

# Odonatological Abstract Service

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1997

- 3487.** Adamovic, Z.R.; Vijatov, S.T. (1997): Morphometric distinction of *Platycnemis pennipes nitidula* Brullé, 1832 from *P.p. pennipes* Pallas, 1771 (Odonata: Platycnemididae). *Acta entomol. serb.* 2(1/2): 61-75. (in English with Serbian summary). ["The statistical examination confirmed that the males and females of *P. p. nitidula* have significantly wider hind tibiae than the males and females of the nominate subspecies *P. p. pennipes*. The ratio: maximum width of hind tibia / length of median tibial spine of the males and females of *P.p. nitidula* are significantly larger than that of the nominate subspecies. Distribution of two subspecies was discussed." (Authors)] Address: Vijatov, S.T., Institute for Medical Research, P.O. Box 721, 11001 Beograd, Serbia
- 3488.** Elsner, O. (mit Beiträgen von Fischer-Leipold, O.; Meyer, N.; Reiser, B; Uhlenhaupt, H.; Weber, K.) (1997): Ökologische Untersuchungen zu Keupersandsteinbrüchen im Landkreis Haßberge. *Ber. naturforsch. Ges. Bamberg* 71: 69-154. (in German). [Bavaria, Germany; 7 quarries were surveyed for their flora and fauna; records of *Coenagrion hastulatum*, *Leucorrhinia dubia*, *Orthetrum brunneum*, *Sympetrum danae*, *S. flaveolum*, and *Cordulia aenea* are of some interest. Management measures are proposed. ] Address: Elsner, O., Inst. für Vegetationsk. und Landschaftsökologie, Georg-Eger-Str. 1b, D-91334 Hemhofen/Zeckern, Germany
- 3489.** Hilfert, D.; Rüppell, G. (1997): Early morning oviposition of dragonflies with low temperatures for male avoidance (Odonata, Aeshnidae, Libellulidae). *Entomol. gen.* 21(3): 177-188. (in English with German summary). ["The relationship between oviposition by females and the beginning of male flight activity, on the one hand, and air temperature and time of day, on the other, was investigated in Northern Germany, in Southern France and in Japan. Females of some Anisoptera species, as females of *Orthetrum cancellatum*, *Aeshna cyanea*, and *A. mixta*, avoid further matings by appearing before the males at oviposition sites, when air temperature are still low. In contrast, the females of *Anax imperator* are able to defend themselves against males successfully. Females of the Aeshnidae in S-France and in Japan fly to oviposition with higher air temperatures than the females of Aeshnidae in N-Germany. In the Zygoptera examined here (*Ischnura elegans*, *Coenagrion puella*), there is no such male avoidance strategy involving oviposition at lower temperature to avoid males. Here the beginning of oviposition and male flight activity is determined by the mating system." (Authors)] Address: Rüppell, G. Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany
- 3490.** Jödicke, R. (1997): Die Verbreitung von *Sympetrum sinaiticum tarraconense* Jödicke (Odonata, Anisoptera: Libellulidae). *Opusc. zool. flum.* 155: 1-7. (in German, with English summary). ["A map is provided which demonstrates the occurrence of this Iberian taxon in the Mediterranean parts of Spain. 18 localities are compiled, ranging from Andalusia to the Pyrenees. There seems to be no recent contact with the nominotypical ssp. from northern Africa." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de
- 3491.** Prasad, M. (1997): Additions to the odonate fauna of Mizoram, northeastern India. *Opusc. zool. flum.* 154: 7-10. (in English). [12 odonate species are added to the fauna of Mizoram, totalling the list of species to 44. Descriptive note on the following species are given: *Aciagrion borneense*, *Calicnemia miniata*, *C. eximia*, *Lestes dorothea*, *Caliphaea confusa*, *Anisopleura comes*, *Euphaea ochracea*, *Merogomphus martini*, and *Idionyx imbricata*.] Address: Prasad, M., Zool. Survey of India, M-Block, New Alipore, Calcutta - 700 053, India
- 3492.** Prasad, M. (1997): Further additions to the odonate fauna of Arunachal Pradesh, eastern India. *Opusc. zool. flum.* 154: 1-6. (in English). [21 species are added to the fauna of the state, totalling the odonate fauna of the Arunachal Pradesh to 77 species. Descriptive notes are provided for *Aciagrion olympicum*, *Ischnura rufostigma mildredae*, *Coelliccia renifera*, *Megalestes major*, *Onychogomphus risi*, *Orthetrum japonicum internum*, and *Sympetrum orientale*.] Address: Prasad, M., Zool. Survey of India, M-Block, New Alipore, Calcutta - 700 053, India
- 3493.** Tremblay, A.; Lucotte, M. (1997): Accumulation of total mercury and methyl mercury in insect larvae of hydroelectric reservoirs. *Can. J. Fish. Aquat. Sci.* 54: 832-841. (in English with French summary). ["Mean total mercury (Hg) and methyl mercury (MeHg) concentrations in insect larvae from hydroelectric reservoirs were 3-5 times (up to 10 times) higher than in their counterparts from natural lakes. Taxonomic differences, which may be related to feeding behavior, and substrate type (lake sediment or flooded soils) together explained a large part of the total variability of total Hg ( $r^2 = 0.64$ ) and MeHg ( $r^2 = 0.79$ ) concentrations in insects. MeHg concentrations in flooded soils increased from 0.3-2 ng Hg.g dry weight<sup>-1</sup> after 1-2 years of flooding to 15-2 ng Hg.g dry weight<sup>-1</sup> after 16 years of impound-

ment. Total Hg and MeHg concentrations in insect larvae followed a similar pattern, but only weak correlations of both total Hg and MeHg concentrations were found between flooded soils and insect larvae, suggesting that factors other than MeHg content of flooded soils also affect the accumulation of these compounds in insects. Our results indicate that suspended particulate matter eroded from flooded soils by wave and ice action and bacterial activity enhanced by the release of labile carbon and nutrients from the flooded soils may indirectly transfer MeHg from flooded soils to insect larvae." (Authors) Mercury concentration in Odonata is presented in several tables and graphs.] Address: Tremblay, A., Chaire de recherche en environnement, Université du Québec à Montréal, C.P. 8888, succursale Centre-Ville, Montréal, QC H3C 3P8, Canada. E-mail: tremblaa@envir.hydro.qc.ca

**3494.** Vizslán, T.; Pingitzer, B. (1997): Adatok Magyarország szitakötő - faunájához (Odonata) II. Folia hist. nat. Mus. matraensis 22: 99-108. (in Hungarian with brief English summary) [43 species from 94 Hungarian localities are documented.] Address: Vizslán, T., Kitabel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria

**3495.** Wong, A.; McQueen, D.J.; Williams, D.D.; Demers, E. (1997): Transfer of mercury from benthic invertebrates to fishes in lakes with contrasting fish community structures. *Can. J. Fish. Aquat. Sci.* 54: 1320-1330. (in English with French summary). ["We examined the flow of mercury (Hg) from benthic invertebrates to fishes in lakes with contrasting fish community structure. The study was carried out in two whole lakes in south-central Ontario in 1992. Both were remote from direct sources of contamination and were chosen because of their physical and chemical similarities. Although the fish communities in the two lakes were qualitatively similar, the total number of fishes in Ranger Lake was an order of magnitude smaller than that in Mouse Lake. As a result of the lower net predation from benthivorous fishes, documented in earlier studies, Ranger Lake benthic invertebrate populations were significantly higher. However, benthic invertebrate taxa in Mouse Lake were generally larger and had higher Hg concentrations. This was partly attributed to the stunted growth of Mouse Lake fishes, which did not allow them to prey on larger benthos as a result of gape limitations. Despite the lower Hg concentrations in Ranger Lake benthos, total benthic invertebrate Hg pools were higher in this lake as a result of its higher total benthic invertebrate biomass. However, the transfer of total Hg from benthic invertebrates to fishes was higher in Mouse Lake due to the higher consumption rates of benthivorous fishes." (Authors) Data of biomasses, mean individual wet mass, Hg concentration, and mean Hg pool for "Odonata" are presented in tables.] Address: Wong, A.H.K., Division of Life Sciences, University of Toronto at Scarborough, 1265 Military Trail, Scarborough, ON M1C 1A4, Canada. E-mail: alwong@lakc.scar.utoronto.ca

## 1998

**3496.** Faton, J.M. (1998): Les libellules du Tricastin. *Le Courrier des Epines drômoises* 85: 12-15. (in French). [Tricastin (44.35N 4.76E) is situated in the Rhône-Alpes-region in France. The author outlines so-

me records of faunistic interest, e.g. *Coenagrion mercuriale*, *Oxygastra curtisii*, *Sympetrum depressiusculum*, and *S. pedemontanum*. Some focus is set on the development of two newly created water bodies south of the nature reserve "L'Étang Saint-Louis" near Suze-la-Rousse; a checklist of 33 odonate species is documented.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France. E-mail: Fatonjm@aol.com

**3497.** Gottschalk, H.-J. (1998): Beitrag zur Odonaten-Fauna im Niederungsgebiet der Nebel. *Naturschutzarbeit in Mecklenburg-Vorpommern* 41(1/2): 46-50. (in German). [Mecklenburg-Vorpommern, Germany; between 1992 and 1994, 36 odonate species were recorded.] Address: not stated

**3498.** Ketcheniev, H.A.; Haritonov, Yu. (1998): Identification key for the dragonflies of the Caucasus. *Karadino-Balkarskiy University, Nal'chik*. ISBN 5-7558-0017-0. 118 pp. (in Russian). [This identification key includes both imagines (focus) and larvae. The species in some cases are briefly commented. Some general information on Odonata and a bibliography comprising of 74 titles are added too.] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia

**3499.** Siva-Jothy, M.T.; Hadrys, H. (1998): A role of molecular biology in testing ideas about cryptic female choice. In: R. DeSalle & B. Schierwater (Eds.): *Molecular approaches to ecology and evolution*. Birkhäuser. Basel: 37-53. (in English). ["If cryptic female choice exists, observations on mating behaviour will not reflect the actual patterns of paternity. Genetic profiling techniques are needed to identify patterns of paternity (and sperm storage) that deviate from expectations based on behavioural observations. Our chapter addresses this problem in two parts. The first provides a critical review of the concept of cryptic female choice leading to a set of criteria required to demonstrate its occurrence. Second, we explore the repertoire of molecular methods available to answer certain questions about cryptic female choice in insects. The potential and limitations of polymerase chain reaction-based single locus and multilocus DNA fingerprint techniques are discussed along with the different options of analysing the data. Two case studies illustrate that sperm storage and usage in odonates might enable females to control paternity." (Authors)] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

**3500.** Wain, W.H.; Wain, C.B. (1998): Observations on the Odonata of Silhouette, Seychelles archipelago. *Phelsuma* 6: 27-31. (in English). [Between 17 to 24th Nov. 1997, 14 odonate species have been recorded from Silhouette. The species are documented locality-wise and discussed in detail.] Address: Wain, W.H. & C.B., The Haywain, Hollywater Road, Bordon, Hants, GU35 OAD, United Kingdom

## 1999

**3501.** Brooks, S.J. (1999): Odonata: the dragonflies and damselflies (45 species in 9 families). In: Barnard,

P.C. (Ed.): Identifying British insects and arachnids. An annotated bibliography of key words: 30-32. (in English). [S. Brooks briefly introduces into the order, and lists and comments on 9 books covering Odonata.] Address: Brooks, S.J., Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, UK

**3502.** Goldstein, M.L.; Bloom, P.H.; Sarasola, J.H.; Lacher, T.E. (1999): Post-migration weight gain of Swainson's Hawks in Argentina. *Wilson Bull.* 111(3): 428-432. (in English). ["Whether hawks forage or fast en route to Argentina, or whether specific stopover habitats are regularly used is not known. The extent of predation on airborne dragonflies and other flying insects during migration is also unknown. Nevertheless, if migrating hawks used only stored fat they might arrive in the pampas in poor condition. Hawks have been reported arriving in Argentina in such weak condition that they were picked up by hand. None of these birds, however, were checked for contaminants." For more details on Swainson's Hawk predation on dragonflies, see: Jaramillo, A. (1995): Swainson's hawks and dragonflies. *Argia* 7(4): 3, Jaramillo, A. (1993): Wintering Swainson's hawks in Argentina: Food and age segregation. *Condor* 95: 475-479, and Rudolph, D.C.; Fisher, C.D. (1993): Swainson's hawk predation on dragonflies in Argentina. *Wilson Bulletin* 105: 365-366.] Address: Goldstein, M.L., Texas A&M Univ., Dept. of Wildlife and Fisheries Sciences, 210 Nagle Hall, College Station, TX 77843-2258. E-mail: mgoldstein@tamu.edu

**3503.** Kano, K.; Miyahata, T. (1999): Evening foraging and thermal behavior in a male of *Trithemis aurora* (Burmeister). *Nature & Insects* 36(11): 32. (in Japanese). ["We sighted evening foraging and thermal behavior in a male of *Trithemis aurora* (Burmeister). We happened to see an individual of *Trithemis aurora* perching on a tip of stem of grass, of which height was 1.6 meter, at a foot path between fallow rice paddies at Oyasu, Kunigami-gun, Okinawa Prefecture in the evening of July 1, 2001. The place is not a suitable habitat of the dragonfly usually, and I aimed my camera at the dragonfly, that raised its abdomen upward. It often took off for preying small insects, and returned to the same tip of the grass, and took often obelisk posture to exposure its body to the setting sun. There were several tall grasses near the perch, and when the perch was shaded, the dragonfly changed its perch to the perch in the sunshine and took the same posture. In the hot daytime dragonflies usually take obelisk posture for avoidance of rising body temperature, however this time, the behavior was for raising body temperature in the cool evening. We stayed there from 6:30 to 7:20 p.m., L, and when the sun set, the dragonfly flew away for roosting." (Taken from the translation of Naoya Ishizawa in *Digest of Japanese Odonatological short Communications* 12).] Address: Miyahata, T., 2: 9-20-9 mitsumata-cho, Maebashi City, Gunma Pref., 371-0018, Japan

