-delachauxetniestle.com/livre/guide-photo-des-libellules-deurope]

21477. Somal, D.S.; Walia, G.K (2022): Cytological study of family Aeshnidae (Odonata: Anisoptera) from India: A review. Biosciences Biotechnology Research Asia 19(4): 843-855. (in English) ["Cytological review of 59 aeshnid species and cytogenetic investigations on Anax ephippiger, Anax immaculifrons, Anax indicus, Anax nigrofasciatus nigrolineatus, Anax parthenope, Gynacantha subinterrupta of the family Aeshnidae by carbol fuchsin staining20023 and C - banding have been under taken. All the species posses 2n = 27m with X0 - XX sex determination except Anax ephippiger with 2n = 14 + neo XY, resulted by the 13 simultaneous fusions among the autosomes and between autosome and sex chromosome. The structure and behaviour of chromosomes, variation in size of m chromosomes and X chromosome and distribution of C - heterochromatin have been studied and compared among the species. C - bands are mostly present at the terminal regions of autosomal bivalents, while Anax ephippiger and Anax parthenope also possess C - bands at the interstitial and sub-terminal regions of the bivalents. Moreover, sex chromosome and m bivalent show variation in distribution of C-heterochromatin in the species. Out of these, chromosome complement of Anax indicus Lieftinck, 1942 and C - banding on Anax ephippiger and Anax indicus have been investigated for the first time. List of cytologically studied species of family Aeshnidae has been updated to 60 species." (Authors)] Address: Walia, Gurinder Kaur, Dept Zool. & Environmental Sciences, Punjabi Univ. Patiala, Punjab, India. Email: gurinderkaur_walia@yahoo.co.in

21478. Theivaprakasham, H.; Darshana, S.; Ravi, V.; Sowmya, V.; Gopalakrishnan, E.A.; Soman, K.P. (2022): Odonata identification using Customized Convolutional Neural Networks. Expert Systems with Applications 206, 15 November 2022, 117688: (in English) ["Highlights: • We introduce a large-scale research-grade odonates image dataset. • Detailed investigation on CNN models for various input image resolutions. • Customized DenseNet161 (450px × 450px) had the highest top-1 accuracy. • Class Activation Map analysis was performed to evaluate the CNN models. Abstract: Alarming decline of the Odonates population needs urgent conservation efforts to balance nature's food cycle and to reduce the negative impact on humans such as increasing the mosquito borne diseases. The existing odonates identification approaches are not efficient and are mainly based on domain expertise which is highly time-consuming and expensive. The fast-growing Artificial Intelligence technologies have shown impressive solutions to many real-world problems including wildlife conservation and management. In this study, we proposed the use of Convolutional Neural Networks (CNN) for the identification of odonates. Firstly, we create a large Odonates image dataset comprising of 64,176 images belonging to 256 species of odonates. Secondly, we employ nine Customized CNN architectures namely AlexNet, DenseNet121, DenseNet161, DenseNet-201, ResNet18, ResNet101, ResNet152, SqueezeNet v1.1, and VGG19 to train our odonates image dataset. Finally, we then compared and empirically studied the performance of our proposed CNN architectures at various image resolutions (224px × 224px, 350px × 350px, 450px × 450px and 550px × 550px). Our pretrained custom DenseNet161 (450px × 450px) performed with highest top-1 accuracy (93.53%), ResNet152 (224px × 224px) with the highest top-3 accuracy (98.07%), DenseNet121 (450px × 450px), and ResNet152 (224px × 224px) with highest top-5 accuracy (98.85%) and DenseNet201 (550px × 550px) with highest F1 score (86.17%). SqueezeNet v1.1 performed the least with highest top-1 accuracy of 83.3%, highest top-3 accuracy (94.24%), highest top-5 accuracy (96.59%), and the highest F1 score (77.68%). The results of our study show that odonates can be reliably and instantly identified using our proposed methodology and the customized model." (Authors)] Address: Theivaprakasham, H., Center for Computational Engineering & Networking (CEN), Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India. Email: cb.en.p2cen20026@cb.students.amrita.edu

21479. van Grunsven, R. (2022): Kempense heidelibel vindt nieuwe stek. Vlinders 4 2022: 14-15. (in Dutch) [Sympetrum depressiusculum; "Dragonflies regularly surprise us: some species suddenly emerge and become successful, like the graceful whitethroat dragonfly. Other species, like black heidelibel that we were not worried about at all, suddenly decline rapidly. The Kempense heidelibel makes it even bolder: it does both." (Author/DeepL)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsven@vlinderstichting.nl

21480. van Grunsven, R.; Bos, G.; Manger, R. (2022): Twee soorten winterjuffers, gaat dat samen? Vlinders 3 2022: 8-9. (in Dutch) [Sympecma paedisca, Sympecma fusca; "The two species of damselflies do things just a little

differently from other damselflies. Whereas most species spend the winter as eggs or larvae, they overwinter as adult dragonflies. The other species can reproduce soon after hatching and live quite briefly as damselflies. The winter damselflies hatch in July and August, but then first go quietly to do some hunting and feeding and find a good place to spend the winter. Months later, in early spring, they only return to the water to reproduce. This way, they are larvae in summer. That is a period when there is plenty of food and the water is nice and warm, but there are also few large larvae of other damselfly species." (Authors)/DeepL)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

21481. Varadinova, E.; Sakelarieva, L.; Park, J.; Ivanov, M.; Tyufekchieva, V. (2022): Characterisation of macroinvertebrate communities in Maritsa River (South Bulgaria)—Relation to different environmental factors and ecological status assessment. Diversity 2022, 14, 833. 12 pp. (in English) ["A survey of the macrozoobenthos communities in the Maritsa River (South Bulgaria) was carried out in the summer of 2021. Benthic samples were collected and physicochemical parameters (water temperature, pH, conductivity, dissolved oxygen and nutrients) were measured at 15 sites located on the main river and its tributary system. The studied sites belonged to different river types and characterised the diversity of the ecological conditions—from unaffected to anthropogenically influenced river stretches. In addition, data from a study conducted in the summer of 2020 were used to analyse species–factor interactions in the river ecosystems and to assess the bio-indicative potential of the aquatic invertebrates. The dynamics of the taxonomic composition and abundance of the macrozoobenthos were analysed in relation to environmental factors. The physicochemical conditions of the water environment changed during the period of high water, which led to a reduction in the composition of the macrozoobenthos. Plecoptera and Trichoptera decreased in richness and abundance downstream and under human impacts. Ephemeroptera and Chironomidae were permanently present along the whole river. Oligochaeta increased in the lower river reaches and at sites with a greater amount of organic matter. The ecological status determined by the macrozoobenthos varied from high (site 1) to good, moderate and bad (site 13) at the studied sites." (Authors) The study includes "Odonata".] Address: Varadinova, Emilia, Dept Geography, Ecol. & Environ. Protection, Faculty Mathematics & Natural Sci., South-West Univ. “Neofit Rilski”, 66 Ivan Michailov Str., 2700 Blagoevgrad, Bulgaria. Email: emily.varadinova@gmail.com

21482. Westermann, K. (Ed.) (2022): Die Moorlibellen des Südschwarzwalds. Populationen und Lebensräume und ihr Schutz bei fortschreitendem Klimawandel. Naturschutz am südlichen Oberrhein 11: 1-248. In German, with English summary ["The moor dragonflies of the Southern Black Forest. Populations and habitats and their protection in the progressing climate change. - From 2011 to 2022, K. and E. Westermann recorded the occurrences of moor dragonfly species in the moors of the Southern Black Forest on a voluntary basis - two to three decades after the only comprehensive investigations were done by K. Sternberg. Over twelve years, around 150 moors or dystrophic ponds were visited at least once. In moors with significant populations, recordings were carried out every one to two weeks at the most and monitoring every five years has started. In some years, the monitoring was limited due to unfavourable weather conditions. In 66 areas at least one species of moor dragonflies was recorded. More than half of all moors did not have any potential water bodies for reproduction. These moors have been significantly affected by human activity since the Middle Ages through drainage, eutrophication, afforestation, transformation into meadows and pastures or manual peat digging. Some peatlands are currently regenerating in part after renaturation measures, the discontinuation of maintenance of ditches or the settlement of beavers {Castor fiber). The regeneration has resulted in positive effects on the occurrence and populations of moor dragonflies, which could be clearly documented in several cases. Species were classified as "moor dragonflies" if they only develop in moor waters or in dystrophic ponds in the Southern Black Forest or if their main distribution is there. Aeshna subarctica and Aeshna juncea, Somatochlora alpestris and Somatochlora arctiea, Leucorrhinia dubia, Sympetrum danae and Coenagrion hastulatum were identified regularly. The occurrences of Aeshna subarctica and Somatochlora alpestris are especially of supra-regional importance, and responsibility for their conservation is a priority. The last population of Aeshna caerulea apparently ceased to exist about 20 years ago. The populations are concentrated in the moor-rich areas around Hinterzarten, Feldberg and Oberer Hotzenwald. Over the last few decades, the moor dragonfly populations of the Southern Black Forest changed considerably less than the populations in the individual moors. Collection of exuviae was considered as the most meaningful method for recording, and was conducted if it could be carried out with reasonable effort. Proof of successful larval development is a good indicator of the condition of the moors. In years with prolonged hot and dry phases, it was mainly the water bodies in partially drained moors with low or strongly fluctuating water levels or generally flat-water bodies that dried up. As climate change progresses, such extreme weather conditions will occur more frequently, meaning that the populations of most species of moor dragonflies are severely endangered or even threatened by extinction. The further development and care of the moors and their larval waters with high occurrences of moor dragonflies, which make up a decisive part of the respective Southern Black Forest population, are therefore of outstanding importance. However, the rapid renaturation of many affected moors is of similar importance but has not been able to keep up with the progressing climate change. If possible, species protection measures should make a real contribution to stabilizing the regional population. Of primary considerations are waterlogging, deepening and enlargement of small moor ditches as well as waterlogging of former manual peat diggings. Due to climate change, a comprehensive 20-year plan for renaturation measures and the rapid implementation are required. The condition of 133 areas is briefly described and concise proposals for renaturation and species protection measures are presented. If a significant part can be considered feasible and implemented in the next 20 years, the protection of the moors of the Southern Black Forest and their organisms will probably be reasonably secured despite climate change. The Baden-Wurttemberg moor register is now an excellent tool that can be used to plan future measures. At least the larger or more powerful of the many peat deposits listed there should be protected from further destruction by systematic rewetting, primarily for reasons of climate and moor protection." (Authors)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen, Germany. E-mail: fosor@t -online.de

21483. White III, H.B.; White Jr., J.F.; Moore, M.C. (2022): Dragonfly biodiversity at abandoned work sites: Dredge-spoil ponds of the Chesapeake and Delaware Canal, New Castle County, Delaware. Northeastern Naturalist 29(2):

262-294. (in English) "There are few undisturbed, freshwater habitats remaining in the populated areas of the United States. Aquatic organisms, such as dragonflies (Odonata), have therefore either had to adapt to disturbed and modified secondary habitats, such as farms, golf courses, storm-water remediation basins, and community-park ponds, or risk extirpation. The species that readily adapt to these habitats are usually widespread common species. However, other aquatic habitats inadvertently created at abandoned work sites often evolve distinctive characteristics over time that provide refuge for species rarely or never found at deliberately created pond habitats. For 17 years, we have monitored the diverse Odonata fauna at several floristically distinct ponds formed in depressions left from the dredging of the Chesapeake and Delaware Canal in the 1960s. Among the species found are ones not known elsewhere locally or ones found in unusual abundance at 1 or more of the ponds, though infrequently encountered regionally. These dredge-spoil ponds are important for conserving regional Odonata biodiversity by providing unique habitats in an increasingly urbanized environment." (Authors)] Address: White III, H.B., Dept of Chemistry & Biochemistry, Univ. of Delaware, Newark, DE 19716, USA. Email: halwhite@udel.edu

21484. Xu, M.; Fincke, O.M. (2022): Negative body size-dependent resource allocation underlies conspicuous sexual ornaments in a territorial damselfly. Journal of Evolutionary Biology 35(2): 288-298. In English ["Sexual ornaments, signaling individual quality to choosy females or rival males, often show steeper body size scaling compared to non-sexually selected traits. Theory posits such steeper body size scaling is the result of differential resource allocation, reflecting trade-offs between different components of fitness. Yet the process of resource allocation towards body size-dependent sexual ornaments has been rarely understood empirically. Using the Neotropical territorial damselfly Megaloprepus caerulatus, whose males and females carry wax-based, sex-specific white wing bands and white wing tips respectively, we investigated nutrition sensitivity and body size scaling of both traits by manipulating larval food availability and directly quantified both the fat allocated to wing ornaments and the fat reserve from which allocations are made. Both color traits exhibited sensitivity to food availability during larval development and steeper body size scaling compared to control traits. Although the absolute amount of fat invested in developing the color ornaments increased with body size, the proportion of total fat allocated to the ornaments decreased with body size, making exaggerated ornaments less affordable for smaller individuals. Our data demonstrate that measuring the proportion of resource pool from which an individual's ornaments are derived (i.e., its affordability) is essential for understanding the maintenance of honesty of sexual signals." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

21485. Zheng, Y.; Qu, Q.; Liu, P.; Hu, T. (2022): Ground effect of a two-dimensional flapping wing hovering in inclined stroke plane. Journal of Fluids Engineering 144(11): 111206: 11 pp. (in English) ["The ground effect aerodynamics and flow physics of a 2D dragonfly wing hovering (the Reynolds number is 157) in an inclined stroke plane are investigated via solving 2D unsteady incompressible laminar flow Navier-Stokes equations. An analysis road map is proposed to explain the influence of the ground on the flow field, pressure distribution on the wing surface, and the aerodynamic force. In the analysis road map, the flow relative to the wing surface induced by the wing motion and vortex is classified into vertical and parallel wing surface flows. The vertical flow impinges on the wing surface to form a positive pressure zone. In contrast, the parallel flow generates the boundary layer and further concentrated vortex and secondary vortex, which induce negative pressure on the wing surface. The ground impacts the flow relative to the wing in three ways: changing the trajectory of the shed vortex by the mirror effect, promoting the deformation and fusion of the vortices, and causing the cushion effect at extremely small ground clearance." (Authors)] Address: Qu, Q.; Email: qql@buaa.edu.cn

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21486. Aghade, J.B.; Saraf, S.A. (2023): Seasonal variation of odonate diversity in harsul and Salim Ali Lake, Aurangabad, Maharashtra, India. Acta Entomology and Zoology 4(1): 103-105. (in English) ["Odonates are intriguing insects that serve as crucial indicators of the environment's health and water supply. In the form of predators and prey, they are important animals in both the terrestrial and aquatic food webs. In 2021–2022, a study on odonates' variety and seasonal fluctuation were carried out at the Harsul and Salim Ali Lake in Aurangabad, Maharashtra, India. Both locations are popular tourist destinations on the outskirts of Aurangabad, with a sizable pond just next to the palace. The location has luxuriant vegetation and gardens. Photo of adult specimens. The specimens were kept on file. Different identification keys were used to identify species. 11 species of Odonates were found in total, spread across 3 families, according to the study, 8 species were dragonflies and 3 were damselflies. The most prevalent species was Crocothemis servilia, and the least prevalent was Acisoma panorpoides. The monsoon and post-monsoon seasons saw the highest levels of odonate abundance, whereas summer saw the least amount of reduction. The enhanced abundance can be linked to favorable vegetation, perching places, breeding circumstances, high rainfall, and humidity (83%-94%) with a temperature range of 24.5 °C to 29.5 °C. The findings from the current study serve as the site's baseline for future taxonomy-based research and conservation efforts. Additionally, it will spur interest in odonate diversity studies." (Authors) The study includes three European species, which of course are misidentifications.] Address: Aghade, J.B., Dept of Zoology, Government College of Arts and Science, Dr. B.A.M. University, Chhatrapati Sambhaji Nagar, Aurangabad, Maharashtra, India

21487. Archibald, S.B.; Ware, J.L.; Rasmussen, J.A.; Sylvestersen, R.L.; Olsen, K.; Simonsen, T.J. (2023): The damselfly genus Furagrion Petrulevicius et al. (Odonata, Zygoptera) from the early Eocene Fur Formation of Denmark and the dysagrionoid grade. Zootaxa 5278(2): 289-317. (in English) ["The earliest Eocene odonate genus Furagrion Petrulevicius et al. from the Danish Fur Formation is revised based on eighteen specimens, two of which apparently have been lost since their publication. The holotype of Phenacolestes jutlandicus Henriksen, type species of Furagrion, is incomplete and lacks the characters currently used to differentiate species, genera and higher taxa in Odonata. We, therefore, propose that the holotype is set aside and a recently discovered nearly complete Fur Formation fossil is designated as neotype. Furagrion possesses all of the nine wing character states currently used along with head shape for diagnosing the Dysagrionidae; however, Furagrion has a characteristically zygopteran head, not the distinctive head shape of the suborder Cephalozygoptera. We, therefore,

treat it as a zygopteran unassigned to family. These nine wing character states appear in different combinations not only in various Zygoptera and Cephalozygoptera, but also in the Frenguelliidae, an Eocene family of Argentina that may represent an unnamed suborder. We recognise these taxa as constituting a dysagrionoid grade, in which these character states appear either convergently or as symplesiomorphies. Furagrion morsi Zessin is synonymized with Phenacolestes jutlandicus Henriksen, syn. nov. and Morsagrion Zessin with Furagrion Petrulevicius, Wappler, Wedmann, Rust, and Nel, syn. nov." (Authors)] Address: Archibald, S.B., Beaty Biodiversity Museum; University of British Columbia; Vancouver; British Columbia; Canada

21488. Beatty, C.D.; Alves-Martins, F.; Smith, B.D.; Verheyen, J. (2023): Chapter 13 - Biogeographical ecology in Odonata. In: Dragonflies and Damselflies. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. © Oxford University Press (2023). DOI: 10.1093/oso/9780192898623.003.0013: 167-186. (in English) ["Biogeography — the study of the factors influencing the distribution of organisms in space and time—has a number of applications in modern research on odonates. Studies considering phylogenetic and geological information to infer past and extant patterns of biodiversity (known as historical biogeography, Jenkins and Ricklefs 2011) are considerably enhanced by ecological biogeography, providing a more complete view of the forces structuring odonate diversity. This chapter reviews current knowledge of the distribution of odonates globally, and also considers work in a number of active research areas in odonate biogeography, including the influence of climate on changing distribution, life-history attributes, adaptation to changing landscapes, and the use of biogeographical methods in odonate conservation. It concludes that, while recent decades have seen much important work, much remains to be done to understand global odonate distributions, and to safeguard odonate diversity." (Authors)] Address: Beatty, C.D., Dept of Biology, Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053, USA. Email: cbeatty@scu.edu

21489. Bechly, G.; Velten, J. (2023): A revised diagnosis of Palaeodysagrion cretacicus Zheng et al., 2016 (Insecta: Odonata) from mid-Cretaceous Burmese amber, with erection of a new genus of fossil damselflies. Zootaxa 5263(4): 547-556. (in English) ["The diagnosis of Palaeodysagrion cretacicus Zheng et al., 2016 is revised based on the description of a new specimen from mid-Cretaceous Burmese amber. Previously, only a fragmentary wing base was known from the holotype. The new specimen shows the complete wing venation of fore- and hind wings as well as large parts of the body anatomy. The new information proves that Palaeodysagrion youlini Zheng et al., 2017 has a very different venation and does not belong to the same genus. Therefore, a new genus Pseudopalaeodysagrion gen. nov. is erected for this species. Concurring with the results of Archibald et al. (2021), the “dysagrionine” taxa from Burmese amber are transferred from Dysagrionidae to Burmadysagrionidae stat. nov." (Authors)] Address: Bechly, G., Biologic Institute, 16310 NE 80th Street, Redmond, WA 98052, USA. Email: gbechly@biologicinstitute.org

21490. Brockhaus, T. (2023): Die Verwandlung der Libellen (Odonata) - lange Zeit ein Mysterium in der Entomologie. Teil 3. Wer war Maria Sibylla Merian? Und welchen Einfluss hatte Joris Hoefnagel auf sie? Entomologische Nachrichten und Berichte 67(1): 89-92. (in German, with English summary) ["The metamorphosis of dragonflies (Odonata) - a mystery for a long time in entomology. Part 3: Who was Maria Sibylla Merian? And what influence did Joris Hoefnagel have on her? The portraits of Maria Sibylla Merian in some Wikipedia websites are controversial. So, there is only one probably real portrait of this amazing female naturalist and artist by the painter Georg Gsell. He was the husband of one of the daughters of Maria Sibylla Merian. It is possible that the portrait in above websites shows Maria Sibylla’s mother, Johanna Sybilla Heimius. Joris Hoefnagel was an artist of the 16. Century who created extremely lifelike paintings of plants and animals. His works were important models for Maria Sibylla Merians work." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

21491. Buczynski, P.; Tonczyk, G. (2023): Polish and dedicated to Poland odonatological papers. 21. The year 2022 and additions to the year 2021. Odonatrix 93: 7 pp. (in Polish, with English summary) ["The authors present a list of 56 Polish and dedicated to Poland odonatological works that appeared in the year 2022. Five papers and one Internet publication from the year 2021 are also given to supplement the previous list." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Sklodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

21492. Calvão, L.B.; Brito, J.; Ferreira, D.; Cunha, E.J.; Oliveira-Junior, J.M.B.; Juen. L. (2023): Effects of the loss of forest cover on odonate communities in eastern Amazonia. Journal of Insect Conservation 27: 205-218. (in English) ["In recent decades, the conversion of native forests into anthropogenic landscapes has been impacting progressively the physical habitat of the aquatic systems of Brazilian Amazonia. Given this, we evaluated the effects of the loss of natural vegetation cover on the diversity and morphology of Amazonian odonates (Zygoptera and Anisoptera). To do so, we sampled adult odonates at 50 streams in eastern Brazilian Amazonia. We evaluated land use patterns at each site together with two morphological metrics (length of the thorax and the abdomen) of the odonates. We found a positive relationship between natural vegetation cover and both odonate species richness, in general, and the proportion of zygopteran species richness. However, the relationship was negative for all the anisopteran diversity metrics. We also found only negative relationships in the anisopteran abdomen when we investigated the variation in morphological trait change points. We identified 12 species that were associated with natural forest cover, six (all zygopterans) with more forested environments, and six species (three anisopterans and three zygopterans) that were associated with environments with reduced vegetation cover. The results of the present study indicate that preserving continuous natural vegetation cover together with the riparian vegetation will be crucial to the maintenance of the physical characteristics of streams and the structure of the odonate community. The presence of adult odonates was also associated with the quality of both the aquatic and the terrestrial environments, given that their effects on odonate diversity were detected within a 500 m buffer around the streams. Implications for insect conservation The analysis of landscape metrics may increase the potential of the associations observed between the characteristics of natural communities and the loss of natural vegetation cover, in particular in the case of the forest specialists. The application of analyses based on these metrics should better support the development of more effective mitigation measures." (Authors)] Address: Brito, J., Graduate Program in Ecology, Univde Federal do Pará

(UFPA), Belém, Pará, Brazil Laboratory of Ecology and Conservation, Universidade Federal do Pará (UFPA), Belém, Pará, Brazil. Email: jotabio13@gmail.com

21493. Cheri, C.R.; Finn, D.S. (2023): Odonata as Indicators? Dragonflies and Damselflies Respond to Riparian Conditions along Ozark Spring Streams. Hydrobiology 2(1): 260-276. (in English) ["The Odonata are not typically regarded as informative taxa for stream bioassessment in North America compared to other insects, particularly when monitoring the ecological impacts of organic pollution. However, we hypothesized that stream-dwelling odonates are useful bioindicators of riparian conditions because vegetation associated with streams is used for oviposition and establishing breeding territories and is likely a cue for a suitable nymphal habitat. We sampled odonates from multiple microhabitats and all macroinvertebrates from riffle habitat in 12 Ozark Highlands (USA) spring streams along a gradient of riparian conditions. We also measured a standard suite of physical and chemical variables in each stream. We compared various aspects of the odonate and riffle macroinvertebrate assemblages among sites to evaluate sensitivity to variables associated with riparian structure compared to the other physical and chemical variables measured. The odonates were strongly associated with riparian-specific variables, while riffle macroinvertebrates were associated with riparian variables to a lesser degree. The additional environmental variables explained minimal variation in either assemblage. Overall, our results suggest that Odonata alone could be useful for biomonitoring associated with riparian structure around Ozark spring streams. The sensitivity of odonates to riparian conditions in other Nearctic regions should be further studied to identify regional and species-specific differences." (Authors)] Address: Cheri, Cameron, Department of Biology, Missouri State University, Springfield, MO 65897, USA

21494. Cordero-Rivera, A.; Rivas-Torres, A.; Encalada, A.C.; Lorenzo-Carballa, M.O. (2023): Sexual conflict and the evolution of monandry: The case of the damselfly Ischnura hastata (Odonata: Coenagrionidae) in the Galápagos Islands. Ecological Entomology 48: 336-346. (in English) ["1. Sexual selection favours the evolution and maintenance of polygamy, which is the dominant reproductive strategy in insects. Monogamy can evolve in very short-lived species due to time constraints. Here we study adult activity and mating behaviour of a population of Ischnura hastata, a species rarely seen mating, and which has been suggested to be monandric, in wetlands of Isabela Island, Galápagos. 2. By means of mark-recapture methods, we estimated that the daily survival rate was low, ranging from 0.385 to 0.876, yielding average life expectancies of mature individuals of only 1.2–3.2 days. Adults showed very low activity before 7:00, indicating that mating does not occur early. The number of male–female interactions and mating attempts was extremely low, with only 44 copulations recorded on over 230 h of observations. 3. Copulations were brief, with a mean duration of 11 min (but only two were observed from the start). Males showed clear preference to attempt to grasp in tandem females of intermediate age (in 94.3% of cases), rather than young (31.3%) or mature females (24.0%). Males were very persistent once a tandem was achieved, retaining females for up to 139 min, but most females resisted and did not copulate. 4. We conclude that females of I. hastata show a very short time window to mate, exactly when they change colour from juvenile to mature, and live only enough to mate once. Short lifespan has selected for female monandry in I. hastata, creating an intense sexual conflict over mating rates." (Authors)] Address: Cordero-Rivera, A., Universidade de Vigo, ECOEVO Lab, Escola de Enxeñaría Forestal, Campus Universitario A Xunqueira, Pontevedra 36005, Spain. Email: adolfo.cordero@uvigo.gal

21495. Costa, F.M.O.; Tubelis, D.P. (2023): Citizen Science for the study of birds in distinct biomes: Diet of the Rufous-Tailed Jacamar (Galbula ruficauda) (Aves, Galbulidae) in Brazil. International Journal of Zoology and Animal Biology 6(2): 10 pp. (in English) ["Data obtained by citizen scientists have been used by researchers to study the natural history of tropical birds in several countries. For example, this approach has been increasing the knowledge about their feeding ecology, as many photographs show birds holding prey with their foot and/or bill. Due to this, the diet of numerous bird species can be examined with citizen science data. The Rufous-tailed Jacamar (Galbula ruficauda) is a forest bird species widely distributed throughout the Neotropics, and its diet was scarcely quantified in a few localities. This study aimed to investigate the diet of the Rufous-tailed Jacamar in three Brazilian biomes: the Caatinga, the Cerrado and the Atlantic Forest. Searches for photographs with evidence of feeding activities were done in February 2021 in the WikiAves and eBird databases, the major citizen science projects regarding birds found in Brazil. For each selected record, the captured prey was tentatively identified to the taxonomic Order level, and the date of obtention was classified as part of dry or rainy periods. The chi-square test was used to compare the numbers of prey of distinct insect orders in different periods and biomes. A total of 283 feeding records were obtained by citizen scientists in the Caatinga (12%) and surrounding portions of the Cerrado (45%) and the Atlantic Forest (43%). Captured prey comprised seven insect orders, and 15% of them could not be identified. In the Cerrado, the most numerous prey in its diet were those of the orders Lepidoptera and Odonata, followed by Hymenoptera and Hemiptera, in both the dry and rainy periods. On the other hand, substantial seasonal variation was observed in the Atlantic Forest. Records with Lepidoptera were more numerous than those with other insects in the dry period, while Hymenoptera had more records than other orders in the rainy period. In the Caatinga, prey with more records were those of the orders Odonata, Lepidoptera and Hymenoptera. This study suggests that photographic records available in citizen science databases, such as WikiAves and eBird, can be used to improve our knowledge about the diet of birds found in the Neotropics." (Authors)] Address: Costa, F.M.O., Department of Biosciences, Federal Rural University of the Semi-Arid, Av. Francisco Mota, 572, Mossoró, Rio Grande do Norte state, Brazil. Email: filipeolico@gmail.com