**3504.** Kano, K. (1999): Morning and evening swarms in *Chlorogomphus brunneus brunneus* Oguma near the seashore. *Yosegaki* 102: 40. (in Japanese). [Swarming behaviour - in most cases - of females is described in detail. In general, the swarms are feeding aggregations, in a few cases seizures of females by a male was observed. (more details can be taken from the translation of Naoya Ishizawa in *Digest of Japanese Odonatological short Communications* 12).] Address: Kano, K., 5-19-

17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3505.** Ram, R.; Prasad, M. (1999): On the collection of Odonata from Arunachal Pradesh, India. *Rec. zool. Surv. India* 97: 113-132. (in English). [92 species and subspecies from Arunachal Pradesh, NE India are checklisted and commented in detail with focus on the species distribution. 15 species are new stated records. Remarks on morphology of *Aciagrion pallidum* Selys 1891 and *Ceriagrion olivaceum* Laidlaw, 1914 are made.] Address: Prasad, M.; Zool. Surv. India, M-Block, New Alipore, Calcutta-700053, India

**3506.** Sabarth, A. (1999): Bedeutung von Substrat und Versandung für die Verteilung des Makrozoobenthos in naturnahen Heidebächen. *Dissertation, TU Braunschweig*: 98 pp. (in German). [The macrozoobenthos of three sand bottomed streams in the Lüneburger Heide (Niedersachsen, Germany) were surveyed with special emphasis on the habitat choice of the species in different sediment types, submerged snags, and alder roots. (Covering with) sand sediments was one of the most important factors to explain the (low) abundance of species. *Calopteryx splendens*, *C. virgo*, *Cordulegaster boltonii*, and *Ophiogomphus cecilia* have been recorded at the sampling sites. *O. cecilia* is vulnerable against sand sediment cover, and its abundance can be explained by the depth of cumulated sand sediment.] Address: not stated; Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

## 2000

**3507.** Bach, L. (2000): Auswirkungen von Revitalisierungsmaßnahmen an dem Heidebach Ise auf dessen Libellenfauna. *Angewandte Landschaftsökologie* 37: 267-270. (in German with English summary). [Niedersachsen, Germany; monitoring the effects of revitalisation effects on the odonate fauna between 1991 and 1999, it was found that rheophilous species were favoured significantly; this refers especially to *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Calopteryx splendens*, and *Platycnemis pennipes*. In total, 36 odonate species could be observed, of which 18 regularly were autochthonous. Year by year, larvae of rheophilous species spread over more stretches of the river, and adults could be observed in greater abundances.] Address: Bach, L., Hamfhofsweg 125b, D-28357 Bremen, Germany. E-mail: lotharbach@aol.com

**3508.** Bass, D. (2000): A preliminary study of aquatic macroinvertebrates from two springs in the Pontotoc Ridge Nature Preserve, Oklahoma. *Proceedings of the Oklahoma Academy of Science* 80: 105-109. (in English). [Little is known regarding the spring invertebrate fauna in Oklahoma, USA. The purpose of this investigation was to collect baseline data concerning the physicochemical conditions of the water and to determine distributions of macroinvertebrates in spring-brooks resulting from 2 springs (Pot Spring (34.4973°N, 96.6022°W) and Coal Creek Cave Spring (34.5247°N, 96.6014°W)) emerging on the property. *Argia* sp., *Cordulegaster* sp., *Hetaerina* sp., and *Lestes* sp. are listed in a table and classified according Surber Net Sample

Number and downstream distance from the spring.] Address: Bass, D., Biology Dept, University of Central Oklahoma, Edmond, Oklahoma 73034, USA.

**3509.** Buczynski, P.; Czachorowski, S.; Pakulnicka, J. (2000): Do small man-made water bodies can be a substitute habitat for the lake littoral benthos? In: Cerbin, S. (Ed.): Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park: 45-47. (in Polish). [The Odonata, Trichoptera, and Coleoptera of some gravel and sand pits near Olsztyn, Lublin-region, Poland were investigated. Emphasis is given to the fauna of different stages of vegetation succession. A total of 37 odonate species were found, but not details are given. A German translation of the paper is available from P. Buczynski.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3510.** Buczynski, P. (2000): Jak larwy wazek (Odonata) przezywaja wysychanie drobnych zbiorników? In: Czczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 33-34. (in Polish). [How do larvae of Odonata survive in drying out pools? Records on *Libellula depressa* and *Ischnura pumilio* - characteristic species of temporary water bodies - are referred: The larvae search successively for the most moisty places; shortly before the pools are totally drying out, they crawl in fissures. If it shouldn't rain, these specimens would die too. Larvae of *Coenagrion puella* and *Libellula quadrimaculata* protected themselves under a layer of *Lemna minor*, while *Aeshna cyanea* was found under leaves on the bottom of a pool. Here, they were able to survive a period of 3-4 weeks of drying out. A German translation of the abstract is available from P. Buczynski.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3511.** Clausnitzer, V. (2000): Interspecific competition in rainforest dragonflies (Tetratheminae, Libellulidae). Poster, 13. Jahrestagung der Deutschen Gesellschaft für Tropenökologie, 1.-3. März 2000 in Würzburg; <http://www.biozentrum.uni-wuerzburg.de/zoo3/gtoe/>: 1 pp. (in English). [Verbatim: It is generally hold that "displays of closely related species are clearly distinct so as to minimize the chance of confusion between species" (Krebs & Davies, 1993, p. 363). The similarity in morphology, colouring and behaviour of sympatric rainforest Tetratheminae does not fit this considerations. The territorial behaviour of two *Notiothemis* and one *Tetrathemis* species was studied in a West Kenyan rainforest. Males establish territories at small pools and keep them for several days. The territories are visited by females either for egg-laying or mating; males would approach any female and try to copulate, species determination being tactile only. Within *Notiothemis* inter- and intraspecific competition for the pools is nearly identical, *Tetrathemis* is inferior to the former. The number of territorial males depends on the pool circumference and vegetation cover; the number of territorial *Tetrathemis* being significantly correlated on presence or absence of *Notiothemis*. For both *Notiothemis* species the territory size is larger than for *Tetrathemis*. Neither behaviour nor colouring shows reduction of am-

biguity between the species. The inter- and intraspecific aggression is very similar; species recognition is by contact only. To minimise disturbance for approaching females the territorial male keeps all potential competitors away. In West African rainforests even more species of the Tetratheminae inhabit the same habitats, all showing very similar behavioural and colouring patterns. It remains unclear how such different species have evolved. Literature: Krebs, J. R. & Davies, N. B. (1993): An introduction to behavioural ecology. 420 pp. Blackwell Scientific Publications, Oxford.] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle / Saale, Germany. E-mail: violacl@gmx.de

**3512.** Czachorowski, S.; Buczynski, P.; Majewski, T.; Malek, J.; Monko, M.; Rudowska, K.; Rykowski, D. (2000): Wstępne badania chruscików i wazek okolic Górowa Iławeckiego (Północna Polska). In: Czczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 40-41. (in Polish). [Trichoptera and Odonata of the environs of Górowo Iławeckie (NE Poland): In the framework of a monitoring of anthropogen caused changes in the fauna of water bodies, in May 1998 and in July 1999, 30 odonate species including *Calopteryx virgo*, *Libellula fulva*, *Leucorrhinia dubia*, *L. albifrons*, and *L. pectoralis* were recorded.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3513.** Czerniawska-Kusza, I.; Kochanowski, T. (2000): Characteristics of a benthos in chalk-marl excavations in the Opole city. In: Cerbin, S. (Ed.): Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park: 77-78. (in Polish). [Poland; the water bodies are dominated by a submerged vegetation and *Stratiotes aloides*. Odonata have been sampled, but no details are given] Address: not stated

**3514.** Domek, P.; Joniak, T. (2000): Benthic fauna and water trophy in three dystrophic lakes in the Drawa National Park (northern Poland). In: Cerbin, S. (Ed.): Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park: 81-84. (in Polish). [Poland; *Enallagma cyathigerum*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Cordulia aenea*, and *Leucorrhinia* sp. are listed in a table for two of the three investigated lakes.] Address: Domek, P.; Joniak, T., Zakład Ochrony Wód, Uniwersytet im A. Mickiewicza, ul. Drzymaly 24, PL-60-613 Poznan, Poland

**3515.** Emilyamma, K.G.; Radha-Krishnan, C. (2000): Odonata (Insecta) of Parambikulam Wildlife Sanctuary, Kerala, India. *Rec. zool. Surv. India* 98(1): 157-167. (in English). [Palakka district of Kerala, India; the paper combines checklisting the Odonata of the wildlife sanctuary by providing an identification key of the known species (n=25).] Address: Emilyamma, K.G., Western Ghats Field Res. Stn, Zool. Surv. India, Calicut-673002, India

**3516.** Henson, S. (2000): First & last dates for 1998 & 1999. *Dragonfly news* 37: 14-16. (in English). [Phenological data of the Odonata of UK are listed in a table.] Address: Henson, S., 10 Shotesham Road, Poringland, Norwich NR14 7LE, UK

- 3517.** Kriegel, P. (2000): I love Dragonflies. *Dragonfly news* 38: 11. (in English). [Dragonfly poem.] Address: Kriegel, Patricia, 2600 SW 80th, Oklahoma City, Oklahoma 73159, USA
- 3518.** Lewandowski, K. (2000): Wazki (Odonata) drobnych zbiorników wodnych. In: Czeczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 151-152. (in Polish). [Odonata of small pools. Between 1986 and 1990, in the environs of Olsztyn, Lomza, and in the marshes of Biebrza, Poland, Odonata were collected. Some examples are outlined to document specific abundances in the very water-bodies, and the frequency of occurrence of selected species in the region. Some species of special interest are highlighted. A German translation of the abstract is available from P. Buczynski.] Address: Lewandowski, K., Katedra Ekologii i Ochrony Środowiska, Uniwersytet Warmińsko-Mazurski w Olsztynie, Poland
- 3519.** Lounaci, A.; Brosse, S.; Ait Mouloud, S.; Lounaci-Daoudi, D.; Mebarki, N.; Thomas, A. (2000): Current knowledge of benthic invertebrate diversity in an Algerian stream: a species check-list of the Sebaou river basin (Tizi-Ouzou). *Bull. Soc. Hist. nat. Toulouse* 136: 43-55. (in English, with French summary). [Between 1984 and 1996, 23 sampling sites along the Sébaou River and its tributaries (N Algeria), covering a large range of altitudinal, discharge, and topographic features, were surveyed for their fauna. *Onychogomphus costae* and *O. uncatulus* are recorded from the Aissi Wadi. The latter species is restricted to the altitudes below 140 m. ] Address: Thomas, A., CESAC, UMR 5576 CNRS, Univ. Paul Sabatier, 118 rte de Narbonne, F-31062 Toulouse, France
- 3520.** Machado, A.B.M. (2000): Studies on neotropical Protoneuridae, 10. *Forcepsioneura lucia* sp. n. from Parque Estadual Rola Moça, Minas Gerais, Brazil (Odonata, Zygoptera). *Bolm Mus. Biol. Prof. Mello-Leitao (N.S.)* 11/12: 127-134. (in English with Portuguese summary). [The new species is described, illustrated, and compared with *F. garrisoni*, *R. itatiaiae*, and *F. sancta*. Holotype ♂, allotype ♀, 7 paratypes: Brazil, Minas Gerais, Ibirite, alt. 1000 m, various dates: Oct. / Dec. - 1980 / 1984. Some notes on ecology (it is possible that the larvae live on humid leaf litter on the forest floor) and conservation are provided. The ♂♂ of the genus - comprising of currently known five species - are keyed.] Address: Machado, A.B.M., Depto Zool.-Ent., Inst. Cienc. Biol., UEMG, Caixa Postal 256, BR-31270-901 Minas Gerais, MG, Brasil
- 3521.** Meadows, D.W. (2000): Effect of bison trampling on aquatic invertebrates in streams on Antelope Island, Utah. The Ecological Society of America, 85th Annual meeting August 6-10, 2000 Snowbird, Utah, Document: LAU-3-56-31 WA-3-84-2: (in English). [Verbatim: Trampling of riparian habitats by large herbivores can have significant impacts on aquatic communities. I examined numerous environmental variables and aquatic invertebrate community composition from paired trampled and untrampled sites in eight first or second order streams on Antelope Island, in the Great Salt Lake, Utah. Percent mud and sand substrates were more common in trampled sites in most streams, while percentage cover of aquatic vegetation was lower in trampled sites. Of the twenty taxa common enough to be analyzed statistically, five showed no difference in untrampled vs trampled areas, seven had consistent differences across streams, and eight had stream x trampling level interactions. Annelid worms, ostracods, the beetle *Helophorus*, and the snail *Physella* were more common in trampled areas while the odonate *Argia*, the beetle *Agabus*, the snail *Stagnicola*, the dipteran *Dixa*, hydrophilid beetles, limnephilid caddisflies, and simuliid and chironomid flies were more common in untrampled areas. These results can mostly be explained by direct trampling effects and indirect interactions of bison trampling affecting environmental features and substrate composition. These results suggest the need for managers and ranchers to control access of bison to riparian zones as is necessary for cows and sheep, even though bison wander more and spend much less total time in riparian zones.] Address: Meadows, D.W., Weber State University, Ogden, UT 84408 USA
- 3522.** Merrill, I. (2000): Scotland 2000 - in search of four-winged wonders and much, much more. *Dragonfly news* 38: 12-15. (in English). [Report on a trip to Scotland, UK from 29. June - 4. July 2000. Some emphasis is given to birds and dragonflies.] Address: Merrill, I., 20 Ashford Road, Whitwick, Coalville, Leics., LE67 5GD, UK
- 3523.** Mielewczyk, S. (2000): Larvae of dragonflies (Odonata) of the Great Poland National Park and changes in their composition. In: Cerbin, S. (Ed.): *Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park*: 13-17. (in Polish). [The odonate fauna of different habitats within the borders of the National Park is briefly outlined. Emphasis is given to historical data.] Address: Mielewczyk, S., Polska Akademia Nauk, Zakład Badan Środowiska Rolniczego i Lesnego, ul. Bukowska 19, PL-60-809 Poznan, Poland
- 3524.** Moore, N. (2000): Applying IUCN criteria to assess threats to British dragonflies. *Dragonfly news* 37: 19-20. (in English). [Conservation actions are more urgently required for some species than others, priorities have to be worked out so that the limited manpower and financial resources can be used to best effect. 20 odonate species are classified according to the criteria to assess the degree of threat of extinction in UK.] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom
- 3525.** Parr, A. (2000): Dragonfly news for 1999 - Migrants & vagrants. *Dragonfly news* 37: 12-13. (in English). [UK; *Erythromma viridulum*, *Anax parthenope*, *Pachydiplax longipennis*, *Sympetrum fonscolombii*, *S. flaveolum*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk
- 3526.** Perrin, V.; Clarke, D. (2000): Can BAPs benefit dragonflies? - experiences from Cumbria & Cambridgeshire. *Dragonfly news* 37: 17-18. (in English). [Biodiversity Action Plans (BAP) aim to preserve species of special concern under an EU-level (*Coenagrion mercuriale*) or a more national or regional context. In Cumbria BAP-drafts for *Coenagrion pulchellum* and *Leucorrhinia dubia* have been written. In Cambridgeshire *Libellula fulva* is a candidate for an BAP; the status of *Platycnemis pennipes*, *Coenagrion pulchellum*, and *Brachytron pra-*

tense should be monitored.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: valperrin@dial.pipex.com

**3527.** Perrin, V. (2000): Dragonfly news for 1999 – Resident's round-up. *Dragonfly news* 37: 11-12. (in English). [UK; phenological data of *Pyrrhosoma nymphula*, *Erythromma najas*, *Coenagrion pulchellum*, *Brachytron pratense*, *Aeshna mixta*, and *Sympetrum striolatum* from different British regions are documented. The current status of *Aeshna caerulea*, *Somatochlora arctica*, and *Leucorrhinia dubia* is briefly exemplified. "Mobbing" behaviour of *Calopteryx splendens* against an ovipositing female of *Anax imperator* is described. Mixed pairing between *Libellula fulva* and *L. quadrimaculata* is reported. Northward range extension of *Sympetrum sanguineum* is outlined.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: valperrin@dial.pipex.com

**3528.** Pintor, L.M.; Soluk, D.A. (2000): Understanding the interaction of crayfish and the Hine's Emerald Dragonfly larvae coexisting in crayfish burrows. The Ecological Society of America, 85th Annual meeting August 6-10, 2000 Snowbird, Utah, Document: LAU-3-56-31: (in English). [Verbatim: Biotic interactions, such as predation, can have significant influences on population dynamics, community structure, and the behaviors of organisms. Odonates are a group of organisms in which predation has been a major factor shaping the observed life histories and behaviors. While most studies have focused on the effect of vertebrate fish predators and intraguild predation, crayfish are another predator present in many aquatic systems that can have an effect on larval Odonate populations. Habitat duration can also influence larval Odonate communities by limiting the species that can maintain populations in variable environments. It can also effect the strength of biotic interactions between those organisms that persist. *Somatochlora hineana* inhabits small, ephemeral streamlets that experience seasonal drying; a situation intolerable for many larval Odonates. Field studies indicate that larvae use active crayfish burrows to survive through periods of drought. Crayfish are predators of dragonfly larvae, which raises the question of how these organisms coexist in burrows. To resist predation, *S. hineana* larvae may simply be distasteful or crayfish may fail to recognize them as prey. Lab experiments were conducted to establish whether a direct predator-prey relationship exists between *S. hineana* larvae and the crayfish, *Cambarus diogenes*. Results show that *C. diogenes* readily consume *S. hineana* and other dragonfly larvae, and are only limited by the size of the larvae relative to its own size. To further investigate predation by crayfish inside burrows and whether larvae avoid active burrows, we conducted a field exclusion experiment manipulating the presence of crayfish in burrows. Preliminary results of a repeated-measures analysis shows no significant difference between treatments ( $p=0.87$ ), indicating that the presence of crayfish has no effect on *S. hineana* larval densities within burrows. This suggests either that larvae may not be able to discriminate between burrows with crayfish present/absent, or that the cost may not be high, relative to the benefits attained by inhabiting the burrow. *S. hineana* larvae probably exhibit unique behaviors that allow them to avoid predation by crayfish within burrows.] Address: Pintor, L.M.; Soluk, D.A., University of Illinois, Urbana-Champaign, Champaign, IL 61820, USA

**3529.** Ram, R.; Chandra, K.; Yadav, K. (2000): Studies on the Odonata fauna of Andaman and Nicobar Islands. *Rec. zool. Surv. India* 98(3): 25-60. (in English). [India; 58 species are listed resp. documented in detail, keyed, and discussed, incl. 8 species that are new to the fauna of the Archipelago, of which *Cratilla metallica* is for the first time recorded from the Indian territory. Address: Ram, R., Zool. Surv. India, M-Block, New Alipore, Calcutta-700053, India

**3530.** Rasch, P.; Trapp, M. Ein Fließgewässer im urbanen Umfeld. Analyse des ökologischen Zustandes des unteren Belmer Baches (Osnabrück, Niedersachsen) anhand des Makrozoobenthos. *Osnabrücker Naturwissenschaftliche Mitteilungen* 28: 167-190. (in German with English summary). ["The organic pollution of the lower Belmer Bach can be attributed to its agriculturally intensively used drainage area. Already before entering the urbanized region, the macrozoobenthos is poor in species due to saprobic pollution and the structural poverty of the waterbed and the banks. When comparing the species numbers of a reference sampling plot located before the urban region and a sampling plot situated within this region, hardly any differences could be ascertained. The longitudinal isolation and the rise in temperature of app. 1 °C in the urban brook section negatively influence its fauna; this, however, is compensated by the varied riparian vegetation and the greater structural diversity of the waterbed due to hydraulic engineering. A rise in temperature of app. 5 °C and a continuous inflow of suspended matter from a sewerage works reduce the macrozoobenthos to few dominant taxa." (Authors) *Calopteryx splendens*, *Ischnura elegans*, *Lestes sponsa*, *Chalcolestes viridis*, and *Zygoptera* are listed represented samples from May 1996, and May, July, and Sept. 1997.] Address: Rasch, P., Fachgebiet Ökologie, FB Biologie/Chemie, Universität Osnabrück, Barbarastr. 11, D-49069 Osnabrück, Germany

**3531.** Rutkowski, D.H. (2000): Dziemna i nocna zawartosc przewodów pokarmowych larw wazek równokrzydłych (Odonata, Zygoptera) w litoralu jeziora Kuc. In: Czeczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 226. (in Polish). [Daily site change in preying *Zygoptera* larvae in the litoral of lake Kuc. The diurnal and nocturnal dwellings of larval *Enallagma cyathigerum*, *Erythromma najas*, and *Ischnura elegans* were studied in a mesotrophic lake. During day time, Chironomidae and Ephemeroptera dominated as prey, while during night Cladocera were preferred. Preyed biomass in night was higher than on day. This is explained by a compromise between avoiding being preyed by fishes and searching for prey.] Address: Rutkowski, D.H., Zakład Hydrobiologii, Instytut Zoologii, Uniwersytet Warszawski, Poland

**3532.** Stav, G.; Kotler, B.P.; Blaustein, L. (2000): Direct and indirect effects of the predatory dragonfly nymph *Anax imperator* on green toad *Bufo viridis* tadpoles. The Ecological Society of America, 85th Annual Meeting, August 6-10, 2000 Snowbird, Utah, This abstract is being presented at: 9:00 AM in session: Oral Session #38: Amphibian Ecology, Document: GIL-3-56-2: (in English). [Verbatim: We conducted an artificial pool experiment to assess effects of the predatory dragonfly nymph *Anax imperator* on green toad *Bufo viridis*

tadpoles. We ran three treatments (with six replicate pools each): (1) free *Anax* (direct effects on mortality); (2) caged *Anax* (indirect effects on behavior, development and individual growth rates); and (3) control (no *Anax*). We added 15 liters (10 cm depth) of water to each pool. After five days, we added 30 three-day old tadpoles, all hatched from the same egg string. Caged *Anax* were fed with tadpoles three times a week. The experiment ran from 11 April through 4 August. Free *Anax* eliminated 90% of the tadpoles within three days and all of them within six days. Caged *Anax* had no effect on the spatial distribution of tadpoles. However, caged *Anax* caused tadpoles to metamorphose earlier to a larger size (both statistically significant), and to obtain lighter color. This study shows that *Anax* has a very strong direct effect on the population of *Bufo* tadpoles. Future experiments will be designed to determine whether the prey responses to the predator are reactions to predation or the result of extra organic matter in this treatment (consequence of *Anax* feeding and secretion).] Address: Stav, G., Ben-Gurion University of the Negev, Sede-Boqer Campus, 84990, Israel

**3533.** Sudhaus, W.; Peters, G.; Balke, M.; Manegold, A.; Schubert, P. (2000): Die Fauna in Berlin und Umgebung: Veränderungen und Trends. Sitzungsber. Gesell. naturforsch. Freunde Berlin (N.F.) 39: 75-87. (in German). [The paper compiles recent range changes of different faunal groups with special emphasis on the region around Berlin, Germany. Günther Peters contributes several odonatological examples referring to *Symptetrum pedemontanum*, *Stylurus flavipes*, *Anax imperator*, *A. parthenope*, and *A. ephippiger*.] Address: Peters, G., Museum für Naturkunde, Institut für Systematische Zoologie, Invalidenstraße 43, D-10115 Berlin, Germany. E-mail: thekla.kauffmann@rz.hu-berlin.de

**3534.** Zawal, A.; Mrowinski, P. (2000): Zsynchronizowany wylot *Cordulia aenea* (Linnaeus, 1758). In: Czeczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 300. (in Polish). [Synchronized emerging of larvae of *Cordulia aenea*. Between 10.00 to 17.00 h, along a 50m<sup>2</sup> great stretch of a *Carex*-belt, 48 specimens emerged at 02/05/1999. The process of emerging lasted in the mean app. 5 hours. Emerging was induced by a high water temperatures in the shallow zone of the pool from 9°C at 9.00 h to 22°C at 16.00 h. The day prior and after emerging was overcast with low water temperatures; no emerging could be observed.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

## 2001

**3535.** Adams, M.J.; Pearl, C.A.; Bury, R.B.; Nebeker, A.V. (2001): Introduced fish increases survival of introduced bullfrogs. Ecological Society of America Annual Meeting, 86th Annual Meeting in Madison, WI, August 2001: 41. (in English). [Verbatim: We hypothesized that nonnative bluegill (*Lepomis macrochirus*) are facilitating the survival of nonnative bullfrogs (*Rana catesbeiana*)

through an indirect effect mediated by dragonfly larvae (Aeshnidae) in western North America. Aeshnid larvae were capable of high predation rates on bullfrog larvae in laboratory experiments and reduced survival to zero in field enclosures with either native fish (*Richardsonius balteatus*) or no fish. Adding bluegill increased survival of bullfrog larvae from zero to 20% when aeshnids were present but had no effect when aeshnids were absent. Field surveys at 57 permanent ponds in Oregon and Washington revealed higher bullfrog abundance and lower predaceous macroinvertebrate abundance when nonnative fish were present but this pattern was weak. We conclude that bluegill facilitate survival of bullfrog larvae in PNW ponds but field surveys suggest that other factors may have more important effects on bullfrog distribution and abundance.] Address: Adams, M. J.; Pearl, C.A.; Bury, R.B.; Nebeker, A.V., USGS Forest & Rangeland Ecosystem Science Center, Corvallis, OR 97330 US Environmental Protection Agency, Corvallis, OR 97330, USA

**3536.** Anonymus (2001): Bienenfresser überbringt seiner Partnerin eine Libelle. Kosmos & Natur, Juni 2001: 6-7. (in German). [The courtship behaviour of the bee-eater (*Merops apiaster*) is pictured: a male juggles a *Libellula quadrimaculata* in front of a female.] Address: natur media GmbH, Belfortstr. 8, D-81667 München, Germany

**3537.** Bernard, R. (2001): Badania biologii i rozmieszczenia wazek (Odonata) prowadzone w Zakładzie Zoologii Ogólnej UAM w Poznaniu. Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 20-21. (in Polish). ["Research activities of the Department of General Zoology at the Adam Mickiewicz University with special emphasis to the biology and distribution of Odonata". - Odonatological research in Poznan, Poland, dates back more than 70 years. J. Urbanski, J. Musial, and R. Bernard are odonatologists well known abroad of Poland. More recent research focus on mapping the Polish dragonflies to prepare distribution maps of the Polish Odonata, and the ecology of selected species as *Nehalennia speciosa*, *Cercion lindenii*, and species with range extensions as *Aehna affinis*, and *Anax ephippiger*. A German translation of the paper is available by P. Buczynski, or the IDF.] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**3538.** Bönsel, A.; Höning, D. (2001): Die Zukunftsfähigkeit nationaler Schutzkategorien. Zeitschrift für angewandte Umweltforschung 14: 268-277. (in German with English summary). [The paper critically reflects the recent situation of German nature conservation activities with special emphasis on protected areas. Some odonatological examples underline success and failure of species directed actions plans. Many examples document that it will not be possible to save the species exclusively in protected areas. This requires special measures outside of protected areas.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**3539.** Bowler, J. (2001): New Odonata records from Seychelles 1998-2000. Phelsuma 9: 56-57. (in English). [13 species from the islands of Aride, Grande Soeur, Praslin, La Digue, and Curieuse are briefly annotated.]