21496. Crane, A.L.; Achtymichuk, G.H.; Rivera-Hernández, I.A.E.; Pregola, A.A.; Thapa, H.; Ferrari, M.C.O. (2023): Uncertainty about old information results in differential predator memory in tadpoles. Proceedings of Royal Society B 290: 20230746. https://doi.org/10.1098/rspb.2023.0746: 6 pp. (in English) ["As information ages, it may become less accurate, resulting in increased uncertainty for decision makers. For example, chemical alarm cues (AC) are a source of public information about a nearby predator attack, and these cues can become spatially inaccurate through time. These cues can also degrade quickly under natural conditions, and cue receivers are sensitive to such degradation. Although numerous studies have documented predator-recognition learning from fresh AC, no studies have explored learning from aged AC and whether the uncertainty associated with this older information contributes to shortening the retention of learned responses (i.e. the 'memory

window'). Here, we found that wood frog tadpoles, Lithobates sylvaticus, learned to recognize a novel odour as a predator when paired with AC aged under natural conditions for up to 1 h. However, only tadpoles conditioned with fresh AC were found to retain this learned response when tested 9 days after conditioning. These results support the hypothesis that the memory window is shortened by the uncertainty associated with older information, preventing the long-term costs of a learned association that was based on potentially outdated information." (Authors)] Address: Crane, A.L., Dept of Biology & Dept of Veterinary Biomedical Sciences, Univ. of Saskatchewan, Saskatoon, SK, Canada. Email: adam.crane@usask.ca

21497. Dalvi, A.; Koli, Y.; Thakur, R. (2023): Three new records of odonates (Insecta: Odonata) from Sindhudurg District, Maharashtra, India. Journal of Threatened Taxa 15(5): 23227-23232. (in English, with Marathi summary) ["In this paper, we report the frst confrmed records of Indolestes gracilis davenport Fraser, 1930 and Dysphaea ethela Fraser, 1924 based on a specimen collected from Sindhudurg District, Maharashtra, India. We have also provided additonal records of Macrodiplax cora (Brauer, 1867) from Maharashtra based on photographic evidence from Sindhudurg District." (Authors)] Address: Dalvi, A., 31 Br. Nath Pai Junior College, Kudal, Sindhudurg, Maharashtra 416520, India. Email: asdalvi25@gmail.com

21498. Delunas, C. (2023): Osservazioni sulle libellule (Odonata) di un laghetto artificiale nella città di Cagliari. Mediterraneaonline/Naturalistica 6/2023: 11-16. (in Italian, with English summary) ["Observations on the artificial lake dragonflies (Odonata) in Cagliari city. An artificial lake, in particular situations, can be an ideal habitat for entomological species whose life cycle is linked to water. In Cagliari, the small lake of a city park was populated by numerous specimens of insects belonging to the Odonata order. The site in question is not subject to regular maintenance, the filtering system is not currently active, a manual and summary cleaning is carried out occasionally. This has favored the settlement of numerous dragonflies by integrating and modifying a small city ecosystem." (Authors)] Address: Delunas, Christina, Università degli Studi di Cagliari, DICAAR Dipartimento di Ingegneria Civile Ambientale e Architettura, via Marengo 2, 09123 Cagliari (CA), Italy. Email: cdelunas@unica.it

21499. Dijkstra, K.-D.B.; Assandri, G.; Galimberti, A. (2023): Morphological and molecular evidence supports the species status of the Italian endemic Coenagrion castellani Roberts, 1948 (Coenagrionidae). International Journal of Odonatology 26: 44-53. (in English) ["C. castellani was described from Italy as a distinct species almost 75 years ago but has generally not been recognised or was treated as a subspecies of C. mercuriale (Charpentier, 1840). Populations south of the Alps were recently shown to be completely isolated genetically from those in North Africa and elsewhere in Europe. As markings and male appendages also allow for easy separation in the field, C. castellani is best treated as a good species, the 146th odonate species known from Europe and the second one that is endemic to Italy. Its identification and occurrence are reviewed. North African populations are distinct genetically too, but not in morphology. Whether these should be treated as a distinct taxon, e.g. as the subspecies C. mercuriale hermeticum (Selys, 1872), requires further research." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: kd.dijkstra@naturalis.nl

21500. Durand, E. (2023): Update on distribution, habitat requirements, and vulnerability of Onychogomphus boudoti in Morocco (Odonata: Gomphidae). Odonatologica 52(1/2): 13-24. (in English) ["Since its description, Onychogomphus boudoti Ferreira, 2014 has been known only from two localities in Morocco in a limited part of the Middle-Atlas Mountains. The Status and the distribution of this rare and threatened dragonfly was established by an intensive search in June 2022. Twenty occupied localities were found in Khenifra Province, Morocco, in the south-western part of the Middle Atlas. These records not only confirm the known localities but also extend its known distribution from 100 ha to 15500 ha. Based on these results, its habitat preference with climate and geologic associations and the main threats affecting its status are discussed." (Author)] Address: Durand, E., NATURALIA Environnement, 60 rue Jean Dausset, BP-31285, 84911 Avignon cedex 9, France. Email: e.durand@naturalia-environnement.fr

21501. Forister, M.L.; Black, S.H.; Elphick, C.S.; Grames, E.M.; Halsch, C.A.; Schultz, C.B.; Wagner, D.L. (2023): Missing the bigger picture: Why insect monitoring programs are limited in their ability to document the effects of habitat loss. Conservation Letters. 2023;e12951.: 6 pp. (in English) ["The fate of insects in the Anthropocene has been widely discussed in the scientific literature, the popular media, and in policy circles. This recent attention is justified because reductions in insect abundance and diversity have the potential to undermine the stability of terrestrial ecosystems. Reports of insect declines have also been accompanied by skepticism that is healthy and to be expected in scientific discussion. However, we are concerned about a prevalent misconception that equates reports from monitored natural areas with the global status of insects. In the vast majority of cases, areas monitored for arthropods are undeveloped and thus do not record or even necessarily reflect the masses of insects that are continuously being impacted by habitat loss to urban, suburban and agricultural expansion. We address this misconception and discuss ways in which conservation and policy can be enhanced by correctly locating results from insect monitoring programs within our broader knowledge of biodiversity loss." (Authors) The paper includes a passing reference to Odonata.] Address: Forister, M.L., Department of Biology, University of Nevada, Reno, NV 89557, USA. Email: forister@gmail.com

21502. Fujita, Y.; Iima, M. (2023): Aerodynamic performance of dragonfly wing model that starts impulsively: how vortex motion works. Journal of Fluid Science and Technology 18(1): 1-10. (in English) ["The cross-section of dragonfly wings has corrugated structures. In particular, the leading-edge side of the wing consists of V-shaped structures. According to previous studies, a corrugated wing may exhibit high aerodynamic performance at low Reynolds numbers (Re = O(103)), and vortex dynamics associated with wing structure are expected to play an important role. We study the relationship between the wing structure and vortex dynamics by direct numerical simulations. It is known that, when a two-dimensional flat wing impulsively starts from a rest state, a coherent vortex called lambda vortex, which has the opposite sign to a leading-edge vortex (LEV), is generated and remains for a time interval. Our previous study suggests that, in the case of the corrugated wing, the lambda vortex collapses and is stuck inside V-shaped structures near the leading edge. The collapse of the lambda vortex was proposed as a key factor of high performance for the particular shape of the corrugated wing. In this paper, we investigate the relationship between vortex dynamics

and high performance in a wider parameter range than in our previous studies. We analyse two corrugated models with different Reynolds numbers. It is revealed that the collapse of the lambda vortex is also the key to high performance for these cases." (Authors)] Address: Iima, M., Graduate School of Integrated Sciences for Life, Hiroshima University 1-7-1 Kagamiyama, Higashihiroshima, Hiroshima, 739-8521, Japan. Email: iima@hiroshima-u.ac.jp

21503. Gazzola, A.; Balestrieri, A.; Pellitteri-Rosa, D. (2023): Embryonic exposure to native and alien predator cues tunes tadpole defensive behaviour. Aquatic Ecology 57: 421-431. In English ["When exposed to predation risk, some amphibian species show innate responses, while others recognize their predators by learning. To explore the role played by each mechanism in the assessment of predation risk, we investigated the effects of embryonic and larval exposure to predator chemical cues on tadpole defensive responses, including behavioural, morphological and life history traits. In the first experiment, agile frog (Rana dalmatina) embryos were exposed to the odour of either native (Aeshna cyanea larvae) or alien (Procambarus clarkii) predators each day from egg collection to hatchling (14 days). Body measures (mass, developmental stage, body length, tail length and tail depth) were recorded at hatching and a behavioural test was conducted to explore tadpole responses to predator cues and the potential interaction with their previous embryonic experience. In general, embryonic conditioning did not affect life history traits, except for a slight reduction in tail depth:length ratio for tadpoles exposed to odonate odours. Controls (embryos treated with water) after hatchling reduced their activity when exposed to gammarid-fed odonate cues, suggesting that responses were at least partially innate. Tadpoles exposed to odonate cues as embryos showed a strong defensive response when exposed to dragonfly kairomones. Tadpoles exposed to gammarid-fed crayfish as embryos showed clear behavioural responses towards the same cue (irrespectively of predator diet). Overall, our results suggest that embryonic exposure may tune the defensive responses of the larval stage and early exposure to naïve stimuli may promote their cautionary associations with predation risk." (Authors)] Address: Gazzola, A., Dept of Earth and Environmental Sciences, Univ. Pavia, 27100 Pavia, Italy. Email: andrea.gazzola@unipv.it

21504. Glutz von Blotzheim, U.N. (2023): Die Libellenfauna eines Gartenweihers am Rande von Schwyz. Berichte der Schwyzerischen Naturforschenden Gesellschaft 19: I, 26 pp, App. (in German, with English and French summaries) ["The dragonfly and damselfly fauna of a small garden pond at the edge of a country town with 15,000 inhabitants in rural Central Switzerland. — After a several years of raising the skill level by observing the Odonata on small ponds in our gardens, I began with subsequent monitoring and taking photos in the year 2005. Up to present I found 8 generalist species reproducing in our garden in Schwyz and another 24 species as episodic guests, some with copulations and egg laying but without real proof of successful reproduction. By comparing with the Odonata species richness of some Swiss wetland nature reserves, this rather surprising result encourages wildlife gardening as contribution to the promotion of biodiversity and to amazing experiences. Wetland plant species richness, important for provision of perches, thermoregulation, oviposition and emergence rate, seems to be the main reason for the rather high species richness of dragonflies and damselflies on our pond. Their survey is fascinating and promises moreover detailed observations, which are not easily achieved on shores of lakes or rivers. In any case, I got in due time some insight in the Odonata assemblages, as well as the phenology, the population fluctuation and the behaviour of some species. " (Author)] Address: not stated

21505. Goodman, A.M.; Kass, J.M.; Ware, J. (2023): Dynamic distribution modelling of the swamp tigertail dragonfly Synthemis eustalacta (Odonata: Anisoptera: Synthemistidae) over a 20-year bushfire regime. Ecological Entomology 48(2): 209-225. (in English) ["Intensity and severity of bushfires in Australia have increased over the past few decades due to climate change, threatening habitat loss for numerous species. Although the impact of bushfires on vertebrates is well-documented, the corresponding effects on insect taxa are rarely examined, although they are responsible for key ecosystem functions and services. Understanding the effects of bushfire seasons on insect distributions could elucidate long-term impacts and patterns of ecosystem recovery. Here, the authors investigated the effects of recent bushfires, land-cover change, and climatic variables on the distribution of a common and endemic dragonfly, (S. eustalacta) (Burmeister, 1839), which inhabits forests that have recently undergone severe burning. The authors used a temporally dynamic species distribution modelling approach that incorporated 20 years of community-science data on dragonfly occurrence and predictors based on fire, land cover, and climate to make yearly predictions of suitability. The authors also compared this to an approach that combines multiple temporally static models that use annual data. The authors found that for both approaches, fire-specific variables had negligible importance for the models, while the percentage of tree and non-vegetative cover were most important. The authors also found that the dynamic model outperformed the static ones, based on cross-validation omission rate. Model predictions indicated temporal variation in area and spatial arrangement of suitable habitat, but no patterns of habitat expansion, contraction, or shifting. These results highlight not only the efficacy of dynamic modelling to capture spatiotemporal variables such as vegetation cover for an endemic insect species, but also provide a novel approach to mapping species distributions with sparse locality records." (Authors)] Address: Goodman, A,M., Division of Invertebrate Zoology, American Museum of Natural History, New York, NY 10024, USA. Email: agoodman@amnh.org

21506. Hämäläinen, M.; Fliedner, H. (2023): Why did William Eiford Leach call a small damselfly a 'pirate'? - Revisiting the etymology of the genus Lestes (Odonata: Lestidae). Notulae odonatologicae 10(1): 8-16. (in English) ["We present evidence supporting the widely accepted interpretation that the genus name Lestes Leach, 1815, is based on the Greek masculine word\r|<rrf|c; [lestes] meaning ‘robber or pirate’. Comparison of Leach’s brief definition of Lestes with that of the genus Agrion Fabricius, 1775, from which the new genus was split, suggests that W.E. Leach selected the piratical name because the males of species in this genus are armed with pincer-shaped appendages; hence the name is an allusion to the edged weapons carried by pirates. The common view that the name was suggested by the voracious predatory behaviour of lestids, as well as the interpretation that the genus name is based on the French word teste [= nimble] are both rejected." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, Leiden, the Netherlands. Email: matti.hamalainen@helsinki.fi