Address: Bowler, J., Shepherds's Cottage, Heylipol, Tیره, Scotland PA77 6TY, UK

**3540.** Brendonck, L.; Michels, E.; De Meester, L.; Riddoch, B. (2001): Temporary pools are not 'enemy-free'. *Hydrobiologia* 486: 147-159. (in English). ["Temporary pools are traditionally considered as refuges where the conspicuous anostracans are protected from predation. While this is true for the size-selective predation by fish, there is compelling evidence that invertebrate predation is an important biotic stress regulating temporary pool communities. In rock pools in southeastern Botswana, we studied the impact of some suspected invertebrate predators on populations of the freshwater anostracan *Branchipodopsis wolfi* by means of observations and manipulative experiments. In a survey of 45 pools, the relationship between *B. wolfi* natural population sizes and the abundance of suspected predators were never negative for turbellarians and mosquito larvae. When dragonfly larvae, notonectids or tadpoles were present, the anostracan populations were generally non-existent or very small. In enclosure experiments with turbellarians, there was a significant effect of predation within one hour of the start; the average daily predation rate was about 1/4 anostracan per turbellarian. Anostracans from a pool with few turbellarians were slightly less vulnerable than those from a turbellarian-rich pool. Furthermore, there was an indication of males being predated on more than females. With dragonfly larvae and notonectids, the predation effect was marked with all six anostracans in an experiment eaten in less than one day by a single predator (predation rate: about one anostracan every 2 h per predator). In a behavioral study, both sexes of *B. wolfi* avoided swimming above sediment that held more turbellarians than the open patches; there was no evidence for chemical communication with respect to this behavior." (Authors)] Address: Brendonck, L., Laboratory of Aquatic Ecology, K.U. Leuven, De Beriotstraat 32, B-3000, Leuven, Belgium. E-Mail: Luc.Brendonck@bio.kuleuven.ac.be

**3541.** Buczynski, P. (2001): Wpływ intensywnego rolnictwa na wazki (Odonata): przykład okolic Krzczoczowa (Wyzyna Lubelska). *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 22.* (in Polish). ["Odonata and intensive agriculture exemplified for the region of Krzczoczów (Wyzyna Lubelska)". Between 1998 and 2000, 37 odonate species could be observed. Compared to other areas in the Lublin region, app. 10-20 species are lacking. Most of the taxa are concentrated on habitats in the small floodplains and meadows of the rivers, while the bordering areas are inhabited only by few species. A German translation of the paper is available by P. Buczynski, or the IDF.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3542.** Faton, J.-M. (2001): Le libellules de la forêt de Saou. *Le Courrier des Epines drômoises* 103: 37. (in French). [A total of 27 odonate species (not listed in this paper) are known from the Saou-woods (Drôme, France). Three habitats are described in more detail: The standing water body of Le Pas de Lestang is habitat of *Lestes barbarus*, *Ischnura pumilio*, *Coenagrion scitulum*, and *Sympetrum flaveolum*. The water courses of La Vèbre au Pertuis and the Lauzens are inhabited by

*Cordulegaster boltonii immaculifrons*, and *Onychogomphus f. forcipatus*.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France. E-mail: Fatonjm@aol.com

**3543.** Gaines, K.H. (2001): Are 'sinkholes' aptly named? Larval odonate ecology and adult species diversity in southeastern New Mexico. *Ecological Society of America Annual Meeting, 86th Annual Meeting in Madison, WI, August 2001: 281.* (in English). [Verbatim: The Bitter Lake National Wildlife Refuge is an unusual complex of alkaline salt flats interspersed with wetlands and water-filled sinkholes. Recent collections of over ninety species of adult dragonflies and damselflies on the refuge suggest that the highest diversity of odonates in New Mexico may occur in this relatively small area. The composition of the resident breeding population and the factors that contribute to the observed adult species diversity were unknown. In order to resolve these issues, odonate exuviae, larvae, and adults were collected periodically at more than thirty-five sinkholes exhibiting a wide range of physical and biological characteristics. Habitat data (water chemistry, aquatic vegetation, and fish species assemblages) were also collected at each sinkhole and used to determine ecological correlates of larval species diversity and distribution. Exuviae of one odonate species were the only exuviae found at many of the sinkholes surveyed, indicating larval tolerance of a wide range of ecological conditions. In contrast, exuviae of several species observed as adults throughout the refuge were found at only a few sinkholes, suggesting larval stenotopy (primarily with respect to water salinity) and thus limited suitable breeding habitat availability for those species. The composition of species breeding successfully at sinkholes did not correspond to the adult species composition found to date, indicating that these sinkholes may indeed represent sinks for dispersing individuals rather than sources of species diversity.] Address: Gaines, Karen, Dept Biol., Univ. of New Mexico, Castetter Hall, Albuquerque NM 87131, USA. E-mail: kgaines@umm.edu

**3544.** Gossum, H. van; Stoks, R.; De Bruyn, L. (2001): Male mate choice for female colour morphs: frequency and method dependence. *Animal behaviour* 61: F31-F34. (in English). [The authors compile current studies and theories on male mate choice, and discuss constraints of study design. This paper is a welcome provisional appraisal on the subject, and offers some insight in studies necessary in near future.] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**3545.** Hermans, J.T. (2001): The dragonfly fauna of the Weerterbos. *Natuurhistorisch Maandblad* 91: 270-274. (in Dutch with English summary). [The Netherlands; "During a field survey weekend on 9 and 10 June 2001, members of the Natuurhistorisch Genootschap observed 19 different species of dragonfly. Six of these were present in large numbers: *Calopteryx splendens*, *Pyrrosoma nymphula*, *Ischnura elegans*, *Coenagrion puella*, *Anax imperator*, and *Libellula quadrimaculata*. Over the past four years (1998-2002), 37 dragonfly species have been observed, 20-25 of which can be regarded as permanent or occasional residents. The most unusual species found was *Calopteryx virgo* whose occurrence is restricted to some parts of the Oude

Graaf brook." (Author)] Address: Hermans, J.T.; Herestraat 21, NL-6067 ER Linne, The Netherlands

**3546.** Herrmann, J. (2001): Aluminium is harmful to benthic invertebrates in acidified waters, but at what threshold(s)? *Water Air Soil Pollut.* 130(1/4): 837-842. (in English). [The paper compiles and assesses literature on acidification effects related to the contributing impact of increased aluminium levels at low pH on benthic invertebrates. The evidence on *Enallagma* sp., *Soma-tochlora cingulata*, and *Libellula julia* (Mackie, 1989; Correa et al., 1987; Rockwood et al., 1990) indicates, the odonate larvae are relatively resistant.] Address: Herrmann, J., Freshw. Ecol. Group, Dept Biol. & Environ. Sci., Univ. Kalmar, P.O. Box 905, S-391 82 Kalmar, Sweden

**3547.** Jacquemin, G. (2001): Les marais salés de Lorraine. Premier bilan entomologique (Bescançon 1999). *Bulletin de la société lorraine d'entomologie* 8: 6-11. (in French). [Starting in 1992, the halophilous entomofauna of the Lorraine (France) region was surveyed. A total of more than 400 species, including 31 halophilous species was traced. The list of species includes 28 Odonata; none of these species can be classified as halophilous. *Lestes dryas*, *Coenagrion mercuriale*, *Libellula fulva*, and *Orthetrum coerulescens* are listed as remarkable species. No locality data is given.] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**3548.** Kano, K. (2001): Dragonflies preserved in amber. *Gekkan-Mushi* 345: 5-7. (in Japanese). [The author briefly introduces into Japanese fossils (taken from layers of the later Miocene, the later Pliocene, and the later Pleistocene) and the process of fossilization in amber. He reports on collection material of the Kuji Amber Museum, Kuji City, Iwate Pref., Japan representing material from Domenica and Kaliningrad (Russia). (for more details see Digest of Japanese Odonatological Short Communications 12).] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3549.** Kano, K. (2001): Dragonflies prey on cicadas, *Moganmia minuta* Matsumura. *Nature & insects* 36(1): 35. (in Japanese). ["I sighted *M. minuta* was preyed on by an expectedly lot of species of dragonflies at Kainan, Ishigaki island, on May 2- 5, 1995. It was cloudy and occasionally rainy. This cicada appears from March to July on Ishigaki island; the body length: 2.2-2.3 cm, the smallest in Japan, and it sings on ziiiiiii on leaves of sugar cane. It feeds on the sap from veins of leaves, and perches on the upper side in action and at rest on the underside. So far there have been a few report made on cicadas as prey of dragonflies; *Platypleura kaempferi* Fabricius by *Ictinogomphus clavatus* (Fabricius) (Corbet, 1999), *Graptopsaltria nigrofusca* Motschulsky by *Anotogaster sieboldii* (pers. com. Kurashina). Most of preys are Dipterans and *Moganmia minuta* of Hemipteran may be a rare case. I found a male *Asiagomphus yayeyamensis* (Oguma) subduing and eating a *M. minuta* at grass field in a branch stream of the Miyara River on Ishigaki island on May 2. The dragonfly bit the head of the prey and subdued the cicada, then chewing it, removing the wings onto the ground and finished consumption for five minutes. On that day two species were seen that preyed on *M. minuta* beside the dragonfly; *Orthetrum s. sabina* (Drury) and *O. pruinosum*

*neglectum* (Rambur). In general, there are two modes of foraging; one is midair foraging and the other, glean-ing (Corbet, 1999). In Anisopteran dragonflies, they adopt mostly midair foraging and in Zygopteran, glean-ing, glean small insects such as aphids perching on grasses. The above three species usually take the mid-air foraging mode, by darting to flying insects from their perches, however, in the afternoon on May 5 *O. s. sabina* attacked *M. minuta* that perched on a leaf of Japanese pampas grass, and the latter flew away with a scream. Thereafter I saw the dragonfly approached and attacked twice on *M. minuta* perched on grasses. In this case, dragonflies searched and attacked the preys perching on the upper side of leaves of grasses, though they usually hide underside of leaves. In gleaning capture success may be lower and not so more effective than midair foraging. It was cloudy and occasionally rainy, and flying insects were not seen, therefore the dragonflies took the mode of gleaning." (Taken from Digest of Japanese Odonatological Short Communications 12, 2002)] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3550.** Knijf, G. de (2001): Libellen in Vlaams-Brabant: stand van zaken van het verspreidingsonderzoek. *Brakona jaarboek 2000*: 53-57. (in Dutch). [Odonata in Vlaams-Brabant: the current status of the mapping project - On a fundament of 39000 records, the current status of the knowlege on the odonate fauna of Vlaams-Brabant, Belgium is discussed. A total of 67 species is mapped; in the period between 1990-1999, 59 species could be recorded. Many species are discussed and all species are documented in a table. Their presence in three differnt periods and their grid-frequencies are outlined.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3551.** Kowalczyk, J.K.; Szczepko, K. (2001): Inwentaryzacja entomofauny terenów porolnych w fazie renaturyzacji w zachodniej czesci Kampinoskiego P.N.. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan*: 40. (in Polish). [After abandonment of agriculture, the western part of the Polish Kampinoski Nationalpark was restored. In 1998, 25 odonate species were recorded; *Sympetrum pedemontanum* is the only odonate species listed.] Address: Kowalczyk, J.K., Muzeum Przyrodnicze UL, ul. Kilinskiego 101, PL-90-011 Łódź, Poland

**3552.** Kurzatowska, A.; Pakulnicka, J.; Czachorowski, S. (2001): Badania entomologiczne w Katedrze Ekologii i Ochrony Srodowiska UWM w Olsztynie. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan*: 41-42. (in Polish). [Among the entomological surveys of the Department of Ecology and Environmental protection of the UWM Olsztynie, Poland, 16 are of odonatological content.] Address: Kurzatowska, Alicja, Katedrze Ekologii i Ochrony Srodowiska UWM w Olsztynie, Poland

**3553.** Kuska, A. (2001): Entomologia amatorska na Górnym Slasku. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan*: 42. (in Polish). [Poland; the importance of amateur research on insects is exemplified using among

others the paper of Sakiewicz & Zak (1966) on the Silesian Odonata.] Address: Kuska, A., Katedra Nauk Biologicznych AWF, Katowice, ul. Raciborska 1, Poland

**3554.** Letowski, J. (2001): Aktualne kierunki badan entomologicznych w Zakladzie Zoologii UMCS. Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materialy zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 46-47. (in Polish). [Current research activities at the Dept of Zool., Marie Curie-Sklodowska University, Lublin, Poland, including Pawel Buczynski's impressive studies on Odonata are briefly outlined.] Address: Letowski, J., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland

**3555.** Margolis, B.E.; Raesly, R.L.; Shomway, D.L. (2001): The effects of beaver-created wetlands on the benthic macroinvertebrate assemblages in two Appalachian streams. *Wetlands* 21(4): 554-563. (in English). [The effects of beaver impoundments on the benthic macroinvertebrate assemblages were examined in 2 small streams in Somerset Co., Pennsylvania and Garrett Co., Maryland, USA. Cordulegaster was among the dominant taxa above the impoundment, Chromagrion, Calopteryx, Boyeria, Erythemis, and Plathemis occurred below the impoundment, and Gomphus and Epitheca within it. The presence of submerged aquatic vegetation was responsible for the Chromagrion and Boyeria occurrence below the impoundments. Generally, taxonomic and functional changes in benthic macroinvertebrate assemblages of the beaver-altered streams were a results of direct (impoundment) and indirect (changes in temperature, water chemistry, plant growth) alterations of the stream environment.] Address: Margolis, B.E., New Jersey Dept. Envir. Prot., Bureau Freshw. & Biol. Monitoring, P.O. Box 427, Trenton, NJ 08625-0427, USA)