21507. Hasik, A.Z.; Ilvonen, J.J.; Siepielski, A.M.; Murray, R.L. (2023): Odonata immunity, pathogens, and parasites.

In: Dragonflies and Damselflies. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. © Oxford University Press (2023). DOI: 10.1093/oso/9780192898623.003.0006: 73-84. (in English) ["Parasites and pathogens are a ubiquitous threat facing organisms within every ecological network. To protect themselves from parasites, organisms have evolved immune defenses. Insect immunity has received a great deal of attention, with numerous studies investigating the intersection of parasite pressure, immune function, and ecology. This chapter highlights how the investigation of odonate immunity has provided insight into how insect immunity operates within the ecological theatre under the threat of parasites. It first explains why odonates are an excellent model system for studies of immunity and parasites. It then reviews what is known of the parasites odonates harbor. Then, it covers the myriad mechanisms employed by odonates to defend themselves from their parasitic enemies. It also discusses key ecological and evolutionary studies that fall at the intersection of immunity and parasites" (Authors)] Address: Hasik, A.Z., Department of Biological Sciences, University of Arkansas, SCEN 601, 850 W. Dickson St., Fayetteville, AR 72701, USA. Email: azhasik@uark.edu

21508. Hu, F.-S.; Chen, S.-L.; He, J.-G.; Lin, K.-T. (2023): Indothemis carnatica (Fabricius, 1798) (Odonata: Libellulidae): A newly recorded dragonfly from Kinmen Islands and Matsu Islands, Taiwan. Taiwanese Journal of Entomological Studies 8(1): 16-20. (in English, with Chinese summary) ["Herein, we report a new record of I. carnatica from Kinmen Islands and Matsu Islands based on either collected specimens or observation records, representing the first record of the species in Taiwan and Fujian. Photos of habitus, live specimens and habitats are also provided. Finally, we briefly discussed the current status of the species on both island groups." (Authors)] Address: Hu, F.-S., Dept Biol. Sciences, National Sun Yat-sen Univ., 70 Lienhai Rd., Kaohsiung 80424, Taiwan. Email: fangshuo_hu@smail.nchu.edu.tw

21509. Huang, L.; Duan, Y.; Shi, Y.; Pang, H. (2023): Bioinspired multiple-degrees-of-freedom responsive metasurface by high-entropy-alloy ribbons with hierarchical nanostructures for electromagnetic wave absorption. Journal of Colloid and Interface Science 636: 1-10. (in English) ["The compound eyes of Pantala flavescens are covered by micro-scaled ocelli capable of sensing polarized light, an attractive property for radar stealth and counterre connaissance. In this work, we fabricated biomimetic electromagnetic wave absorption materials (EAMs) by analyzing the covert information identifications of biological systems and focusing on the design of metastructures and microstructures. Several bionic metasurfaces with anisotropic double-V meta atoms made up of $(FeCoNiSi_{8.9}Al_{8.9})C_{0.2}$ high-entropy-alloy (HEA) ribbons for multiple-degrees-of-freedom recognition and broadband absorption are presented. The covert phase, amplitude, and angular momentum of electromagnetic waves were controlled and recognized as information by manipulating the rotation angle θ of meta atoms. A vortex wave with a topological charge of 1 was generated to recognize linearly polarization and left- and right-handed circular polarization. In addition, the polarization conversion enhanced absorption. The hierarchical nanostructures of HEA ribbons give rise to suitable electromagnetic loss and a superior impedance match. Finally, inspired by the structure of compound eyes, the designed multilayer metamaterials realized effective absorption (reflection loss (RL) ≤ -10 dB) within the 4.5–18 GHz regime under 2.8 mm thickness. These materials provide evidence for a new way for integrated EAMs and metamaterials." (Authors)] Address: Duan, Y., Key Laboratory of Solidification Control & Digital Preparation Technology (Liaoning Province), School of Materials Science & Engineering, Dalian Univ. Tech., Dalian 116085, P.R. China. Email: duanyp@dlut.edu.cn

21510. Ivkovic, M.; Baranov, V.; Doric, V.; Stankovic, V.M.; Previšic, A.; Vilenica, M. (2023): Aquatic Insects of Plitvice Lakes. In: Marko Miliša & Marija Ivkovic (eds.): Plitvice Lakes. Springer Cham: 275-316. (in English) ["Aquatic insects are the most species-rich group that inhabit freshwaters. They are connected to water by at least one life stage, usually that of the larvae, and some spend their entire life in freshwater habitats. The majority of aquatic insects' larvae develop in water; while adults emerge and spend their lives primarily in terrestrial environments where they mate, disperse and in some cases feed. Aquatic insects are sensitive to environmental conditions, which is why they are widely used in biomonitoring. Mayflies, stoneflies and caddisflies are among the most commonly used indicators, but other taxa also show high potential. In the Plitvice Lakes, there are confirmed records of 352 species of aquatic insects. The most abundant order of aquatic insects is Diptera, with 165 recorded species, followed by Trichoptera with 91 species, and Plecoptera with 31 species. All other aquatic insect orders are present with lower species richness, with 25 taxa recorded in Coleoptera, 18 taxa in Ephemeroptera and 14 in Odonata. Megaloptera and Neuroptera each have four species. The aquatic insects reflect the uniqueness and peculiarities of the barrage system of the Plitvice Lakes in both, their composition and ecology. Although some groups of aquatic insects have been well studied throughout the years, there are still many unknowns and many species that need to be recorded." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, Univ. of Zagreb, Dept in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia

21511. Jiang, X.-R.; Dai, Y.-Y.; Wang, Y.-R.; Guo, K.; Du, Y.; Gao, J.-F.; Lin, L.-H.; Li, P.; Li, H.; Ji, X.; Qu, Y.-F. (2023): Dietary and sexual correlates of gut microbiota in the Japanese Gecko, Gekko japonicus (Schlegel, 1836). Animals 2023, 13, 1365. 15 pp. In English ["Simple Summary: We used wild-caught Japanese geckos (Gekko japonicus) and captive conspecifics fed with mealworms and fruit flies to study their differences in gut microbial structure and composition and sexual correlates of gut microbiota. Gut microbial community richness and diversity were higher in mealworm-fed geckos than in wild geckos. The beta rather than alpha diversity of gut microbiota was sex dependent. From this study, we know the following. First, dietary and sexual correlates of gut microbiota are evident in G. japonicus. Second, with respect to the composition of gut microbiota, G. japonicus is more similar to the common leopard gecko than other reptilian taxa. Third, the diversity of gut microbiota is higher in geckos ingesting food with a higher chitin content. Abstract: Numerous studies have demonstrated that multiple intrinsic and extrinsic factors shape the structure and composition of gut microbiota in a host. The disorder of the gut microbiota may trigger various host diseases. Here, we collected fecal samples from wild-caught Japanese geckos (Gekko japonicus) and captive conspecifics fed with mealworms (mealworm-fed geckos) and fruit flies (fly-fed geckos), aiming to examine the dietary and sexual correlates of the gut microbiota. We used 16S rRNA gene sequencing technology to determine the composition of the gut microbiota. The dominant phyla with a mean relative abundance higher than 10% were Verrucomicrobiota, Bacteroidota, and Firmicutes. Gut microbial community richness

and diversity were higher in mealworm-fed geckos than in wild geckos. Neither community evenness nor beta diversity of gut microbiota differed among wild, mealworm-fed, and fly-fed geckos. The beta rather than alpha diversity of gut microbiota was sex dependent. Based on the relative abundance of gut bacteria and their gene functions, we concluded that gut microbiota contributed more significantly to the host's metabolic and immune functions. A higher diversity of gut microbiota in mealworm-fed geckos could result from hi gher chitin content in insects of the order Coleoptera. This study not only provides basic information about the gut microbiota of G. japonicus but also shows that gut microbiota correlates with dietary habits and sex in the species." (Authors)] Address: Jiang, X.-R.Coll. Life Sci., Nanjing Normal Univ., Nanjing 210023, China. Email: xji@wzu.edu.cn

21512. Johansson, F.; Berger, D.; Outomuro, D.; Sniegula, S.; Tunon, M.; Watts, P.C.; Rohner, P.T. (2023): Mixed support for an alignment between phenotypic plasticity and genetic differentiation in damselfly wing shape. Journal of Evolutionary Biology 36(2): 368-380. (in English) ["The relationship between genetic differentiation and phenotypic plasticity can pro vide information on whether plasticity generally facilitates or hinders adaptation to environmental change. Here, we studied wing shape variation in a damselfly (Lestes sponsa) across a latitudinal gradient in Europe that differed in time constraints me diated by photoperiod and temperature. We reared damselflies from northern and southern populations in the laboratory using a reciprocal transplant experiment that simulated time-constrained (i.e. northern) and unconstrained (southern) photoperiods and temperatures. After emergence, adult wing shape was analysed using geomet ric morphometrics. Wings from individuals in the northern and southern populations differed significantly in shape when animals were reared in their respective native environment. Comparing wing shape across environments, we found evidence for phenotypic plasticity in wing shape, and this response differed across populations (i.e. G × E interactions). This interaction was driven by a stronger plastic response by individuals from the northern population and differences in the direction of plastic wing shape changes among populations. The alignment between genetic and plastic responses depended on the specific combination of population and rearing environ ment. For example, there was an alignment between plasticity and genetic differ entiation under time-constrained, but not under non-time-constrained conditions for forewings. We thus find mixed support for the hypothesis that environmental plasticity and genetic population differentiation are aligned. Furthermore, although our laboratory treatments mimicked the natural climatic conditions at northern and southern latitudes, the effects of population differences on wing shape were two to four times stronger than plastic effects. We discuss our results in terms of time con straints and the possibility that natural and sexual selection is acting differently on fore- and hindwings. " (Authors)] Address: Johansson, F., Dept Ecology & Genetics, Animal Ecol., Uppsala Univ., Uppsala 752 36, Sweden. Email: frank.johansson@ebc.uu.se

21513. Josemans, M.; van der Zee, F. (2023): Biodiversiteit toekomstig zonnepark Oudenhoorn: Nulmeting van vegetatie, dagvlinders en libellen. Rapport / Wageningen Environmental Research No. 3246: 47 pp. (in Dutch, with English summary) ["A solar park in Oudenhoorn [The Netherlands] will be built by Farm Frites early 2023 and will be operational at the end of 2023. The solar park and nature dikes were monitored in 2021 by students of HAS University of Applied Sciences. In 2022, Wageningen Environmental Research made another inventory of the location and this inventory serves as a baseline measurement before the construction of the solar park. The following groups of species were inventoried: vegetation, butterflies and dragonflies. The quality of the soil also has been analysed. However, no responsible comparison can be made between the data of 2021 and 2022 due to observer effects, differences in approach, experience and knowledge and inaccurate locations. To improve the coverage of plant species on the nature dikes, it is important to mow the dikes twice a year and to dispose of the grass clippings. Resume The Farm Frites company in Oudenhoorn has built a natural dike on its site (completed in March 2020) with clay soil, which comes from harvested potatoes. The dike and the adjacent terrain around the walking path were sown with a herbal mixture of flowers. In 2021, the dike will be inventoried by students from HAS Den Bosch for plants and some insect species. Farm Frites is currently developing a solar park on its property on a site that was previously used as farmland. The actual construction of that park is planned for spring 2023. The solar park will be 20 hectares in size and will have 46,500 panels, with a power production of 23.5 GWh per year. In addition to producing sustainable energy, the park is also intended to contribute to increasing biodiversity. 4 ha of new nature will be added with 2700 m of extra water bodies and more than 14,000 plants, bushes and shrubs will be planted. Farm Frites has asked Wageningen Environmental Research to draw up and implement a monitoring plan to evaluate how biodiversity will develop in the coming years. This report is an account of that monitoring from 2022. The aim was twofold: 1. Research into the development of biodiversity on the nature dike. Are there any changes compared to 2021 in which students have made an initial inventory? 2. Determining the zero situation at the location of the solar park to be built, so that by means of monitoring changes in biodiversity can be determined in the future and management can be adjusted if desired. In 2022, inventories of vegetation, butterflies and dragonflies will be made on the nature dikes, hiking trails and the future solar park. Vegetation recordings were made on fixed quadrants and transects were walked for the monitoring of butterflies and dragonflies. The differences between the vegetation recordings in 2021 and 2022 are large. This has to do with the following: 1. The difference in fieldwork data between 2021 and 2022. In 2021 the fieldwork was carried out from March - May, in 2022 from July - September. Due to differences in approach and experience (of the students versus researchers of WENR), there are observer effects. The differences are not due to changes in biodiversity, but are caused by the difference (and quality) of observation. The species knowledge of the students was limited. In 2022, about twice as many plant species were found compared to 2021. 2. Accuracy of GPS coordinates to find the exact same location: there may be a difference of three to four meters, so that other plant species with different covers may have been found. It is therefore not possible to draw responsible conclusions about differences between 2021 and 2022. The main results and conclusions from the monitoring are: 1. The nature dikes and walking paths north of the Farm Frites business park appear to have become more species-rich and look attractive. Especially around the hiking trails, many plants bloom, which attract many butterflies and other insects. 2. In 2022, 151 plant species have been observed around the nature dike and 90 around the future solar park. A total of 175 different plant species have been found at both locations. 3. The solar park is planned on a location that has been used as a field for many years. The current biodiversity at the location of the solar park is very low. This is due to the use of the

field. Due to crop rotation, several crops are grown alternately, for example potatoes are grown once every four years. There is potential to improve biodiversity on the new solar park, partly because no fertilizers or pesticides will be used on the solar park. The condition is that the solar park has good nature management. 4. Soil analyzes at the location of the future solar park indicate that there are few obstacles in terms of chemical composition and soil type for the development of herb-rich grassland. The report includes advice for management and points of attention for the construction of the solar park. To improve the cover of plant species on the dikes, it is important to mow the dikes twice a year and to dispose of the clippings." (Authors)] Address: not stated

21514. Lim, S.-h.; Park, J.-K.; Park, W.-B.; Won, D.-H.; Kim, M.-S.; Hong, S.; Do, Y. (2023): Gut microbiome of three species of Odonata. Entomological Research 53(4): 167-172. IN english ["The influence of diet and host specificity on the fecal microbiome of three adult dragonfly species, Pseudothemis zonata, Orthetrum lineostigma, and Orthetrum melania, was investigated. The fecal bacterial communities were analyzed using 16S rRNA gene sequencing, and stable isotope analysis was used to investigate their food sources. The results showed significant differences in the composition of fecal bacterial communities among the three species, with host specificity potentially playing a more important role than diet. The dominant phyla in the fecal bacterial communities of all three species were Firmicutes, Proteobacteria, and Bacteroidetes. The operational taxonomic units (OTUs), Shannon index, and phylogenetic diversity index were not significantly different among the three species, indicating that there were no major differences in the diversity of the fecal bacterial communities. The stable isotope analysis showed that the food sources were similar among the three species, being primarily small insects found near the aquatic habitats. However, the fecal bacterial communities of two closely related species, O. lineostigma and O. melania, were different despite their similar food sources. In contrast, the fecal bacterial communities of O. lineostigma and P. zonata were similar, despite the different food sources of these two species. Our findings suggest that host specificity and diet can influence the composition of the intestinal microbiome in these insects, but the degree of influence may depend on the specific host and environmental conditions." (Authors)] Adress: Yuno Do, Y., Dept of Biological Sciences, Kongju National University, 56, Kongjudaehak-ro, (32588) Room 204, Kongju-si, Chungcheongnam-do, Republic of Korea. Email: doy@kongju.ac.kr