**3556.** McPeck, M.A.; Turgeon, J.; Thum, R.; Stoks, R. (2001): Generating biodiversity: The phylogeography of a North American insect radiation. *Ecological Society of America Annual Meeting, 86th Annual Meeting in Madison, WI, August 2001*: 156. (in English). [Verbatim: Recent phylogenetic analyses have shown that two lineages of North American Enallagma damselflies (Odonata: Coenagrionidae) radiated very recently to give 18 extant species, and ecological studies have demonstrated that multiple habitat shifts occurred as part of this radiation. We are now using phylogenetic analyses using a 940 bp mtDNA fragment to reconstruct how speciation proceeded during this radiation. The phylogenetic relationships and geographic distributions of 54 haplotypes identify E. hageni as the ancestor of one radiating lineage. These data also show that E. hageni is comprised of disjunct Continental and Atlantic races that are indicative of restrictions to separate refuges during the last glacial period. Nine new species arose by at least three different speciation mechanisms from the Continental hageni race as it expanded its range following glacial retreat, but no new species arose from the Atlantic race. Three coastal plain endemics show very low genetic diversity and were each derived by a few populations differentiating from the Continental hageni in a local area. Three other widely distributed species show substantial polyphyletic origins within the Continental hageni. Parallel speciation events driven by habitat shifts appear to have created two of these species, and sharply contrasts with the apparent lack of ecologi-

cal differentiation in the third. These results taken with previous studies suggest that both ecological and non-ecological speciation mechanisms can simultaneously drive radiation events.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**3557.** Mocek, B.; Mikat, M. (2001): The second contribution to the knowledge of the dragonfly fauna (Odonata) in the Nature Monument "Na Plachte", eastern Bohemia, Czech Republic. *Acta Mus. reginaehradecensis* (A) 28: 135-142. (in Czech, with English summary). [Compared with records made between 1997-2000, the number of thermophilous species (e.g. Aeshna affinis, Anaciaeschna isocetes) has increased, while some psychrophilous taxa (species preferring lower temperatures) have disappeared (Leucorrhinia pectoralis, L. dubia). 5 species were added to the list, totalling now at 37 species.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřeží 465, CZ-50001 Hradec Králové, Czech Republik. E-mail: mvc@mvc.anet.cz

**3558.** Monnerat, C. (2001): Prolongement de la periode de vol de certains odonates en octobre 2001. *Bull. romand Ent.* 19(2): 95-106. (in French with english summary). [An extension of the flying period in western Switzerland was noticed in October 2001 in several species, most particularly in Enallagma cyathigerum, Ischnura elegans, and I. pumilio. Bad weather conditions in September did not cause a significant mortality, and favourable weather in October favoured the adult longevity. The 2001 evidence is compared with 4990 observations made during 1989-2000, 99 of which were made in October. In addition, phenological of Calopteryx splendens, Chalcolestes viridis, Lestes sponsa, Sympecma fusca, Aeshna cyanea, A. grandis, A. juncea, A. mixta, Somatochlora arctica, Orthetrum brunneum, Sympetrum fonscolombii, S. pedemontanum, S. sanguineum, S. striolatum, and S. vulgatum are documented.] Address: Monnerat, C., Centre suisse Cartogr. Faune, Terreaux 14, CH-2000 Neuchatel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**3559.** Napiórkowska-Kowalik, J.; Letowski, J. (2001): Stan poznania entomoloafauny Lublina. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materialy zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 50-51.* (in Polish). [The authors document the present knowledge on the entomofauna of the town of Lublin, Poland. Within the borders of the town, at present 28 odonate species could be traced. ] Address: Letowski, J., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland

**3560.** Piotrowski, W. (2001): Wyniki badan entomologicznych w Poleskim Parku Narodowym do konca 2000 r.. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materialy zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 54-55.* (in Polish). [While in 1994, no odonate species were known for the Poleskie Nationalpark, Poland, 51 species had been recorded in the succeeding period up to 2000.] Address: Piotrowski, W., Poleski park Narodowy, Urszulin, Poland

**3561.** Rolando, A. Boano, G. (2001): Aggressive interactions and demographic parameters in Libellula fulva

(Odonata, Libellulidae). *Advances in Ethology* 36: 253-254. (in English). [Verbatim: Male aggressive interactions and demographic parameter of the dragonfly *Libellula fulva* were studied for four years at a low marshy site in north-western Italy. Individuals were caught and marked with white marking fluid. Perching males attacked every dragonfly passing near the perch. The mean conspecific attack distance was significantly longer than the heterospecific one and this suggests that males were able to discriminate among species, at least partially. Sex ratio was very biased toward males and adult females were in fact rather rare. Life span estimates were similar to field observations, both suggesting most males stayed alive for less than 10 days. Male aggressive behaviour may be viewed as an adaptation to a sexual environment where the time for reproduction is very short and the probability of meeting a partner is very low. Such an aggressive behaviour may enhance the probability of males catching and copulating with females which are flying through the site. It is significant that the releaser of aggressive attacks, as demonstrated by experimental tests, is the moving individual, not the individual per se. Weather conditions influenced male behaviour, attack distance being significantly and positively related to light intensity. We believe the aggressive pattern observed in *Libellula fulva* cannot be properly classed as territoriality. In this case, in fact, the classical "defence of resources" approach does not work because males did not defend any resources located inside their hypothetical territories. We suggest aggressive interactions may be, in reality, mere attempts to catch females.] Address: Rolando, A. & G. Boano, Dipartimento di Biologia Animale e dell'Uomo, Turin University, Italy

**3562.** Stav, G.; Kotler, B. P.; Blaustein, L. (2001): Effect of risk of predation on two temporary pool species (*Bufo viridis* and *Culiseta longiareolata*). *Ecological Society of America Annual Meeting, 86th Annual meeting in Madison, WI, August 2001*: 211. (in English). [Verbatim: Green toad (*Bufo viridis*) tadpoles and mosquito larvae (*Culiseta longiareolata*) are highly vulnerable to predation by the dragonfly nymph, *Anax imperator*. We assessed various responses of tadpole and mosquito larva to caged *Anax* in artificial pools. We compared responses in seven treatments (five replicate pools each) of various combinations of presence or absence of: one caged *Anax*, 30 *Bufo* tadpoles and 100 *Culiseta* larvae. Caged *Anax* were fed with 1 tadpole and 3 mosquito larvae once a week. *Culiseta* females oviposited more in pools without *Bufo*. *Bufo* were more prevalent farther from *Anax* in the absence of *Culiseta*, but closer to *Anax* when *Culiseta* were also present. *Culiseta* larvae did not respond spatially to caged *Anax* in the absence of *Bufo*, but when *Bufo* were present, they were more prevalent closer to the predator. The presence of *Culiseta*, but not *Anax*, affected time to and size at metamorphosis, and survival of *Bufo* tadpoles. Both the presence of *Anax* and water turbidity affected color of *Bufo* tadpoles. When *Anax* was present or when water was cloudy, *Bufo* tadpoles were lighter in color. In the lab, lighter colored tadpoles were more vulnerable to *Anax* in clear water, while no difference was found in cloudy water. This study shows the complexity of predation risk on prey species, and its potential effect on temporary pool community.] Address: Blaustein, L., Life Science Department and Mitrani Center for Desert Ecology, Blaustein Institute for Desert Research, Ben-Gurion University, Sede-Boqer Campus, 84990, Is-

rael Community Ecology Laboratory, Institute of Evolution, University of Haifa, 31905, Israel

**3563.** Steglich, R. (2001): Libellen (Odonata). In: *Arten- und Biotopschutzprogramm Sachsen-Anhalt, Landschaftsraum Elbe. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt, Sonderheft 2/2001*: 342-352. (in German). [The Federal State of Sachsen-Anhalt, Germany elaborated an extensive study (comprising more than 700 pages) for habitat and species conservation in the floodplain of the River Elbe. Rosmarie Steglich contributed the chapter on Odonata. The odonatalogical importance of the region is outlined, and some consideration on research activities necessary to solve some open questions on the status of rare species are made. *Aeshna affinis*, *A. viridis*, *Lestes barbarus*, *Erythromma viridulum*, *Ophiogomphus cecilia*, *Calopteryx splendens*, *Epitheca bimaculata*, *Stylurus flavipes*, *Gomphus vulgatissimus*, and *Leucorrhinia pectoralis* are commented. In addition, the paper contains a list of unpublished expertises with odonatalogical data, and distribution maps of *A. affinis*, *L. barbarus*, *A. viridis*, *E. viridulum*, *O. cecilia*, and *C. splendens*.] Address: Steglich, Rosmarie, Quittenweg 53, 39118 Magdeburg, Germany

**3564.** Stevens, L.E.; North, E.; Meretsky, V.J. (2001): Wings and mucus in space and time: Patterns of invertebrate biogeography in Grand Canyon. *Ecological Society of America Annual Meeting, 86th Annual meeting in Madison, WI, August 2001*: 349. (in English). [Verbatim: Taxa with vastly differing vagility may encounter similar dispersal challenges in complex terrain over evolutionary time. Diverse topography and Pleistocene-Holocene climate changes have affected invertebrate biogeography in the Grand Canyon region. Museum collections and published data allowed us to examine the biogeographic role of Grand Canyon as a barrier/filter, corridor, refuge, or null effect. We studied the distribution of landsnails, Odonata, Orthoptera, semi-aquatic Heteroptera, butterflies, and bees. Grand Canyon is a barrier/filter that limits the northward expansion of desert species, and a southern boundary for some Rocky Mountain taxa. The neoregional inner Grand Canyon desert is depauperate and has low levels of endemism, a conclusion supported by the distribution of 31 semi-aquatic Heteroptera, 110 butterflies and skippers, 38 Colorado River chironomid midge species. Butterfly diversity in the desert (42 taxa) is lower than that on either rim (58 and 77 species on the South and North rims, respectively), and that in southern Arizona. The positive relationship between butterfly diversity and elevation is likely an artifact of the small, isolated area of low desert habitat, the evolutionarily brief time (10,000 yr) it has supported desert vegetation, and the long-linear habitat shape. Similar patterns exist among 20 landsnail taxa, with only one endemic snail at one inner canyon spring. However, more than 60 percent of invertebrate taxa are affected by the Grand Canyon as a biogeographic feature.] Address: not stated

**3565.** Stoks, R.; McPeck, M.A.; Turgeon, J.; Thum, R. (2001): Intercontinental phylogeography of an insect radiation and its ecological implications. *Ecological Society of America Annual Meeting, 86th Annual meeting in Madison, WI, August 2001*: 212. (in English). [Verbatim: Phylogenetic reconstructions provide historical hypotheses for the development of biodiversity in an ecological context. We are investigating the diversification

of one clade of *Enallagma* damselflies on three continents. Based on mtDNA data, this clade appears to have originated in eastern North American lakes containing fish -10 million years ago, with 38 extant North American species. Moreover, about half of these species are derived from the radiation of two lineages in association with the last glacial period (15,000 years ago). Most of these new species are found only in fish lakes, but at least two independent adaptive habitat shifts into fishless waters where large dragonflies are the top predators also occurred. Substantial morphological evolution associated with adapting to dragonfly predation was associated with these habitat shifts. Interestingly, the three Eurasian and one North African *Enallagma* species are derived from an ancestor that split from the North American clade ~900,000 years ago. These four species are also derived from a radiation event that occurred at the same time as the North American radiation. The morphology of one Eurasian species that is distributed from Spain to Russia is very similar to the fishless-lake species of North America, but this species is found in both fish and fishless waters. These data suggest a number of testable hypotheses about differences in the role of fish predation in structuring littoral communities on the two continents.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

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**3566.** Akkermans, R.W. (2002): Dragonflies in the Roermond urban area. *Naturhistorisch Maandblad* 91: 103-107. (in Dutch, with English summary). ["A two-year survey of the urban area of the city of Roermond, The Netherlands found 22 species of dragonfly. There are three different water systems within the Roermond urban area: the river Meuse, the river Roer and the Maasnielderbeek brook, each with its own typical dragonfly community. The Meuse system has the smallest number of species, but houses rheophile species like *Calopteryx splendens* and *Platycnemis pennipes*. The Roer, a small river, has a wide spectrum of species, dominated by rheophile species like *C. splendens*, *P. pennipes*, and *Gomphus vulgatissimus*, the latter a red-listed species. The Maasnielderbeek is a brook which was converted to a series of more or less static ponds in the process of urban expansion. These static ponds house the largest numbers of species within the Roermond urban area, including especially species of stagnant water like *C. puella*, *Pyrrhosoma nymphula*, *Aeshna mixta*, and *Sympetrum striolatum*. Finally, the urban area includes a number of garden ponds. These were found to house only the most common species present in the surrounding areas, and added no further species to the survey." (Author)] Address: Akkermans, R.W., Wilhelmialaan 47, NL-6042 EL Roermond, The Netherlands

**3567.** Alonso-Eguia, L.P.E.; Gonzalez-Soriano, E.; Gutierrez-Yurrita, P.J. (2002): Listado y distribución de los odonatos de la Cuenca del Río Moctezuma, Centro-Occidente de México (Insecta: Odonata). *Folia Entomologica Mexicana* 41(3): 347-357. (in Spanish with English summary). ["The Moctezuma basin is located in junction of three North American freshwater ecoregions:

1) Springs in the headwaters of Río Verde, 2) Rivers and streams in Tamaulipas-Veracruz and 3) Watersheds of the Lerma river system and has been considered as a zone of top priority for the National Board for the knowledge and Use of the Biodiversity (CONABIO). The high deterioration rate of the aquatic ecosystems of the Moctezuma river system make necessary to promote and reinforce this kind of studies to gather information concerning the biological conservation of the ecosystem ecological processes that give biological identity of the area. The main purpose of this study was to know the species of odonata and their distribution in the river Moctezuma Basin. Seventy eight species of Odonata belonging to 36 genera and 10 families were recorded; the family Libellulidae and Coenagrionidae, Argia genus in particular, are of special interest due to their great number of species. Four species are new records for Guanajuato, four for Hidalgo and one for San Luis Potosí. *Progomphus belyshevi* is striking for its rarity to this region; *Hetaerina americana* and *Macrothemis pseudimitans* were the more distributed species in the basin. Approximately 70% of the species are limited to one or two localities; 78.5% of Zygoptera and 59.2% of Anisoptera are of netotropical affinity." (Authors)] Address: Gutierrez-Yurrita, P.J., Biología, Facultad de Ciencias Naturales, Universidad Autónoma de Querétaro, Centro Universitario s/n, Cerro de las Campanas, Santiago de Querétaro, QRO, 76010, México; E-Mail: yurrita@sunserver.uaq.mx

**3568.** Bamnowska, A.; Zawal, A. (2002): Odonate fauna of Binowskie Lake. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 29. (in Polish). [The odonate fauna of the Binowskie lake near Szczecin in NW Poland is composed of largely common species as *Enallagma cyathigerum* (dominance: > 10%), and *Coenagrion puella*, *C. pulchellum*, *Erythromma najas*, *Ischnura elegans*, and *Platycnemis pennipes* (dominance: each > 5%). No additional species are mentioned.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznan

**3569.** Barnett, H.K.; Richardson, J.S. (2002): Predation risk and competition effects on the life-history characteristics of larval Oregon spotted frog and larval red-legged frog. *Oecologia* 132(3): 436-444. (in English). ["We conducted an artificial pond experiment to test hypotheses about the effects of competition and non-lethal predator cues on metamorphic characteristics of sympatric Oregon spotted frogs (*Rana pretiosa*) and red-legged frogs (*R. aurora*) in southwestern British Columbia. Tadpoles were exposed to the presence or absence of one another, two density levels and to the presence or absence of predacious odonate larvae (*Aeshna palmata*) isolated in enclosures. In the artificial pond study, *R. aurora* were significantly larger at metamorphosis (12%) and exhibited only slightly longer larval periods when exposed to *Aeshna*. In the presence of *R. pretiosa*, they significantly decreased time to metamorphosis, and were significantly larger at metamorphosis (12%) than those reared alone. *Rana pretiosa* in treatments with *R. aurora* were somewhat larger at metamorphosis when a non-lethal predator was present, and in treatments where *R. pretiosa* were alone with a predator tadpole mass at metamorphosis was smaller than those in the absence of *Aeshna*, but these results were not statistically significant. Both species reduced activity

and moved away from the predator in the presence of an enclosed dragonfly larva in the laboratory. Most tadpole mesocosm experiments have found that the trade-off between size and timing of metamorphosis is extremely important to amphibians, but we suggest that the trade-off discussed in traditional amphibian models may not apply to species like *R. pretiosa* that are exposed to the same grape-limited predators upon reaching metamorphosis." (Authors)] Address: Barnett, Heidy, Department of Forest Sciences, University of British Columbia, 3041-2424 Main Mall, Vancouver, BC, V6T 1Z4 Canada; E-Mail: Heidy.Barnett@ci.seattle.wa.us

**3570.** Bechly, G.; Sach, V.J. (2002): An interesting new fossil dragonfly (Anisoptera: Libellulidae: "Brachydiplacini") from the Miocene of Germany, with a discussion on the phylogeny of Tetrathemistinae and a fossil list for the locality Heggbach. *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie)* 325: 1-11. (in English with German summary) ["A new dragonfly species, *Parabrachydiplax miocenica* n. gen. n. sp. (Anisoptera: Libellulidae), is described from the early Middle Miocene of Heggbach in southern Germany. The holotype was collected by the priest J. PROBST in 1865 and represents the earliest record of fossil insect remains from the Upper Freshwater Molasse of Baden-Württemberg. The phylogenetic position of this new genus and species is discussed. It is a very primitive Libellulidae of the subfamily Tetrathemistinae, and can be attributed within the latter taxon to a basal grade within the clearly paraphyletic tribus "Brachydiplacini". The accompanying fauna and flora of *Parabrachydiplax miocenica* n. gen. n. sp. is presented, based on a newly revised fossil list for the locality Heggbach." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**3571.** Bechly, G.; Ueda, K. (2002): The first fossil record and first New World record for the dragonfly clade Chlorogomphida (Insecta: Odonata: Anisoptera: Araripechlorogomphidae n. fam.) from the Crato Limestone (Lower Cretaceous, Brazil). *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie)* (328): 1-11. (in English). ["A new dragonfly is described from the Lower Cretaceous limestones of the Crato Formation (Brazil): *Araripechlorogomphus muratai* n. gen. n. sp. (Araripechlorogomphidae n. fam.) which clearly belongs to the chlorogomphid clade within Anisoptera. It is the first fossil record of Chlorogomphida and also the first New World record of this dragonfly group that is now exclusively distributed in East Asia. The phylogenetic and biogeographic implications of this new discovery, are discussed. As consequence of the phylogenetic analysis the new higher taxa Cristotibiata, Paucipostnodalia, Eubrachystigmata, Neobrachystigmata, Paneurypalpidomorpha, Eurypalpidomorpha, and Eurypalpidiformia are introduced. A monotypic family Juracordulidae n. fam. is established for the genus Juracordulia, and the genus *Prohemeroscopus* is transferred from Nannogomphidae to a new monotypic family Prohemeroscopidae n. fam. within Paucipostnodalia as sister-group of Eubrachystigmata." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**3572.** Bernard, R.; Buczynski, P.; Tonczyk, G. (2002): Status, threats to, and conservation of the odonate fau-

na of Poland. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 8-9. (in Polish). [The summary refers on current activities of Polish odonatologists preparing an distribution atlas of the odonate fauna, on most recent odonatological phenomenes as range extensions of southern species to Poland, and on considerations to focus conservation activities on habitats and specialized species. A German translation of the paper is available from IDF or P. Buczynski.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani

**3573.** Biber, E. (2002): Habitat analysis of a rare dragonfly (*Williamsonia lintneri*) in Rhode Island. *Northeastern Naturalist* 9(3): 341-352. (in English). ["*W. lintneri* is a rare dragonfly species restricted to southern New England and some northern states. In 1999, I tested the hypothesis that upland development around wetlands reduces habitat suitability for *W. lintneri* through increased nutrient runoff. I examined 27 wetlands and analyzed water quality and depth data, the composition of aquatic invertebrate assemblages, and land use patterns. Sites where *W. lintneri* was present did not differ in water quality from sites where it was absent (i.e., null sites). However, *W. lintneri* sites had significantly deeper levels of water throughout the summer, were dry for shorter periods of time, and had significantly lower levels of development in the surrounding uplands than did null sites. These results suggest that both hydrologic cycle and upland development are important in limiting the local distribution of this species." (Author)] Address: Biber, E., Yale School of Forestry and Environmental Studies, 370 Prospect Street, New Haven, CT, 06511, USA. E-Mail: eric.biber@aya.yale.edu

**3574.** Brauckmann, C.; Herd, K.J. (2002): Insekten-Funde aus dem Westfalium D (Ober-Karbon) des Piesberges bei Osnabrück (Deutschland). Teil 1: Palaeoptera. *Osnabrücker Naturwissenschaftliche Mitteilungen* 28: 27-69. (in German with English summary). ["In this first part of a monograph on the hitherto known fossil insects (exclusively Blattodea) from Westphalian D beds of the Piesberg quarry near Osnabrück (Lower Saxony, Germany) the palaeopteran taxa are described. They are distributed among the Palaeodictyoptera (*Homoioptera kortumi* n. sp., *Breyeria brevis* n. sp., *B. bistrata* Brauckmann, 1995, *B. solida* Brauckmann & Herd, 2000, *Hasala inferiorsaxonica* Brauckmann, 1995), Megasecoptera (*Aspidothorax tristrata* n. sp., *A. aestatis* Brauckmann, 1991, *Pyebrodia martinsnetoi* n. gen. n. sp.), Diaphanopteroidea (*Piesbergala leipnerae* n. gen. n. sp.), and Odonatoptera (*Erasipterella piesbergensis* Brauckmann, 1983)." (Authors)] Address: Brauckmann, C., Institut für Geologie und Paläontologie, TU Clausthal, Leibnizstr. 10, D-38678 Clausthal-Zellerfeld, Germany. E-mail: Carsten.Brauckmann@tu-clausthal.de

**3575.** Buczynski, P.; Czachorowski, S.; Serafin, E.; Szczepanski, W. (2002): Is a nature reserve the optimal place for conservation of aquatic insects?: an example of dragonflies and caddisflies (Odonata, Trichoptera) in the "Kosno Lake" Nature Reserve. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 30-31. (in Polish). [The nature Reserve 'Kosno Lake' (app. 53.34N 20.19E) was surveyed for its odonate fauna. Within the borders of the reserve,

14 species, and outside the bords 30 species could be recorded. It is concluded that the area of the nature reserve should be expanded. A German translation of the paper is available from P. Buczynski.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani

**3576.** Buczynski, P.; Lewandowski, K. (2002): Is a period of 200 years sufficient for dragonfly exploration of a region: exemplified on dragonflies of the Northpolish lake district. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn: 31-32. (in Polish). [The paper outlines some milestones in odonatological survey of the Polish lake district. In spite of the fact, that it is explored quite intensify, some periods are nearly without any odonate data. Thus, it will not be possible to analyse the importance of some ancient human exploitation activities on the fauna in a more regional scale, or it will not be possible to analyse the range extensions of some southern species in the last decades. The paper can be understood as an appeal for a long term monitoring of the fauna.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani

**3577.** Buskens, R.; Mars, H. de (2002): Attention for moorland pools in Limburg. *Naturhistorisch Maandblad* 91: 195-201. (in Dutch, with English summary). [The ecological value and the variation in moorland pools in terms of their ecohydrological position in the context of the landscape in Limburg, The Netherlands are outlined. Some typical species including the Odonata are briefly annotated.] Address: Buskens, R.; Mars, H. de, Royal Haskoning, Postbus 1754, NL-6201 BT Maastricht, The Netherlands

**3578.** Buss, D.F.; Baptista, D.F.; Silveira, M.P.; Nesimian, J.L.; Dorville, L.F.M. (2002): Influence of water chemistry and environmental degradation on macroinvertebrate assemblages in a river basin in south-east Brazil. *Hydrobiologia* 481: 125-136. (in English). ["Benthic macroinvertebrate assemblages, water chemistry variables and environmental degradation were investigated in an Atlantic Forest region in Brazil. Seven sites of the Guapimirim river basin were studied during three sampling periods based on the rain regime: end of wet season (May 1998), dry season (August 1998), and wet season (January 1999). Four substrates were collected at each site: sand, stony substrates, litter in pool areas and litter in riffle areas. Relationships between macroinvertebrate assemblages, water chemistry variables and environmental degradation were examined using canonical correspondence analysis (CCA). According to CCA, concentrations of dissolved oxygen and chloride, and the environmental degradation, measured by the Riparian Channel Environment index, exhibited the strongest relationship to macroinvertebrate assemblages. Overall, the loss of community diversity measured by the Shannon Index along the degradation gradient was observed. Some taxa were shown to be sensitive to water pollution, especially among Plecoptera, Trichoptera, Coleoptera and some Ephemeroptera, while others such as Simuliidae, Odonata and molluscs were tolerant to moderate levels of pollutants. The Chironomidae were the only group tolerant to a high level of pollutants and degradation." (Authors)] Address: Buss, D.F., Laboratorio de Avaliacao e Promocao da Saude Ambiental, Departamento de Biologia, IOC, FIOCRUZ,

Av. Brasil 4365, Manginhos, CEP 21045-900, Rio de Janeiro, RJ, Brazil. E-Mail: buss@centroin.com.br

**3579.** Carron, G. (2002): *Leucorrhinia albifrons* (Burmeister, 1839), nouvelle espece de libellule (Odonata) pour le canton de Geneve. *Bull. romand Ent.* 20(1): 45-49. (in French). [1 male, Moulin-de-Vert(Cartigny), 17-VIII-2000. This is the first record for the canton of Geneva, Switzerland. The habitat is described in detail.] Address: Carron, G., C.P. 250, CH-2002 Neuchâtel, Switzerland

**3580.** Catling P.M. (2002): Decline of *Gomphus fraternus fraternus* (Odonata: Gomphidae) in Lake Erie. *Great Lakes Entomologist* 34(1) (2001): 1-7. (in English). ["Collections and literature reports indicate that *Gomphus fraternus fraternus* was abundant on the shoreline of Lake Erie prior to 1960, and "tens of thousands" were reported at Long Point Bay. After 1960 there were no reports from the shoreline, although there have been a number of comprehensive studies that have included the shoreline area and a number of Odonata specialists have also visited the Lake Erie shoreline regularly. A survey of portions of the Lake Erie shoreline, including the Long Point Bay area in 1999 and 2000, during the established peak and late peak flight period in southwestern Ontario, did not result in any observations. It is concluded that *G. fraternus* has declined substantially in Lake Erie and is possibly extirpated from the lake. The decline appears to have occurred between 1950 and 1960, and thus approximates the mid-1950s decline of burrowing mayflies in Lake Erie, which has been associated with warm weather oxygen depletion and pollution. Although it may never be possible to precisely determine the cause of the decline of *G. fraternus*, it is likely that a number of factors are involved including climatic warming, pollution, changes to the shoreline, other effects of shoreline development, and introduced species." (Author)] Address: Catling P.M., 2326 Scrivens Drive, R.R. No. 3, Metcalfe, ON, KOA 2P0, Canada

**3581.** Cordero, A.; Andres, J.A.. (2002): Male coercion and convenience polyandry in a calopterygid damselfly. *Journal of Insect Science*, 2:14: 7 pp. ["Copulation in odonates requires female cooperation because females must raise their abdomen to allow intromission. Nevertheless in *Calopteryx haemorrhoidalis haemorrhoidalis* males commonly grasp ovipositing females and apparently force copulations. This has been interpreted as a consequence of extreme population density and male-male competition. We studied this behavior at two sites on a river that had different densities over three years. As predicted, at high densities most matings were forced (i.e. not preceded by courtship), but at low density most were preceded by courtship. Courtship matings were shorter at high density, but density did not affect the duration of forced matings. Females cooperated in forced matings even if they had very few mature eggs. Furthermore, females mated more times if they experienced higher male harassment during oviposition, and at low density second and subsequent matings were more likely to be forced. We interpret these results to mean that females engage in "convenience polyandry", because they gain more by accepting copulation than by resisting males. The results also suggest that females might trade copulations for male protection, because under extreme population density harassment by males is so intense that they

can impede oviposition." (Authors) This paper includes three videos that can be accessed at <http://insect-science.org/2.14>

**3582.** Costa, J.M.; Lourenco, A.M.; Vieira, L.P. (2002): *Micrathyria pseudhypodidyma* sp. n. (Odonata: Libellulidae), com chave das especies do genero que ocorrem no Estado do Rio de Janeiro. *Neotrop. Ent.* 31(3): 377-389. (in Portuguese, with English summary). [The new species is described, illustrated, and compared with *M. hypodidyma*. Holotype ♂: Brazil, Rio de Janeiro, Restinga de Marambaia, 1942; paratypes: 2 ♂♂, Goiás State; deposited at UFRJ. The congeners (*M. almeidai*, *M. artemis* Ris, *M. atra*, *M. borgmeieri*, *M. catenata*, *M. hesperis*, *M. mengeri*, *M. hypodidyma*, *M. ocellata*, *M. pirassunungae*, *M. pseudeximia*, *M. spinifera*, *M. spuria*, *M. stawiarskii*, *M. unglata*) from the state of Rio de Janeiro are illustrated, keyed, and commented.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: [jcosta@unisys.com.br](mailto:jcosta@unisys.com.br)