21515. Lin, S.-C. (2023): Taxonomie reassessment of the two supposed subspecies of Leptogomphus sauteri in Taiwan based on morphological and molecular characters (Odonata: Gomphidae). Odonatologica 52(1/2): 127-142. (in English) ["L. sauteri Ris, 1912, is a species endemic to Taiwan and is currently treated as having two subspecies, L. sauteri sauteri and L. sauteri formosanus Oguma, 1926. However, the two subspecies are difficult to distinguish due to morphological similarity or overlap. In this study, morphological and molecular methods are used to reassess the taxonomic status of the two subspecies. It can be confirmed that three morphological characters, namely body size, coloration, and the male accessory genitalia, and two molecular genetic markers, namely nuclear ITS1 and mitochondrial COI Segments, fail to discriminate between the two subspecies. These results suggest that the splitting of L. sauteri into two subspecies is not justified. Therefore, the taxon L. formosanus is treated as a junior synonym of L. sauteri." (Author)] Address: Lin, S.-C., Division of Zool., Endemie Species Research Institute, lst, Minsheng East Rd., Jiji, Nantou 55244, Taiwan. Email: lsc0724@gmail.com

21516. Linklater, D.P.; Le, P.H.; Aburto-Medina, A.; Crawford, R.J.; Maclaughlin, S.; Juodkazis, S.; Ivanova, E.P. (2023): Biomimetic nanopillar silicon surfaces rupture fungal spores. International Journal of Molecular Sciences 24(2), 1298; https://doi.org/10.3390/ijms24021298: 16 pp. (in English) ["The mechano-bactericidal action of nanostructured surfaces is well-documented; however, synthetic nanostructured surfaces have not yet been explored for their antifungal properties toward filamentous fungal species. In this study, we developed a biomimetic nanostructured surface inspired by dragonfly wings. A high-aspect-ratio nanopillar topography was created on silicon (nano-Si) surfaces using inductively coupled plasma reactive ion etching (ICP RIE). To mimic the superhydrophobic nature of insect wings, the nano-Si was further functionalised with trichloro(1H,1H,2H,-2H-perfluorooctyl)silane (PFTS). The viability of Aspergillus brasiliensis spores, in contact with either hydrophobic or hydrophilic nano-Si surfaces, was determined using a combination of standard microbiological assays, confocal laser scanning microscopy (CLSM), and focused ion beam scanning electron microscopy (FIB-SEM). Results indicated the breakdown of the fungal spore membrane upon contact with the hydrophilic nano-Si surfaces. By contrast, hydrophobised nano-Si surfaces prevented the initial attachment of the fungal conidia. Hydrophilic nano-Si surfaces exhibited both antifungal and fungicidal properties toward attached A. brasisiensis spores via a 4-fold reduction of attached spores and approximately 9-fold reduction of viable conidia from initial solution after 24 h compared to their planar Si counterparts. Thus, we reveal, for the first time, the physical rupturing of attaching fungal spores by biomimetic hydrophilic nanostructured surfaces." (Authors)] Address: Linklater, Denver, School of Science, STEM College, RMIT University, Melbourne, VIC 3000, Australia

21517. Linklater, D.; Ivanova, E.P. (2023): Challenges to the design and testing of antimicrobial nanostructured surfaces. Microbiology Australia 44(2): 79-82. In English ["Nanomaterials, specifically nano-topographies, have been explored for their antimicrobial activity toward bacteria, fungi and even viruses. A decade ago, we discovered that the nanopillar topography of insect wings such as cicadas, dragonflies and damselflies, were not repelling bacteria as previously surmised, but bacteria were attaching and consequently being killed. The nature of the bactericidal effect associated with nanostructured insect wings has been extended to include antimicrobial activity toward both to environmental and pathogenic fungi. Specifically, the antimicrobial nature is associated with the physical disintegration of attached microbes due to a mechanical stress imposed on the cell membrane, which stretches and breaks. This exciting new discovery implies that, if successfully replicated on the surface of biomaterials and implantable devices, systemic or local administration of antibiotics are no longer required to kill bacteria that attach on such surfaces." (Authors)] Address: Ivanova, Elena P., School of Science, STEM College, RMIT University, Melbourne, VIC 3000, Australia. Email: elena.ivanova@rmit.edu.au

21518. Mähn, L.A.; Hof, C.; Brandl, R.; Pinkert, S. (2023): Beyond latitude: Temperature, productivity and thermal niche conservatism drive global body size variation in Odonata. Global Ecology and Biogeography 32(5): 656-667. (in English) ["Aim: So far, latitudinal body size clines have been discussed primarily in the context of thermoregulation, sensu

Bergmann. However, body size patterns are ambiguous in ectotherms, and this heterogeneity remains poorly understood. We tested whether Bergmann's rule and the resource availability rule, which states that energetic requirements determine species body size, apply to Odonata. Furthermore, we hypothesized that the contrasting effects of thermoregulation and resource availability (e.g., productivity) can obscure the overall gradient in body size variation. Location: Global. Time period: Contemporary. Major taxa studied: Odonata. Methods: Using data for 43% of all odonate species described so far, we tested our hypotheses in phylogenetically and spatially comparative analyses at assemblage and species levels. For the distribution data, we integrated expert range maps and ecoregional ranges based on all available occurrence records. To distinguish between long-term and evolutionarily recent responses of environmental drivers in body size, we constructed a phylogenetically informed classification of all odonate species and decomposed the body size into its phylogenetic and specific components for our subset of species. Results: We documented a weak positive relationship between body length and latitude but found strong and contrasting effects for temperature between dragonflies and damselflies and consistent positive effects for productivity that explained 35–57% of body size variation. Moreover, we showed a strong phylogenetic signal in sized-based thermoregulation that shaped the distribution of dragonflies, but not of damselflies. Main conclusions: We concluded that temperature, productivity and conservatism in size-based thermoregulation synergistically determine the distribution of ectotherms, while the taxon-specific importance of these factors can lead to contrasting and weak latitude–size relationships. Our results reinforce the importance of body size as a determinant of species distributions and responses to climate change." (Authors)] Address: Mähn, Laura Anna, Dept of Animal Ecology, Fac. Biol., Univ. Marburg, Karl-von- Frisch-Str. 8, 35043 Marburg, Germany. Email: lauramaehn@posteo.de

21519. Maharani, R.; Triana, E.; Dharma, A.P. (2023): Studi keanekaragaman jenis capung (Ordo Odonata) di blok legok Majalaya resort Sarongge Taman Nasional Gunung gede pangrango. Biopendix 9(2): 195-202. (in Indonesian, with English summary) ["So this study aims to determine the diversity of dragonflies found in the Legok Majalaya Block, which can also be used as a bioindicator of environmental quality. Methods: This research was conducted in July 2022 with the research location in the Legok Majalaya Block. The method used for sampling is using a combination of roaming methods or direct encounter surveys with the TTLTK (Capture Mark Release Capture Back) method. The captured dragonflies were then identified using the book Odonata Semarang Raya (2018) and the book Flying Insect Wendit (2013). Results: 5 species of dragonflies found: O. sabina, O. pruinosum, O. glaucum, B. contaminata and P. flavescens. With a shanon-wiener diversity index value of 1.36 and an evenness index of 0.34. Conclusion: The evenness index value indicates a depressed community condition that causes the dominance of a species." (Authors)] Address: Maharan, R., Program Studi Pendidikan Biologi, Universitas Muhammadiyah Prof. DR. Hamka, Indonesia. Email: dibittt231@gmail.com

21520. Mairif, M.; Bendifallah, L.; Doumandji, S. (2023): Diversity of odonates (Odonata, Anisoptera & Zygoptera) in the Theniet El Had National Park - North West of Algeria. Journal of Insect Biodiversity and Systematics 9(1): 155-182. (in English, with Arabian summary) ["The aim of this study is to make an inventory of the fauna of the Odonata in Theniet El Had National Park, which helps managers to make appropriate decisions for the conservation of these species. The site is entirely forested (Cedrus and Quercus species) with numerous intra-forest natural environments (clearings, grasslands, rocky habitats, springs, pools and ponds, etc.), this mosaic of habitats harbours a remarkable wealth of fauna and flora. Our study focused on the natural and artificial temporary forest ponds, scattered throughout the park, which are of biological and ecological interest for a very wide range of insects, most notably the hemimetabola. These are characterised by a larval stage that is quite different from the adult stage in terms of habitat and lifestyle, namely odonates, where the larvae are aquatic whereas the adults have an aerial life. The inventory of odonates was carried out through monthly surveys of 8 water bodies (7 forest ponds and one hill reservoir) during one year, from March 2017 to February 2018. This preliminary inventory allowed us to inspect 240 individuals of odonates belonging to 18 species i.e. 11 genera and 5 families. The species recorded at the end of this study are the subject of a cartographic representation showing their distribution at the local scale (in the park) and at the national scale." (Authors)] Address: Mairif, M., Laboratory for the Protection of Plants in Agricultural and Natural Environments Against Crop Pests, Departement of Agricultural and Forestry Zoology, Higher National Agronomic School, El Harrach, Algeria. Email: mairif.vialar38@gmail.com

21521. Makbun, N. (2023): The genus Sympetrum Newman, 1833 in Thailand, with description of S. thailandensis sp. nov. (Odonata: Libellulidae). Zootaxa 5296(4): 569-581. In English ["The records of genus Sympetrum Newman, 1833 from Thailand were analysed. The unidentified Sympetrum sp. reported from Chiang Mai and Loei provinces in the past is confirmed as S. hypomelas (Selys, 1884) and additional provincial records of this species are also provided. Sympetrum thailandensis sp. nov. is described and figured based on the adult specimens of both sexes from Hin Tung, Muang, Nakhon Nayok province, Central Thailand. The new species belongs to infuscatum-group and is most similar to S. darwinianum (Selys, 1883). However, it is different from the congener by a combination of morphological and colouration characters. The key to species of Sympetrum known from Thailand is also presented." (Author)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. Email: noppadon.makbun@gmail.com

21522. Martens, A.; Kohl, S.; Wildermuth, H. (2023): Are anal spines of anisopteran larvae an antipredator device? A case study in Boyeria irene (Odonata: Aeshnidae). Odonatologica 52(1/2): 49-60. (in English) ["B. irene larvae of different stages sampled at several localities in the headwaters of the Gardon River, Southern France, frequently showed malformations and injuries in their anal pyramid. The majority of these were broken or imperfectly regenerated tips of the anal spines. To quantify this phenomenon in a standardized way, exuviae of B. irene were sampled. In addition to running water habitats from the headwaters of the Gardon in France, exuviae from Lake Lucerne, Switzerland, were also analysed. In the Gardon river System, 9 to 26 % of the exuviae collected in 2008 showed damaged spines and para- or epiprocts. In Lake Lucerne, in 2006, 73% of the exuviae were damaged. In most cases the tips of the epiproct or paraproct were broken or malformed. We interpret the damaged and malformed spiny appendages as indicating successful defence against fish attacks. When disturbed, anisopteran larvae spread out the elements of their anal pyramid presenting a spiky crown-like target. We

hypothesise that this behaviour helps reduce the risk of being swallowed by predaceous fish. Presumably, most injuries are caused by the stresses the elements are subject to when puncturing the fish's mouth." (Authors)] Address: Martens, M., Institute of Biology, University of Education Karlsruhe, Bismarckstraße 10, 76133 Karlsruhe, Germany. Email: andreas.martens@ph-karlsruhe.de

21523. Martin, R.; Maynou, X. (2023): Larval development and voltinism of rheophilous Odonata from a Mediterranean river in the north-eastern Iberian Peninsula. Odonatologica 52(1/2): 25-48. (in English) ["We describe the larval development and voltinism of nine species of running-water dragonflies and damselflies from the upper and middle reaches of the Tordera, a Medi-terranean-climate river located in the north-east of the Iberian Peninsula. We sampled larvae between October 2020 and October 2022. We determined larval growth patterns and identi-fied and estimated the sizes of the late developmental stadia by means of correlation graphs between pairs of body features, i.e., head width and hind wing-sheath length, for Calopteryx haemorrhoidalis, C. virgo meridionalis, C. xanthostoma, Pyrrhosoma nymphula, Platycnemis acutipennis, P. latipes, Boyeria irene, Onychogomphus forcipatus unguiculatus, and O. uncatus. Calopteryx virgo meridionalis, B. irene and O. uncatus, characteristic of the upper course, exhibited bifurcations in the timing of their development (cohort splitting), generating patterns of mixed voltinism - 1-2 years per generation in the case of C. virgo meridionalis and 2-3 years in the case of O. uncatus and B. irene. The rest of the taxa, typical of the middle course, were largely univoltine. It is notable that O. forcipatus unguiculatus, hitherto reported as semi- or partivoltine (2-3 years) throughout its range, including the Maghreb, is exclusively univoltine in the Tordera river." (Authors)] Address: Martin, R., Institució Catalana d'Història Natural, carrer del Carme 47, E-08001 Barcelona, Catalonia, Spain. Email: ricardo.martin@cllicenciats.cat

21524. Metz, M. (2023): Mechanistic basis and evolutionary aspects of metabolic allometry in dragonflies and damselflies. Degree project in biology, Master of science (2 years), 2023. Examensarbete i biologi 60 hp till masterexamen, 2023. Biology Education Centre, Uppsala University: 25 pp. (in English) ["Metabolic allometry is the study of how the minimal energy expenditure of an organism, standard metabolic rate (SMR), scales with the body mass. Previous research, predominantly on mammals and birds, typically find allometric relationships between SMR and body mass, with a scaling coefficient (slope) of 0.75, often referred to as "Kleiber's law". This has been suggested to reflect some global physiological constraints. However, recently, it has been suggested that metabolic allometry instead results from life history optimization. Several recent studies on lower phylogenetic scales reveal scaling coefficients deviating from 0.75 and the intraspecific variation of metabolic allometry, along with its mechanistic basis, remains poorly understood. In this study, I aimed to investigate the variation in metabolic rate in an insect species, the common Bluetail Damselfly (Ischnura elegans). I measured SMR of individuals in three different temperatures and compared the sexes and three heritable female colour morphs that occur in this variable species. Furthermore, I compared the cell size of 20 species of Odonata to obtain a better understanding of possible physiological constraints on the evolution of SMR. In I. elegans, I found low intraspecific variation of metabolic allometry, allometric scaling coefficients that were generally lower than 0.75 and no evidence across species that SMR seemed to be directly constrained by cell size. My results are in line with recent theories that metabolic allometries probably have higher evolvabilities than previously thought." (Author)] Address: not stated

21525. Miga, M.; Jahari, P.N.s.; Parimannan, S.; Rajandas, H.; Abdul-Latiff, M.A.B.; Yap, J.W.; Shamsir, M.S.; Mohd Salleh, F. (2023): The complete mitochondrial genome dataset of the Green Metalwing damselfly, Neurobasis chinensis (Hagen, 1887) (Odonata: Zygoptera: Calopterygidae) from Malaysia. Mendeley Data, V1, doi: 10.17632/53zs79xytt.1: (in English) ["This dataset described the complete mitochondrial genome of N. chinensis from Malaysia, sequenced using the next-generation sequencing technologies. It has a total length of 15,245bp in length, consisting of 13 protein-coding genes, 22 transfer RNAs, 2 ribosomal rRNAs and a control region. The genomic DNA was extracted from fresh tissue sample of Ischyja marapok using the Qiagen Blood and Tissue Kit (Qiagen, Valencia, CA) and fragmented using a Bioruptor® system. The library was prepared using NEBNext® Ultra™ II DNA Library Prep Kit for Illumina®. The sample was then sent for sequencing using the Illumina NovaSeq 6000 platform with 150 paired-end mode (PE150). The assembly was done using NOVOPlasty v.4.2 and run through a PALEOMIX BAM pipeline to assess the mitogenome mapping. Annotation was done using the MITOS v2 web server and the predicted protein-coding genes were further verified using the Open Reading Frame (ORF) Finder. The annotated mitogenome sequence file was converted into an accepted Genbank format using the GB2sequin web application. The circular mitogenome map was generated using OGDRAW. The mitogenome is available in Genbank under the accession number ON165246." (Authors) blob:https://data.mendeley.com/3d7c6c14-45c7-44-6c-aa32-17320fd56cd3] Address: Salleh, F.M., Dept Biosciences, Fac. Science, Universiti Teknologi Malaysia, Johor, Malaysia Centre of Excellence for Omics-Driven Computational Biodiscovery (COMBio), Faculty of Applied Sciences, AIMST University, Bedong, Kedah, Malaysia. Email: faezah@utm.my

21526. Mill, P.; Green, D. (2023): Species Rewiew 12: Ischnura elegans (Vander Linden), the Blue-tailed Damselfly, with notes on I. genei (Rambur), the Island Bluetail and I. graellsii (Rambur), the Iberian Bluetail. Journal of the British Dragonfly Society 39(1): 1-23. (in English) [Description, habitat, distribution, life cycle, dispersal, predation, parasites] Address: Green, D., 128 Bankside, Leeds, LS8 5AD, UK

21527. Moreno-Pallares, M.; Lobo Hernández M.; Gutiérrez-Moreno L.C.; Pérez- Gutiérrez, L. (2023): 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, María, Grupo de investigación Biodiversidad del Caribe colombiano, Universidad del Atlántico, Barranquilla, Colombia. Email: mariainesmoreno@mail.uniatlantico.edu.co

21528. Nienhaus, H.; Fitzpatrick, S.W.; Bloom, D.D.; Schriever, T.A. (2023): Dispersal ability and biogeographic gradients influence gene flow of three aquatic insects in Laurentian Great Lakes interdunal wetlands. Freshwater Science 42: 88-103. (in English) "Population genetic connectivity is influenced by multiple abiotic and biotic attributes, including geography, dispersal ability, and life history, which may lead to different patterns of population structure of organisms occupying similar habitats. We investigated how differences in dispersal ability and biogeographic gradients correspond with population structuring of 3 aquatic insect species found within naturally fragmented interdunal wetlands along the eastern shoreline of Lake Michigan in midwestern USA. Interdunal wetlands are small, highly fragmented, and patchily distributed along the eastern coast of Lake Michigan, USA. Our focal species, Anax junius, Notonecta undulata Say, 1832, and Caenis amica Hagen, 1861 were chosen as high, intermediate, and low dispersers, respectively. We hypothesized that all insect populations experience isolation by distance with relatively low gene flow among sites, but that the strength of isolation by distance varies with dispersal ability. We used cytochrome c oxidase subunit I sequence data to confirm species identification and restriction enzyme-association DNA sequencing for population genomic analyses. Our cytochrome c oxidase subunit I data revealed that Caenis populations consisted of multiple species split along a latitudinal gradient. Restriction site-association DNA sequencing data showed that A. junius displayed strong isolation by distance, where N. undulata did not. Additionally, both A. junius and N. undulata populations displayed 2 genetic clusters along the coastline, and genetic diversity increased along with latitude. These results indicate that biogeographical variables, such as latitude and covarying abiotic factors, may be stronger predictors of population structure than dispersal ability and that inference of population structure within aquatic macroinvertebrates should be on a species-specific basis." (Authors)] Address: Schriever, Tiffany, Dept of Biological Sciences. Western Michigan Univ.. 1903 West Michigan Avenue, Kalamazoo. Michigan 49008 USA. Email: liffany.schricvcr@wmich.edu

21529. Oldak, K.A., (2023): Dragonflies (Odonata) of selected localities in Warsaw. Odonatrix 194: 12 pp. (in Polish, with English summary) ["12 localities within the boundaries of Warsaw were researched. A total of 29 species of dragonflies (mostly eurytopes) were found (39.2% of the Polish odonate fauna), 18 of which were classified as autochthonous or probably autochthonous. One species protected in Poland was recorded – Sympecma paedisca." (Author)] Address: Oldak, K.A., Ziemowita 14, 05-300 Miñsk Mazowiecki, Poland. Email: krystian.adam.oldak@gmail.com

21530. Palacino-Rodríguez, F.; Altamiranda-Saavedra, M.; Palacino, D.A.; Penagos, A.C.; Ríos, K.J. (2023): Factors influencing predation on Odonata by Argiope trifasciata (Forsskål, 1775). International Journal of Odonatology 26: 36-43. (in English) ["Despite a high number of incidental online records of spiders predating upon dragonflies/damselflies, studies on these interactions are scarce. Here, we describe the predatory behavior of Argiope trifasciata on the two most common odonate species in the study area [Rhionaeschna marchali, Mesamphiagrion laterale], and whether various factors (web width, web length, spider body length, odonate body length, distance of the web from the edge of water body, and height of the web above ground) are related to the number of odonates captured. Argiope trifasciata employed stalking and frontal approaches as Odonata predation strategies. Our findings showed that larger Odonata are preyed upon by larger spiders. The greatest numbers of prey were caught in wider, higher webs, whereas narrow webs closer to the ground caught more small prey. Capturing success by A. trifasciata was similar in webs at different distances from the water for both species. Contrary to our hypothesis, there was no relationship between capturing success in either prey species and the distance of the web from the water. Habitat architecture may be more important to this interaction, as vegetation attracts both spiders (for anchoring webs) and odonates (as perch sites)." (Authors)] Address: Palacino-Rodríguez, F., Sección Etología, Facultad de Ciencias, Univ. de la República, Montevideo, Uruguay

21531. Paray, N.A.; Mir, A.H. (2023): Odonate fauna (Insecta: Odonata) of Kashmir, Jammu & Kashmir, India: a preliminary report. Journal of Threatened Taxa 15(5): 23257-23261. (in English) ["The current study was conducted to investigate the variety of Odonata in Kashmir from November 2020 to November 2022. The study revealed the existence of 24 species, which includes 18 species of Anisoptera under eight genera & two families and six species of Zygoptera in five genera & three families. New records of Orthetrum sabina, O. internum, Aeshna petalura, and Anax guttatus from the region are provided herewith. Libellulidae (12 spp.) followed by Aeshnidae (six spp.) were recorded as two dominant families. This study provides some important baseline information on the odonates of Kashmir, Jammu & Kashmir, India." (Authors)] Address: Paray, N.A, Entomology Research laboratory, Dept of Zoology, University of Kashmir, Srinagar- Jammu & Kashmir 190006, India

21532. Pati, A.; Kundu, S.; Sharma, A.; Dubey, V.K.; Ghosh, M.; Dasgupta, S.; Banerjee, S. (2023): Studies on the diversity of macroinvertebrates in suburban and rural aquatic bodies of West Bengal: Implications of vector control. Acta Ecologica Sinica 43(3): 560-575. In English ["Biological assessment of the freshwater habitats aims to characterize and monitor the conditions of the aquatic resources. Assessment of species assemblage in these habitats will indicate the possible variations in the resource exploitation and trophic interactions. Macroinvertebrates are the best indicators of aquatic ecosystem and play an important role in freshwater ecosystem functioning through nutrient cycling, primary production, decomposition and biological control of mosquitoes. Observations revealed that the prey individuals of order Diptera were found to be highest (51.16%), however the cumulative predatory taxa including Coleoptera, Odonata, Hemiptera and Orthoptera accounted to 67.02% The values of diversity indices varied significantly across different sampling spots justifying the usage of those wetlands and potentiality of them towards conservation biological control. Based on the biotic index, rice fields at Panskura ranked 'Good' to 'Fair' while all others ranked 'Fair' or 'Poor'.Irrespective of the classes and orders, the representative individuals were observed in high numbers during the post monsoon and the winter months which may be attributed to the fact that with the volume of water, the space available

for the insects increases, thereby promoting population expansion and releasing the crowding effect. The result of three way factorial ANOVA on the number of macroinvertebrates considering the spots, sites and sampling months as explanatory variables, revealed significant differences across all the interactions. A correspondence of the taxonomic diversity with the functional role of the aquatic predatory insects of the order Coleoptera, Hemiptera and Odonata is well established, through their links with multiple prey species including mosquito and chironomid larvae. In an assorted species assemblage of both predator and prey species, conservation biological control may require habitat extension and modification to allow increment of niche width to sustain diverse species in the habitats. Therefore to comment on the chances of the potentials of conservation biological control, monitoring of the macroinvertebrate community becomes imperative. " (Authors)] Address: Banerjee, S., Ecology & Vector Biology Research Unit, Dept of Zool. for UG & PG Studies, Serampore Coll., Serampore, Hooghly, West Bengal 712201, India. email: soumyajitb@gmail.com

21533. Payra, A.; Deshpande, A.; Koparde, P. (2023): Northernmost records of two endemic odonates Protosticta sanguinostigma Fraser, 1922 and Idionyx saffronatus Fraser, 1924 from the northern Western Ghats, Maharashtra, India (Odonata, Platystictidae). Spixiana 45(2): 249-253. (in English) ["The present communication deals with new spatial records of two endemic odonates of Western Ghats P. sanguinostigma and I. saffronatus for the State of Maharashtra, based on the materials collected from the Thoseghar Waterfall of Satara district, Maharashtra, India. Both records represent northernmost localities of the species. Detailed diagnostic characters and photographs are provided." (Authors)] Address: Payra, A., School of Sustainable Development, Faculty of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Kothrud, Pune, Maharashtra, 411038, India. Email: arapayra@gmail.com

21534. Pinto, A.P.; Bota-Sierra, C.A.; Marinov, M. (2023): Chapter 19. Species identification and description. In: Dragonflies and Damselflies. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. © Oxford University Press (2023). DOI: 10.1093/oso/9780192898623.003.0019: 263-278. (in English) ["Species identification (establishing an affiliation of a sampled specimen to a particular taxon) and description (introduction of a new taxon) are two of the basic tasks in taxonomy, commonly known as alpha-taxonomy. We review practices which have shaped contemporary taxonomy in Odonata at taxonomic and nomenclature ranks within the species group and propose a workflow for future studies." (Authors)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand Email: milen.marinov@mpi.govt.nz

21535. Powell, K.E.; Oliver, T.H.; Johns, T.; González-Suárez, M.; England, J.; Roy, D.B. (2023): Abundance trends for river macroinvertebrates vary across taxa, trophic group and river typology. Global Change Biology 29(5): 1282-1295. (in English) ["There is mounting evidence that terrestrial arthropods are declining rapidly in many areas of the world. It is unclear whether freshwater invertebrates, which are key providers of ecosystem services, are also declining. We addressed this question by analysing a long-term dataset of macroinvertebrate abundance collected from 2002 to 2019 across 5009 sampling sites in English rivers. Patterns varied markedly across taxonomic groups. Within trophic groups we detected increases in the abundance of carnivores by 19% and herbivores by 14.8%, while we estimated decomposers have declined by 21.7% in abundance since 2002. We also found heterogeneity in trends across rivers belonging to different typologies based on geological dominance and catchment altitude, with organic lowland rivers having generally higher rates of increase in abundance across taxa and trophic groups, with siliceous lowland rivers having the most declines. Our results reveal a complex picture of change in freshwater macroinvertebrate abundance between taxonomic groups, trophic levels and river typologies. Our analysis helps with identifying priority regions for action on potential environmental stressors where we discover macroinvertebrate abundance declines." (Authors) Trends for Odonata were stable.] Address: Powell, Kathryn, UK Centre for Ecology & Hydrology, Wallingford, UK. Email: katpow@ceh.ac.uk