**3583.** Dathe, W.; Piechocki, R. (2002): Juan Cristóbal Gundlach - una vida para la ciencia, una vida en 'modestia biblica'. In: Dathe, W. & R.M. González López (Ed.): *Johann Christoph Gundlach (1810-1896). Una naturalista en Cuba / Naturforscher auf Cuba*. ISBN. 3-925347-65-8.: 125-136. (in German and Spanish). [Wilfried Dathe and Rosa María González López edited a book on the Cuban naturalist J.C. Gundlach, born in Marburg, Germany. 11 chapters treat several aspects on the person Gundlach, and on his scientific vita. Special emphasis is given to birds, amphibians, molluscs, and the flora. The book includes a commented translation of his autobiography and a list of his correspondance as far as it was to trace. Regrettably, few information on Gundlach's entomological activities are given. Gundlach co-operated with H. A. Hagen by shipping specimens; Hagen's publications on the Cuban Odonata are based substantially on the collections of Gundlach, and his accompanying descriptions of the dragonflies in life condition (!) (compare: Hagen, H.A. (1867): *Die Neuropteren der Insel Cuba*. *Stettiner entomol. Zeitung* 28: 215- 232; Hagen, H.A. (1868): *The odonata-fauna of the island of Cuba*. *Proceedings of the Boston society for natural history* 11: 289- 294; Hagen, H.A. (1868): *Odonaten Cubas*. *Stettiner entomol. Zeitung* 29: 274-287). In addition, Gundlach published a comprehensive work on the Odonata of Cuba by himself (Gundlach, J.C. (1888): *Contribución á la entomología Cubana*. *Neurópteros*. Habana, Alvarez & Co. 2: 189-281). This publication was failed to notice for long years. P.P. Calvert traced it, and commented critically on Gundlach's publication (see: Calvert, P.P. (1919): *Gundlach's work on the odonata of Cuba, a critical study*. *Transactions of the American entomological society* 45: 335- 396; Calvert, P.P. (1921): *On Gundlach's work and on Enallagma pollutum and E. vesperum*. *Ent. news* 32: 32). In a chapter (pages 125-136) the correspondance of Gundlach with Carl Robert von Osten Sacken, Herman August Hagen, and Philip Reese Uhler is outlined. This interesting book - priced 24,50 Euro - can be obtained by W. Dathe.] Address: Dathe, W., Hegelstr. 73, D-06114 Halle/Saale, Germany. E-mail: [wilfried.dathe@gmx.de](mailto:wilfried.dathe@gmx.de)

**3584.** Dolny, A.; Miszta, A.; Parusel, J. (2002): Dragonfly conservation perspectives in the Czech and Polish parts of the Upper Silesia. All-Poland scientific con-

ference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 33-34. (in Polish). [The odonate fauna of the Czech-Polish border region is analyzed in terms of common conservation measures for the odonate fauna. Two main data pools exist: one from the beginning of the 20th century, and one resulting from studies between 2000 and 2002. It is concluded that most nature reserves (n=189) in the region are insufficient to protect Odonata. Only 23 nature reserves aim to conserve aquatic habitats. The restoration of water bodies with the rare and threatened *Stratiotes aloides* would give the opportunity to re-establish *Aeshna viridis* in the region.] Address: Available from *Pol. Ent. Soc. Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani*

**3585.** Dorda, D. (2002): *Biotope und Schutzgebiete der Kreisstadt Homburg. Ein Beitrag zum kommunalen Umweltschutz. Kreis- und Universitätsstadt Homburg (Hrsg.)*. ISBN 3-924653-30-5: 73 pp. (in German). [Saarland, Germany; *Aeshna juncea* is mentioned for the valley of the Lambsbach.] Address: Kreis- und Universitätsstadt Homburg, Rathaus, Am Forum 5, D-66424 Homburg, Germany

**3586.** Evans, H.E. (2002): A review of prey choice in Bembicine sand wasps (Hymenoptera: Sphecidae). *Neotropical Entomology* 31(1): 1-11. (in English). ["The prey of 132 species of Bembicini (Hymenoptera) that have been studied is reviewed. About three quarters of the species prey on Diptera, and it is believed that fly predation is ancestral in the group. Eleven species make occasional or regular use of other insects as prey in addition to Diptera (Lepidoptera, Hymenoptera, Neuroptera, Odonata, and/or Homoptera), while 21 species of five genera prey on insects of these same five groups with no use of Diptera. It is hypothesized that this represents an evolutionary progression, whereby populations have experienced shortages of dipterous prey in the past and have broadened their sensory focusing to include other groups of flying insects. Behavior initially learned has, over time, been reinforced genetically to produce the currently observed radiation in prey choice within the group." (Author)] Address: Evans, H.E., Dept. Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO, 80523-1177 USA

**3587.** Fagan, W.F.; Siemann, E.; Mitter, C.; Denno, R.F.; Huberty, A.F.; Woods, H.A.; Elser, J.J. (2002): Nitrogen in insects: Implications for trophic complexity and species diversification. *American Naturalist* 160(6): 784-802. (in English). ["Disparities in nutrient content (nitrogen and phosphorus) between herbivores and their plant resources have lately proven to have major consequences for herbivore success, consumer-driven nutrient cycling, and the fate of primary production in ecosystems. Here we extend these findings by examining patterns of nutrient content between animals at higher trophic levels, specifically between insect herbivores and predators. Using a recently compiled database on insect nutrient content, we found that predators exhibit on average 15% greater nitrogen content than herbivores. This difference persists after accounting for variation from phylogeny and allometry. Among herbivorous insects, we also found evidence that recently derived lineages (e.g., herbivorous Diptera and Lepidoptera) have, on a relative basis, 15% - 25% less body

nitrogen than more ancient herbivore lineages (e.g., herbivorous Orthoptera and Hemiptera). We elaborate several testable hypotheses for the origin of differences in nitrogen content between trophic levels and among phylogenetic lineages. For example, interspecific variation in insect nitrogen content may be directly traceable to differences in dietary nitrogen (including dilution by gut contents), selected for directly in response to the differential scarcity of dietary nitrogen, or an indirect consequence of adaptation to different feeding habits. From some functional perspectives, the magnitude rather than the source of the interspecific differences in nitrogen content may be most critical. We conclude by discussing the implications of the observed patterns for both the trophic complexity of food webs and the evolutionary radiation of herbivorous insects." (Authors). Predatory Odonata (n=2) were tested against herbivory Ephemeroptera (n=3) ((tab. 1). Within ordinal groups, mean predator N content always exceeded the corresponding herbivore mean. The difference between Odonata and Ephemeroptera was 2.20%. The mean within-order difference was 1.34%. More details may be available at <http://www.nceas.ucsb.edu/ecostoichiometry>.] Address: Fagan, W.F., Department of Biology, University of Maryland, College Park, Maryland 20742, USA. E-mail: [bfagan@glue.umd.edu](mailto:bfagan@glue.umd.edu)

**3588.** Faton, J.-M. (2002): Le libellules de la mare du vallon de Combau. Le Courrier des Epines drômoises 109: 51. (in French). [A survey of the locality, situated in the Drôme-region (France) at 1350 asl, resulted in 8 odonate species.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France. E-mail: [Fatonjm@aol.com](mailto:Fatonjm@aol.com)

**3589.** Feiber, A.L.; Rangarajan, J.; Vaughn, J.C. (2002): The evolution of single-copy Drosophila nuclear 4f-rnp genes: Spliceosomal intron losses create polymorphic alleles. *Journal of Molecular Evolution* 55(4): 401-413. (in English). ["This study provides the first report in which spliceosomal intron losses within a single-copy gene create functional polymorphic alleles in a population. 4f-rnp has previously been shown to be a nuclear gene that is localized on the X chromosome in *D. melanogaster* and to have eight short spliceosomal introns. An insect species survey was done via polymerase chain reaction (PCR) amplification and sequencing of a 1028-bp gene fragment spanning introns 4-8, which are located in the 3' half of the gene. The results show that 4f-rnp and (thus far) introns 7 and 8 are at least as old as order Odonata, an early-diverging insect line. Unexpectedly, several species within the dipteran family Drosophilidae were found to contain two differently sized 4f-rnp gene sequence variants, owing to precise inframe intron losses. Results of single-male *D. melanogaster* PCR analyses show that the two gene size variants are allelic and that the intron loss mechanism appears to be biased toward the 3' end of the gene. A stable potential stem-loop has been identified in *D. melanogaster*, predicted to fold the 4f-rnp mRNA 3' terminus into a natural primer for subsequent reverse transcription into cDNA. When results are displayed in a phylogenetic context, multiple independent intron loss events are identified. These observations support a model in which frequently occurring cDNAs have led to numerous independent intron losses via homologous recombination/gene conversion during 4f-rnp gene evolution. The results provide insights into the evolution of intron loss and may lead to improved understanding of

the dynamics of this process in natural populations." (Authors)] Address: Vaughn, J.C., Dept of Zoology, Miami University, Oxford, OH, 45056, USA. E-Mail: [vaughnjc@muohio.edu](mailto:vaughnjc@muohio.edu)

**3590.** Fleck, G. (2002): Contribution à la connaissance des odonates de Guyane française. Notes sur les genres *Epigomphus* Hagen, 1854 et *Phyllocycla* Calvert, 1948 (Anisoptera, Gomphidae). *Bull. Soc. Entomol. France* 107: 493-501. (in French, with English summary). ["The larva of *Epigomphus hylaeus* Ris, 1916, and the true larva of *Phyllocycla neotropica* Belle, 1970, are described and illustrated for the first time. The differences with the other known larvae of these genera are listed. For both genera, a key in French and in English is given to separate the unambiguously known ultimate instars larvae. The previously unknown female of *Phyllocycla neotropica* is briefly described and illustrated. A reared larva of *Phyllocycla modesta* Belle, 1970, yielded a female showing a thoracic color pattern different from that of the allotype described by Belle (1970)."] (Author)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [fleck@mnhn.fr](mailto:fleck@mnhn.fr)

**3591.** Fleck, G.; Nel, A. (2002): The first isophlebioid dragonfly (Odonata: Isophlebioptera: Campteropteroptera) from the Mesozoic of China. *Palaeontology* 45(6): 1123-1136. (in English). ["*Bellabrunetia catherinae* gen. et sp. nov., the first Chinese Mesozoic isophlebioid dragonfly, is described. This fossil is the first known Isophlebioptera with well-preserved body structures, demonstrating that the fore- and hindwings are of very different size and shape in Campteropteroptera, and that the female Campteropteroptera had an endophytic way of oviposition, unlike the Isophlebioptera." (Authors)] Address: Fleck, G., Laboratoire d'Entomologie and CNRS UMR 8569, Muséum National d'Histoire Naturelle, 45 rue Buffon, F-75005, Paris, France. E-Mail: [fleck@mnhn.fr](mailto:fleck@mnhn.fr), [anel@mnhn.fr](mailto:anel@mnhn.fr)

**3592.** Fleck, G. (2002): Une larve d'Odonate remarquable de la Guyane française, probablement *Lauro-macromia dubitalis* (FRASER, 1939) (Odonata, Anisoptera, 'Corduliidae'). *Bulletin de la Société Entomologique de France* 107(3): 223-230. (in French, with German and English summary). [From French Guyana, a last instar larva of the neotropical "corduliid" *Lauro-macromia* Geijskes, 1970 - probably *L. dubitalis* - is described in detail. The "larvae show well-developed lateral spines on abdominal segments 3 to 9 which is unusual for cordulegastrid-like or libellulid-like larvae. In the libellulid-like larvae, the lateral spines are generally confined on segments 8 and 9. Traditionally the genus *Lauro-macromia* was considered to be a member of the Gomphomacromiinae sensu Davis & Tobin (1985). The features of the larva clearly demonstrate that the genus *Lauro-macromia* cannot be considered as a Gomphomacromiidae sensu Carle (1995) because of the presence of raptorial setae on the labial palp which are a clear synapomorphic character to the "Macromiid-Corduliid-Libellulid-Complex" sensu Carle, 1995 (=Valvulida sensu Lohmann, 1996) (=Trichodopalpida sensu Bechly, 1996)."] (Author)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [fleck@mnhn.fr](mailto:fleck@mnhn.fr)

**3593.** Geraeds, R.P.G.; Schaik, V.A. van (2002): Observations on the distribution and ecology of the Club-

tailed dragonfly (*Gomphus vulgatissimus*) along the river Roer. *Natuurhistorisch Maandblad* 91: 113-118. (in Dutch with English summary). [*G. vulgatissimus* has always been a rare species in the province of Limburg, The Netherlands. "During an intensive inventory in 2000 and 2001, however, 1597 exuviae of this species were found along the river Roer. Observations on the adult dragonflies were also recorded. The species can be found along the entire river. The greatest densities of exuviae were found between Herkenbosch and Roermond. Here, the larvae find ideal conditions in slow-flowing muddy parts of the river. Most larvae emerge vertically and close to the waterline (0-0.5 m). They seem to prefer emerging among the vegetation. The average length of the exuviae was 29.5-30mm." (Authors)] Address: Geraeds, R., Julianalaan 46, NL-6042 JH Roermond, The Netherlands