21536. Rosenthal, D.M.; Deng, L.; Rose, T.; Touchon, J.C. (2023): One of these things is not like the other: Mixed predator cues result in lopsided phenotypic responses in a Neotropical tadpole. PLoS ONE 18(5): e0285968. https://doi.org/10.1371/journal.pone.0285968: 14 pp. (in English) ["Many organisms have evolved to produce different phenotypes in response to environmental variation. Dendropsophus ebraccatus tadpoles develop opposing shifts in morphology and coloration when they are exposed to invertebrate vs vertebrate predators. Each of these alternate phenotypes are adaptive, conferring a survival advantage against the predator with which tadpoles were reared but imposing a survival cost with the mismatched predator. Here, we measured the phenotypic response of tadpoles to graded cues and mixed cues of both fish and dragonfly nymphs. Prey species like D. ebraccatus commonly co-occur with both of these types of predators, amongst many others as well. In our first experiment, tadpoles increased investment in defensive phenotypes in response to increasing concentrations of predator cues. Whereas morphology only differed in the strongest predation cue, tail spot coloration differed even at the lowest cue concentration. In our second experiment, tadpoles reared with cues from both predators developed an intermediate yet skewed phenotype that was most similar to the fish-induced phenotype. Previous studies have shown that fish are more lethal than dragonfly larvae; thus tadpoles responded most strongly to the more dangerous predator, even though the number of prey consumed by each predator was the same. This may be due to D. ebraccatus having evolved a stronger response to fish or because fish produce more kairomones than do dragonflies for a given amount of food. We demonstrate that not only do tadpoles assess predation risk via the concentration of predation cues in the water, they produce a stronger response to a more lethal predator even when the strength of cues is presumed to be identical." (Authors)] Address: Touchon, J.C., Biology Dept, Vassar Coll., Poughkeepsie, New York, USA. Email: E-mail: jutouchon@vassar.edu

21537. Schneider, T.; Plyushch, I.G.; Vierstraete, A.; Ikemeyer, D. (2023): Cordulegaster coronata in eastern Afghanistan (Odonata: Cordulegastridae). Notulae odonatologicae 10(1): 1-7. (in English) ["In the last decades only a little knowledge has been gained regarding the Odonata fauna of Afghanistan, principally due to ongoing conflict within the country. Nevertheless, Ukrainian scientists have visited there in recent years, mainly to study Lepidoptera and Coleoptera. During one expedition in the Paghman-Dara mountains at an altitude of 2 500 m a.s.l. ca 20 km west of Kabul

a female of C. coronata (Morton, 1916) was collected. No further specimens of this species were seen." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. Email: thomas.rs@gmx.de

21538. Schröter, A.; Borkenstein, A.; Jödicke, R. (2023): Why do mature dragonflies migrate? A critical analysis of Corbet's chapter “Spatial displacement by light" with reference to Sympetrum striolatum (Odonata: Libellulidae). Odonatologica 52(1/2): 61-78. (in English) ["Migrating dragonflies coming in from the North Sea in north-western Germany in the autumn of 2021 prompted the authors to consider the cause and biological function of undertaking a risky crossing of the open sea. Individuals of the most prevalent species, Sympetrum striolatum, were all mature, while some sampled specimens were old. In Corbet’s System of spatial displacement, published in his seminal book “Dragonflies: behaviour and ecology of Odonata”, S. striolatum is provisionally treated as a species exhibiting seasonal flights to and from aestivation refuges but not as a migratory species. In fact, the species belongs to a group of autumn migrants that begin mass movements when mature. An analysis of our observations and the available literature led us to the conclusion that the chapter “Migration beginning in the reproductive period” of Corbet’s book treats the subject inadequately. We argue that the flight type assessment of S. striolatum must be corrected accordingly: it is also a true autumn migrant whose mass flight is particularly noticeable in high mountain ranges and in Coastal areas. However, there remain question marks over the biological significance and evolutionary benefits of mature dragonflies performing such risky mass flights over open sea." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

21539. Slomczynski, K.; Tonczyk. G.; Plóciennik, M. (2023): New insight into the macroinvertebrates of the Rawka River Nature Reserve (central Poland). Ecologica Montenegrina 62: 12-23. (in English) ["This paper presents the results of a preliminary survey on macroinvertebrate communities of a pristine lowland river Rawka in central Poland. The whole river is protected by a nature reserve but its invertebrates haven’t yet been investigated extensively. This research has three main objectives: 1) to recognise preliminarily Rawka’s macrofauna, 2) to determine the dissimilarity pattern between macroinvertebrates from the riverbed and the local oxbow, 3) to compare the invertebrate assemblages occurring in different habitats. The material was collected at three riverbed sampling points and one oxbow study site. It was found that the oxbow of Rawka River has different aquatic invertebrate communities than the riverbed. Conducted preliminary studies indicate that Rawka and its oxbow reveal high invertebrate diversity that is still vastly underestimated. Seventy-seven invertebrate taxa were collected and twenty-seven of them are first-recorded for Rawka River. Some rare and protected species have been found in the river, e.g. Ophiogomphus cecilia - a dragonfly which remains under strict species protection in Poland. The composition of aquatic invertebrates indicates that water quality of Rawka at the investigated section is good, but this needs to be confirmed with more extensive studies." (Authors)] Address: Slomczynski, K., University of Lodz, Department of Invertebrate Zoology and Hydrobiology, Banacha St. 12/16, Lodz 90-237, Poland.

21540. Sukkasem, C.; Boonsoong, B. (2023): Species diversity and distribution of dragonfly nymphs (Odonata: Anisoptera) in ponds of Nakhon Nayok and Nakhon Pathom Provinces. Kasetsart University Academic Conference No. 59: 76-84. (in Thai, with English summary) ["This study aims to investigate the species diversity and distribution of dragonfly nymphs in ponds of Nakhon Nayok and Nakhon Pathom provinces. Dragonfly nymphs were collected from 15 sampling stations (6reference sites and 9 test sites) on 4 occasions between October 2018 and July 2019. The full-grown nymphs were reared until emerged to adults for species identification. The results showed that 10 species from 9 genera and two families of dragonfly nymphs were founded. The result of the PCA and CCA ordination plot showed that the reference sites were strongly correlated with Brachydiplax chalybea, Macrodiplax cora, Rhyothemis phyllis, Rhyothemis variegata and Neurothemis fluctuans while Ictinogomphus decoratus, Brachythemis contaminata and Crocothemis servilia nymphs correlated with test sites." (Authors)] Address: Boonsoong, B, Department of Zoology, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand. Email: fscibtb@ku.ac.th

21541. Thakur, Y.; Grover, A.; Sinha, R. (2023): Differential distribution of macroinvertebrate associated with water quality. World Water Policy 9(1): 84-112. (in English) ["Streams and rivers are the major source of drinking water and irrigation in many developing countries. Stream health is a major criterion and regulator of the health of its dependents (invertebrates, aquatic flora, fishes, animals, and humans). For the sustenance of a balanced ecosystem, a mutual existence between flora and fauna along with other abiotic factors is a prerequisite. Benthic fauna lying on the riverbed serves as a food source for fish, larger insects, birds, etc. Nowadays, most freshwater bodies are getting polluted through various anthropogenic activities like mining, land-use practices (fertilizers and insecticides), industrial effluent, and sewage inlet. Due to the water contamination, there have been observed changes in the physicochemical parameters of the water. The macroinvertebrate species being sensitive to these changes play an important role not only in determining the health of the water body but also in regulating the ecosystem. After review, it was observed that order like Diptera dominated in various locations, comprising of family Ceratopogonidae and Chironomidae, followed by order Trichoptera and Coleoptera. Species belonging to family Baetidae and Chironomidae possess pollution tolerance capabilities; additionally, these species can survive at a wide range of temperatures. Species from families such as Simuliidae showed their existence at varying water velocities. Families like Limnephilidae, Simuliidae, and Glossosomatidae exhibited their survival in fast moving water whereas Notonectidae, Hydrophilidae Gomphidae, Coenagrionidae, Libellulidae, Aeshnidae, and Dryopidae indicated species of low waterflow. Species of the family Tipulidae have been related to areas of high conductivity, whereas Gomphidae, Dryopidae, and Glossomatidae as species of low conductivity. Hydrophilidae and Notonectidae dominated high temperature areas. The present study will put forth before the government, current scenario of macroinvertebrate structure depending on the different characteristics of the water. This will help in regulating and controlling water pollution." (Authors)] Address: Sinha, Reshma, Dept of Animal Science, School of Life Sci., Central Univ. of Himachal Pradesh, Kangra, India. Email: sinhareshma89@gmail.com

21542. Theischinger, G.; Mitchell, A.; Richards, S.J.; Polhemus, D.A. (2023): Systematics of the Nosticta salomonis complex (Odonata: Zygoptera: Platycnemididae). Zootaxa 5296(2): 101-146. (in English) ["We examined the morphology, colour patterns and genetic relationships of

Nososticta populations allied to N. salomonis (Selys) from across Melanesia. Seven species-level taxa are recognised in the N. salomonis 'complex': N. africana (Schmidt), N. boonei sp. nov., N. chrismulleri Theischinger & Richards, N. hedigeri sp. nov., N. salomonis (Selys), N. stueberi sp. nov., and N. tagula sp. nov. All of these species are black damselflies with blue markings, and they differ from all other Nososticta by having: 1) a prominent spike on the male superior appendage, 2) a prominent angular base of the male inferior appendage, and 3) a complex posterior lobe on the female pronotum bearing two pairs of processes in the rough shape of a chair when viewed laterally. A molecular phylogeny based on the DNA barcode fragment of the COI gene plus two nuclear genes indicates that these seven species are closely related, but more extensive sampling of Nososticta species is required to confirm that they form a monophyletic group." (Authors)] Address: Theischinger, G., Australian Museum, Ento., 1 William Str., Sydney, N.S.W. 2010, Australia. Email: theischingergunther@gmail.com

21543. Theys, C.; Verheyen, J.; Janssens, L.; Tüzün, N.; Stoks, R. (2023): Effects of heat and pesticide stress on life history, physiology and the gut microbiome of two congeneric damselflies that differ in stressor tolerance. Science of The Total Environment 875: (in English) ["Highlights: • Gut microbiota differed between two damselfly species differing in pace-of-life. • Stressor response patterns of the microbiome and the host phenotype were similar. • A heat spike negatively impacted both species' phenotype and microbiome. • Pesticide-induced microbial shift may underlie species differences in tolerance. • Gut microbiota may improve mechanistic insights in combined stressor effects. Abstract: The combined impact of toxicants and warming on organisms is getting increased attention in ecotoxicology, but is still hard to predict, especially with regard to heat waves. Recent studies suggested that the gut microbiome may provide mechanistic insights into the single and combined stressor effects on their host. We therefore investigated effects of sequential exposure to a heat spike and a pesticide on both the phenotype (life history and physiology) and the gut microbiome composition of damselfly larvae. We compared the fast-paced Ischnura pumilio, which is more tolerant to both stressors, with the slow-paced I. elegans, to obtain mechanistic insights into species-specific stressor effects. The two species differed in gut microbiome composition, potentially contributing to their pace-of-life differences. Intriguingly, there was a general resemblance between the stressor response patterns in the phenotype and in the gut microbiome, whereby both species responded broadly similar to the single and combined stressors. The heat spike negatively affected the life history of both species (increased mortality, reduced growth rate), which could be explained not only by shared negative effects on physiology (inhibition of acetylcholinesterase, increase of malondialdehyde), but also by shared effects on gut bacterial species' abundances. The pesticide only had negative effects (reduced growth rate, reduced net energy budget) in I. elegans. The pesticide generated shifts in the bacterial community composition (e.g. increased abundance of Sphaerotilus and Enterobacteriaceae in the gut microbiome of I. pumilio), which potentially contributed to the relatively higher pesticide tolerance of I. pumilio. Moreover, in line with the response patterns in the host phenotype, the effects of the heat spike and the pesticide on the gut microbiome were mainly additive. By contrasting two species differing in stress tolerance, our results suggest that response patterns in the gut microbiome may improve our mechanistic understanding of single and combined stressor effects." (Authors)] Address: Theys, Charlotte, Lab. of Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. Email: theys.charlotte@kuleuven.be

21544. Thor, K.A.; Oldak, K.A.; Klich, D.; Gajewska, K.; Popczyk, B.; Klimaszewski, K.; Olech, W. (2023): Artificial waterholes for European Bison as biodiversity hotspots in forest ecosystems: Ecological effects of species reintroduction activities. Diversity 2023, 15(3), 446. 15 pp. (in English) ["Despite the growing population of European bison (Bison bonasus), it is necessary to plan the reintroduction of these animals to new areas. Reintroduction of European bison often requires the improvement of natural conditions. Such preparatory activities allow European bison to more easily adapt to new places, but also impact the functioning of animals from other taxa. The aim of the presented study was to examine the impact of waterholes for European bison on the development of local populations of amphibians and dragonflies (Odonata), as well as the creation of new feeding grounds for bats. We examined 15 reservoirs in the Augustów Forest District located in northeastern Poland, of which five were waterholes for European bison built in 2013–2014, four were semi-natural reservoirs transformed into waterholes for European bison in 2018, and six were natural reservoirs. Dragonflies were studied in 2021–2022; amphibians in 2018 and 2020; and bats in 2018, 2019, and 2020. In total, 24 species of dragonflies (Odonata), 10 species of amphibians, and 13 species of bats were found. The results of the inventory of three taxonomic groups using different comparative variants indicate a significant impact of the construction of waterholes for European bison on the biodiversity of the forest ecosystem. We concluded that the waterholes for European bison present better resistance to drying out than natural reservoirs. In addition, waterholes warm up more quickly, supporting better conditions for amphibians. The surface of the reservoirs and their exposed surroundings are favorable for insects (including dragonflies), and these are a source of food for bats, becoming attractive feeding grounds for them." (Authors)] Address: Thor, Katarzyna Anna, Inst. of Animal Sciences, Warsaw Univ. of Life Sciences—SGGW, Ciszewskiego 8, 02-786 Warsaw, Poland. Email: katarzyna_thor@sggw.edu.pl

21545. Tolman, E.R.; Beatty, C.D.; Bush, J.; Kohli, M.; Moreno, C.M.; Ware, J.L.; Weber, K.S.; Khan, R.; Maheshwari, C.; Weisz, D.; Dudchenko, O.; Lieberman Aiden, E.; Frandsen, P.B. (2023): A chromosome-length assembly of the Black Petaltail (Tanypteryx hageni) Dragonfly. Genome Biol. Evol. 15(3) https://doi.org/10.1093/gbe/evad024. 8 pp. In English ["We present a chromosome-length genome assembly and annotation of T. hageni. This habitat specialist diverged from its sister species over 70 million years ago, and separated from the most closely related Odonata with a reference genome 150 million years ago. Using PacBio HiFi reads and Hi-C data for scaffolding we produce one of the most high-quality Odonata genomes to date. A scaffold N50 of 206.6 Mb and a single copy BUSCO score of 96.2% indicate high contiguity and completeness." (Authors)] Address: Ethan R. Tolman, E.R., American Museum of Natural History, Dept of Invertebrate Zoology, New York, USA. E-mail: etolman@amnh.org

21546. Torres-Cambas, Y.; Megna, Y.S.; Salazar-Salina, J.C.; Diez, Y.L.; Catalá, A.; Trapero-Quintana, A.D.; Schröder, B.; Domisch, S. (2023): A database of freshwater macroinvertebrate occurrence records across Cuba. Scientific Data volume 10, Article number: 169 (2023) Cite this

article: 9 pp. (in English) ["In light of the ongoing freshwater biodiversity crisis, detailed knowledge regarding the spatial distribution of freshwater species is urgently required, especially in biodiversity hotspots. Here we present a database of georeferenced occurrence records of four freshwater invertebrate taxa groups across Cuba, namely flatworms (Platyhelminthes: Tricladida), insects (Ephemeroptera, Odonata, Hemiptera, Trichoptera, Coleoptera, Diptera), crabs and shrimps (Crustacea: Decapoda), and mollusks (Mollusca). We collated the geographic occurrence information from scientific literature, unpublished field records, museum collections and online databases. The database, comprising 6292 records of 457 species at 1075 unique localities, is organized in 32 fields that contain the information about the taxonomic classification of each recorded species, the sex and life stage of collected individuals; the geographic coordinates, location, author and date of the record and a reference to the original data source. This database provides an important basis towards an improved understanding of the spatial distribution of freshwater biodiversity in Cuba." (Authors)] Address: Torres-Cambas, Y., Leibniz Institute of Freshwater Ecology & Inland Fisheries, Dept of Community & Ecosystem Ecol., Müggelseedamm 310, 12489, Berlin, Germany. Email: yusdiel.torres-cambas@igb-berlin.de

21547. Valencia Vargas, J.P. (2023): Análisis de Estado de Diversidad de Macroinvertebrados Bentónicos dentro de la Provincia de Esmeraldas. Tesis de Licenciatura en Gestión Ambiental, Pontificia Universidad Católica del Ecuador: VI + 39 pp. (in Spanish, with English summary) ["Benthic macroinvertebrates are currently considered as bioindicators for water quality assessment due to their tolerance to contaminated environments. The general objective of this research was to analyze the state of diversity of the benthic macroinvertebrate community within the province of Esmeraldas and its relationship with environmental indicators. To meet the objective, quantitative research was carried out, where the influence of the variability of environmental indicators in three scales (local, riparian and basin) on the diversity of benthic macroinvertebrates was identified, three documents referring to macroinvertebrate studies carried out in some rivers of the cantons of the Province of Esmeraldas were taken as a guide. As a result, an abundance and richness of benthic macroinvertebrates was evidenced in the analyzed studies of Martinez et al and Molinero without publishing; and within the most significant taxonomic groups were Ephemeroptera, Trichoptera, Diptera, Coleoptera, Heteroptera and Odonata [Libellulidae, Coenagrionidae]. Within the most dominant families stood out Leptoplebiidae, Baetidae, Leptohyphidae, Chironomiidae and Hydropsychidae: and of the rare groups it was evidenced that the family Palaemonidae correlated with the environmental indicator density of roads and low percentage of forest in the basin, that is, where there is environmental alteration. From the study concluded that the presence of forest in both the basin and riparian zone should be indispensable for the conservation of benthic diversity and thus the water resource; It was also demonstrated that the intervention of anthropogenic activities influences the presence of benthic macroinvertebrates tolerant to environmental pollution." (Author)] Address: not stated

21548. Viella, D.S.; Guillermo-Ferreira, R.; Koroiva, R. (2023): Argia koroivarum sp. nov. (Odonata: Coenagrionidae) from Minas Gerais state, Southeastern Brazil. Zootaxa 5296(1): 58-66. (in English, with Portuguese summary) ["Argia koroivarum sp. nov. (BRAZIL, Minas Gerais state, São Roque de Minas, Parque Nacional Serra da Canastra, 9.iv.2019, (-20.2323, -46.6084, 1306m asl), D.S. Vilela, R. Guillermo, R. Koroiva leg., Laboratory of Ecological Studies on Ethology and Evolution (LESTES), Uberaba, Minas Gerais State, Brazil) is described, illustrated, and diagnosed based on specimens collected in Minas Gerais state, Brazil. The new species can be diagnosed from its congeners by the morphology of male ligula, dorsal branch of paraproct, and of female mesostigmal lobes." (Authors)] Address: Viella, D.S., Univ. Estadual Paulista, Dep.to de Ciên. Biol., Fac. de Ciências e Letras de Assis, Laboratório de Biol. Aquática (LABIA), Assis, SP, Brazil. Email: deeogoo@gmail.com

21549. Vilenica, M.; Katar, M. (2023): New data on Odonata fauna of the Drava River basin. Entomologia Croatica 22(1): 8-16. In: English, with Croatian summary ["Odonata are amphibious insects widely used as bioindicators of freshwater ecosystems' health. Their assemblages at lotic and lentic habitats in the area of the Drava River basin are still not completely known. Therefore, we surveyed Odonata fauna at two Drava River oxbows and the Drava River lower reaches in Croatia and Hungary. We recorded a total of 21 species. Although most of them were generalists, we also documented two species of conservation concern: Sympetrum fonscolombii and Ophiogomphus cecilia. During the fieldwork, we also observed some of the anthropogenic impacts present at studied habitats, such as plastic waste disposal, and removal of riparian vegetation, including the removal of individual tress for purposes of fishing. With this study, we increased our knowledge about Odonata fauna of the Drava River basin. Our data can be used for future monitoring of the recorded species and their habitats." (Authors)] Address: Vilenica, Marina, Fac. of Teacher Education, Univ. of Zagreb, Dep in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia

21550. Waldhauser, M.; Vierstraete, A.; Schneider, T. (2023): Records of little-known Odonata from south-western Saudi Arabia. Notulae odonatologicae 10(1): 17-29. (in English) ["During a short trip to south-western Saudi Arabia focusing on the Asir Mountains in November 2022, 27 species of Odonata were found. The occurrence of species known from Saudi Arabia, albeit from data older than 50 years (Diplacodes lefebvrii and Crocothemis sanguinolenta), was confirmed. New localities of some previously only scarcely reported species were discovered, viz. Pseudagrion sublacteum, Anax speratus, Paragomphus sinaiticus, Brachythemis impartita, Nesciothemis farinosa, Trithemis dejouxi and presumed Pseudagrion arabicum, on which DNA analysis was performed." (Authors)] Address: Waldhauser, M., Nature Conservation Agency of the Czech Republic, U Jezu 10, 46001 Liberec, Czech Republik. Email martin.waldhauser@nature.cz

21551. Waldhauser, M.; Müller, O.; Vierstraete, A.; Schneider, T. (2023): Pinheyschna yemenensis, a new species for Saudi Arabia, with description of the final instar larva and exuvia (Odonata: Aeshnidae). Odonatologica 52(1/2): 79-87. (in English) ["During a short trip to south-western Saudi Arabia with a focus on the Asir Mountains in November 2022, a larva and several exuviae of Pinheyschna yemenensis (Waterston, 1984) were found. Molecular genetic analysis of the COI fragment from the larva confirmed its generic identity. Pinheyschna yemenensis, is a new species to the Odonata fauna of Saudi Arabia, and its larva and exuvia are described." (Authors)] Address: Waldhauser, M., Nature Conservation Agency of the Czech Republic, U Jezu 10, 46001 Liberec, Czech Republic. Email: martin.waldhauser@nature.cz

21552. Weihrauch, F.; Brockhaus, T.; Günther, A.; Piper, W.; Theischinger, G. (2023): In memoriam Günther Peters (1932-2023). Odonatologica 52(1/2): 1-12. (in English) ["Personal recollections of Günther Peters, the world's leading expert on the Aeshnidae, and a brief outline of his life, his scientific career, and his expeditions are presented." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. Email: mail@osmylus.com

21553. Yeh, W.-C. (2023): An amendment on the record of Rhyothemis fuliginosa Selys, 1883 in Taiwan - a newly discovered gynomorphic wing pattern in female R. regia regia (Brauer, 1867) (Odonata: Libellulidae). Taiwanese Journal of Entomological Studies 8(1): 21-28. (in English) ["The identity of Taiwanese Rhyothemis fuliginosa Selys, 1883 is clarified to be the gynomorphic female of R. regia regia (Brauer, 1867). Female Taiwanese R. r. regia differ from female R. fuliginosa mainly in having paler face with weak metallic lustre, anteriorly more strongly incurved postclpyeus and stouter cerci. The reported wing patterns of various subspecies of R. regia are compiled from the literature for comparison. A transitional variation of the female wing pattern of Taiwanese R. r. regia varying from andromorphic to gynomorphic is illustrated. The case of range expansion caused by climatic warming in R. r. regia and other libelullid dragonflies in Taiwan is elucidated." (Author)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), No. 53, Nanhai Rd., Zhongzheng Dist., Taipei, 100051, Taiwan. Email: wcyeh@tfri.gov.tw

21554. Yeh, W.-C.; Hu, F.-S. (2023): The real status of Chlorogomphus splendidus (Selys, 1878) in Taiwan (Odonata: Chlorogomphidae). Taiwanese Journal of Entomological Studies 8(1): 12-15. (in English, with Chinese summary) ["The single record of Chlorogomphus splendidus (Selys, 1878) in Taiwan was based on a single female specimen collected from Lanyu Island in eastern Taiwan. The status of this species in Taiwan has remained uncertain for nearly a century, as no new material is available for study. Upon the capture of a female C. risi Chen, 1950 in 2010 from the island, we decided to re-examine the voucher specimen of C. splendidus and compared it with the female C. risi. The result reveals that Lanyu C. splendidus is a pale-winged female C. risi. Hence, Chlorogomphus splendidus has to be excluded from the list of Taiwanese Odonata." (Authors)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), No. 53, Nanhai Rd., Zhongzheng Dist., Taipei, 100051, Taiwan. Email: wcyeh@tfri.gov.tw

21555. Zhan, Z.; Zhang, C.; Chen, M.; Wang, J.; Fu, A.; Fan, Y.; Luan, X. (2023): DNA metabarcoding-based winter diet analysis of Eurasian otter (Lutra lutra) in the northern Greater Khingan Mountains. Biodiversity Science, 31, 22586. doi: 10.17520/biods.2022586: 12 pp. (in Chinese, with English summary) ["Aims: The Eurasian otter (Lutra lutra) is a key indicator and flagship species of freshwater ecosystems. Unfortunately, human disturbance and environmental changes have caused a severe decrease in Eurasian otter populations in China, even resulting in extinction in some areas. At present, the species is predominantly found in northeast and southwest China, with the northern part of the Greater Khingan Mountains being one of the most important habitats for Eurasian otter populations in the northeast. Studying the diet composition of Eurasian otter is a valuable tactic in understanding its interspecific relationship and the functioning of its ecosystem. This information is essential when assessing their survival status and carrying out conservation efforts. Method: In this study, 50 suspected Eurasian otter fecal samples were collected from the northern Greater Khingan Mountains. Based on DNA barcoding technology, 35 samples were confirmed to be Eurasian otter fecal samples. Then, using DNA metabarcoding technology, species in the identified feces were analyzed to gain insight into the feeding habits of the otters. Results: In this study, 22 different species were identified in Eurasian otter fecal samples, including 15 fishes, 2 frogs, and 5 insect species. Cottus poecilopus had the highest relative frequency of occurrence (19.35%) and relative read abundance (27.32%) among all the vertebrate foods, followed by Rana amurensis (15.48% and 21.73% respectively). At the family level, Cottidae had a significantly higher relative frequency of occurrence (32.26%) and relative read abundance (45.72%) than other fishes. Conclusion: The results of this study revealed that fish, primarily from the family Cottidae, were the main prey of Eurasian otters in the northern part of the Greater Khingan Mountains in winter, followed by frogs. In addition, some aquatic insects such as Odonata, Trichoptera and Plecoptera were found in a small amount of otter feces, which might come from otter prey. This research provides valuable insight into the survival status of otter populations, and can be used to inform the development of relevant policies and conservation efforts." (Authors)] Address: Luan, X., School of Ecology and Nature Conservation, Beijing Forestry University, Beijing 100083, China. E-mail: luanxiaofeng@bjfu.edu.cn

21556. Zhao, Z.; Feng, X.; Zhang, Y.; Wang, Y.; Zhou, Z. (2023): Species diversity, hotspot congruence, and conservation of North American damselflies (Odonata: Zygoptera). Frontiers in Ecology and Evolution 10:1087866. doi: 10.3389/fevo.2022.1087866: 9 pp. (in English) ["The rapid extinction of species is of considerable concern for biodiversity conservation. Identifying the drivers of species diversity and hotspots is beneficial for developing conservation strategies. Studies on insects have mainly focused on terrestrial species and rarely on semiaquatic species. Using 135,208 georeferenced occurrence records of 296 damselflies across North America, their species richness and endemism (represented by weighted endemism) patterns were mapped in a 100 × 100-km grid size, and the effects of environmental variables on species richness and endemism were investigated using generalized linear models and hierarchical partitioning. Subsequently, the top 5% grids with species richness and weighted endemism were separately selected as hotspots and their congruence was evaluated. Finally, species diversity hotspots were identified by integrating two types of hotspot grids, and gap analysis was performed to evaluate their conservation status. Temperature conditions and water availability had the strongest influence on species richness and endemism, respectively. Low congruence among species richness and endemism hotspots was observed. Moreover, four species diversity hotspots were identified, namely, region of the eastern United States and southeastern Canada, southwestern United States, central Mexico, and southernmost North America. Approximately 69.31% of the hotspot grids are not a part of the existing protected areas, presenting a significant conservation gap. The habitats of taxonomic groups should be considered while identifying the most common driving mechanisms of endemism. Strengthening the establishment of protected areas in regions with conservation gaps is urgently needed to promote the conservation of damselflies in North America." (Authors)] Address: Zhao, Z., College of Agriculture, Anshun University, Anshun, China. Email: zzx611324@163.com