**3594.** Gibbons, L.K.; Reed, J.M.; Chew, F.S. (2002): Habitat requirements and local persistence of three damselfly species (Odonata: Coenagrionidae). *Journal of Insect Conservation* 6(1): 47-55. (in English). ["Habitat requirements and population persistence were investigated in three damselfly species, all coastal plain pond specialists: *Enallagma recurvatum*, *E. laterale*, and *E. pictum*. Because of geographic restriction, two are of special concern to conservation, *E. recurvatum* and *E. laterale*. We surveyed more than 70 ponds on Cape Cod, Massachusetts, and collected adult presence-absence data during the summers of 1999 and 2000. We achieved a detection rate approaching 100% for each species by visiting each pond up to three times. We looked for relationships between the presence of each damselfly species and presence of specific aquatic vegetation, the presence of the other *Enallagma* species, and the number of ponds within various distances of the 72 surveyed ponds. Using stepwise logistic regression, we found the following significant associations: *E. recurvatum* with the rush *Juncus militaris*; *E. laterale* with water lilies (*Nuphar variegatum* and *Brasenia schreberi*) the damselfly *E. pictum*, and the number of ponds within 2 km; and *E. pictum* with the water lily *Nymphaea odorata*, the damselfly *E. laterale*, and the number of ponds within 1.5 km and 2.5 km. Presence-absence data were used to calculate turnover and local extinction rates for each species between the two years. *E. recurvatum*'s turnover and local extinction rates (33.3% and 41% respectively) were much higher than either *E. laterale* (9.8%, 11.5%) or *E. pictum* (7.7%, 10%). These results suggest that *E. recurvatum* occurs in a metapopulation, and that patch colonization rates might be important to local population persistence." (Authors)] Address: Reed, J.M., Dept Biol., Tufts Univ., Medford, MA 02155, USA. E.mail: mreed@tufts.edu

**3595.** Goldschmid, U.; Grotzer, C. (2002): Anlage und Management eines Teiches als ökologische Ausgleichsmaßnahme: Das Tritonwasser auf der Wiener Donauinsel. *Denisia* 3: 25-45. (in German with English summary). ["In 1989 the Department of Water Res decided to set up an about 2 ha large pond. It was to fulfil exclusively ecological functions and to serve as a further stepping-stone in a chain of humid biotopes. Special consideration was given to the demands amphibious animals, water- and reed-birds and dragonflies make on a water body. The design of the pond and its environment were derived from the ecological requirements as: well structured shoreline with bays, islands

and peninsulas; flat riparian zones; deep water zones which will not freeze; high structural diversity by initial plantings of submerged and emergent vegetation. The construction work was carried out during winter of 1989/90. The basin of the pond was sealed with a 30 cm-thick layer of clay. The substratum ranges along the gradient from sands to coarse gravel. The gradients of the slopes reach a maximum of 1:2, but are at an average of 1:5 to 1:10. Parts of the pond are separated by gravel ridges into several individual sections, which get an individual character from a hydrologic and faunistic point of view. The pond was filled via a feeding pipeline from the New Danube. Initial plantings were carried out, mainly with a variety of marsh and aquatic plants. These endemic plants were taken from several detention reservoirs of Vienna's rivers. The succession processes and colonization by animals and the increase of plants are subjected to a scientific long-term monitoring project." (Authors)] Address: Goldschmid, Ulrike, Wilhelminenstrasse 93, MA 45 - Wasserbau, A-1160, Wien, Austria. E-Mail: gol@m45.magwien.gv.at

**3596.** Harding, D.; Thompson, J. (2002): Habitat use by the Seychelles fineliner damselfly (*Teinobasis alluaudi*) on Silhouette island, Seychelles. *Phelsuma* 10: 35-40. (in English). [In 2002, research on the island located 4 sites for this species providing new data on appearance, vegetation use by teneral and adults, colour development, and oviposition. Apparent preference for alien vegetation (*Clidemia hirta*, *Paraserianthes falcataria*) is attributed to males preferring an open vegetation structure.] Address: Harding, D., Sch. Biol. Sci., Univ. Sussex, Palmer, Brighton, BN1 9QJ, UK

**3597.** Heijligers, H. (2002): Boekbespreking: Libellen van Noordwest Europa. Determinatie, Verspreiding, Biotopvoorkom en Bedreiging van de libellensoorten van Noordwest-Europa. *Natuurhistorisch Maandblad* 91: 240. (in Dutch). [This is a brief book review of Wendler, A. & J.-H. Nüss. Vertaling: Willem Schipper. Bewerking: Arjan Stroo, Marcel Wasscher & Wendy Schuurmans, 2002. 136 pp. Jeugdbondsuitgeverij, Utrecht. ISBN 90-5107-031-4.] Address: not stated

**3598.** Houston, W.A.; Duivenvoorden, L.J. (2002): Replacement of littoral native vegetation with the ponded pasture grass *Hymenachne amplexicaulis*: Effects on plant, macroinvertebrate and fish biodiversity of backwaters in the Fitzroy River, Central Queensland, Australia. *Marine & Freshwater Research* 53(8): 1235-1244. (in English). ["Changes in plant and macroinvertebrate communities were found following replacement of extensive zones of floating-attached/submergent native vegetation within Fitzroy River backwaters by the major environmental weed *Hymenachne amplexicaulis* (Poaceae). Impacts of *H. amplexicaulis* on native littoral flora and fauna (macroinvertebrates and fish) were assessed by comparing three sites previously supporting native vegetation and now invaded by *H. amplexicaulis* with nearby stands of native backwater vegetation. Plant biomass of *Hymenachne* plant beds was 30-fold greater than native plant beds, whereas plant species diversity (richness) was significantly less. Macroinvertebrate communities of *Hymenachne* beds were significantly lower in abundance of insect orders Ephemeroptera, Hemiptera and Odonata, while Coleoptera were more abundant in *Hymenachne* beds. Non-metric multidimensional scaling ordination of macroinvertebrate family abundance and composition data showed that

Hymenachne plant beds had a different assemblage to that in native plant beds. In common with other studies of weed invasions, an increased abundance of some vertebrate fauna was observed (in this case an introduced fish species *Xiphophorus maculatus* comprised 75% of fish captured in Hymenachne beds compared with 0% in native plant beds). Change in vegetation structure was implicated as an important factor influencing macroinvertebrate and fish faunal composition, and with potential to impact on waterbird habitat values of wetlands." (Authors)] Address: Houston, W.A., Centre for Environmental Management, Central Queensland University, Rockhampton, QLD, 4702, Australia. E-Mail: w.houston@cqu.edu.au

**3599.** Huguet, A.; Nel, A.; Martinez-Delclos, X.; Bechly, G.; Martins-Neto, R. (2002): Preliminary phylogenetic analysis of the Protanisoptera (Insecta: Odonatoptera). *Geobios* 35(5): 537-560. (in English). ["The Permian suborder Protanisoptera (Insecta: Odonatoptera) is revised and a new phylogenetic hypothesis proposed after analyses based on wing venation and different outgroups. After our study the families Camptotaxineuridae and Kaltanoneuridae are excluded from the Protanisoptera. After a new phylogenetic analysis, the family Permaeschnidae is redefined and the families Pholidoptilidae, Polytaxineuridae, Callimokaltaniidae and Hemizygoteridae are restored, as already proposed for the latter three families by Bechly (1996). The new genus *Proditaxineura* is described. The genus *Gondvanoptilon* ROSLER et al., 1981 is excluded from the Meganisoptera: Erasipteridae and re-included in the Permaeschnidae, as already proposed by Bechly (1998). *Permaeschna proxima* MARTYNOV, 1931 is considered as a junior synonym of *Permaeschna dolloi* MARTYNOV, 1931. *Pholidoptilon camense* ZALESSKY, 1931 is excluded from *Permaeschna* MARTYNOV, 1931 and the genus *Pholidoptilon* ZALESSKY, 1931 is restored. *Ditaxineurella stigmalis* MARTYNOV, 1940 is excluded from the Hemizygoteridae and considered as a Protanisoptera Incertae sedis." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**3600.** Jacunski, L.; Tesznar, L.; Templin, J.; Napiórkoska, T. (2002): The case of oligomely in the larvae of the dragonfly *Aeshna grandis* L.. *Przegląd Zoologiczny* 46: 91-93. (in Polish with English summary). [A larva of *Aeshna grandis* with five legs (2/3) is documented and discussed.] Address: Tesznar, Lidia, Zakład Zoologii Bezkręgowców, Instytut Biologii Ogólnej i Molekularnej, Uniwersytet M. Kopernika, ul. Gagarina 9, PL-87-100 Torun, Poland. E-mail: tesznar@biol.uni.torun.pl

**3601.** Ketelaar, R. (2002): The status of the Northern Damselfly *Coenagrion hastulatum* in the Netherlands, a characteristic dragonfly of non-disturbed shallow lakes (Odonata). *Ned. faun. Meded.* 16: 1-10, col. phot. excl.. (in Dutch, with English summary). ["Between 1980-2000, the species disappeared from 7 localities, at present 16 populations are known in the southern and eastern Netherlands. These are reviewed, and circumstantial evidence is presented on the wandering of individuals over a distance of at least ca 2km."] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**3602.** Knötzsch, G. (2002): Das Auftreten mediterraner Libellenarten im Eriskircher Ried. *Naturschutz zwischen Donau und Bodensee* 1: 37-42. (in German). [Baden-Württemberg, Germany; a monitoring of Odonata starting in the end of the 1980th proves that so called mediterranean species as *Aeshna affinis*, *Crocothemis erythraea*, and *Sympetrum fonscolombii* meanwhile belong to the characteristic and permanent fauna of the area. It can be assumed that global warming is one of the main reasons of the range extensions of these species. The author outlines in some detail the ecological factors responsible for the occurrence of *A. affinis* in the area: this species depends on the high flood of lake Constance, and builds up large populations in a year with high flood, while it may lack in dry summers. Records of *Sympetrum meridionalis* in August 2002 are very remarkable. In addition, records of *Lestes barbarus*, *C. erythraea*, and *S. fonscolombii* are reported in detail, and a check-list comprising of 45 odonate species is added. The Eriskirchener Ried is definitely a "Prime Dragonfly Area" in (Western) Europe.] Address: Knötzsch, G., Friedrichstr. 44, D-88045 Friedrichshafen, Germany.

**3603.** Koperski, P. (2002): Factors determining diversity in diet composition: multivariate analysis of a guild of epiphytic predators. *Arch. Hydrobiol.* 155(2): 291-314. (in English). ["The diet composition of five species of epiphytic predators (the larval damselfly *Enallagma cyathigerum*, larval midge *Ablabesmyia monilis*, larval caddisfly *Cyrnus flavidus* and leeches *Erpobdella octoculata* and *E. nigricollis*), inhabiting *Stratiotes aloides* in the shallow littoral of three Polish lakes, was analysed using multivariate methods. The gut contents of individuals living in experimental mesocosms were also analysed to test the behavioural effects of the stimuli released by larger predators - fish and aquatic insects. The main aims of the study were: to determine the most important interactions between particular members of the guild of epiphytic predators, to explain interactions between the above and their feeding resources and to characterize the effects of experimentally simulated predatory pressure. A further aim was also to test if the diversity in dietary composition caused by intrinsic, species-specific feeding preferences is higher or lower than that caused by anti-predator changes in their feeding behaviour. To design the data matrix, the dietary composition of each of 595 individuals was characterised by 28 variables, designing at the numbers or percentage of prey taxa and prey ecological groups as well as the cumulative metrics and indices. [...] Individual dietary composition has customarily been seen as depending more markedly on the presence of stimuli from larger predator than on taxonomic specifics. The dietary compositions of the three insect species studied were more similar in natural conditions than in experimental habitats. The dietary composition of *E. nigricollis* was more distinct from the diets of the other species, and significantly different even from that of the congeneric species *E. octoculata*. Diets of leeches diverged more significantly in various feeding habitats than those of insect larvae. Moreover, the diversity to the dietary compositions of particular species feeding in natural lake conditions was lower than that to the composition noted for conspecifics feeding in different habitats." (Author)] Address: Koperski, P., Department of Hydrobiology, Institute of Zoology, Warsaw University, Banacha 2, 02-097 Warszawa, Poland. E-mail: koper@hydro.biol.uw.edu.pl

- 3604.** Kozak, A.; Zawal, A. (2002): Comparison of dragonfly communities in the open-land and forest small water bodies. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn: 42. (in Polish). [In both water body types - located near Binowo, Poland - *Coenagrion puella* was the dominant species. The similarity of the dragonfly fauna of different sample localities accounted to 30-50%. The nearby situated open-land water bodies influenced the composition of the small forest water bodies, e.g. *A. viridis* - definitely no species of wooded habitats - could be observed in the forest water body.] Address: Available from Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznan
- 3605.** Kury, D.; Bauer-Stingelin, K. (2002): Änderungen der Libellengemeinschaft in der Zurlindengrube Pratteln zwischen 1986 und 1996. Mitt. naturf. Gesell. beider Basel 6: 15-22. (in German with English summary). [A comparison is made between the 1986 and 1996 odonate assemblages of the abandoned gravel pit, canton Basel-Landschaft, Switzerland. The alterations are probably due to management measures, aiming at the re-institution of some early succession stage habitats.] Address: Bauer-Stingelin, Fraumattstr. 51, CH-4410 Liestal, Switzerland
- 3606.** Laurila, A.; Pakkasmaa, S.; Crochet, P.-A.; Merila, J. (2002): Predator-induced plasticity in early life history and morphology in two anuran amphibians. *Oecologia* 132(4): 524-530. (in English). ["Predation pressure during early life stages is often high, but few studies have examined antipredator responses at these stages. We studied the effects of an egg predator (leech, *Haemopsis sanguisuga*) and two tadpole predators (dragonfly larvae, *Aeshna* spp.; and three-spine stickleback, *Gasterosteus aculeatus*) on the timing of hatching and morphology of hatchlings and young tadpoles in two anuran amphibians (*Rana arvalis* (RA) and *R. temporaria* (RT)) in a factorial laboratory experiment. We also compared the responses of two geographically separated RA populations on the Baltic island of Gotland and in Uppland on the Swedish mainland. We found inconsistent evidence for the predictions that the presence of an egg predator induces earlier hatching, and the presence of a larval predator delays hatching. RT hatched later in the presence of stickleback than in the control treatment, but RA hatched earlier, less developed and at smaller size in the leech, dragonfly, and stickleback treatments. There was no indication of predator-induced morphology in hatchlings of either of the species. However, young RA tadpoles had shorter tails and deeper bodies in the stickleback treatment and RT had shorter tails in the leech, dragonfly and stickleback treatments. Irrespective of treatment, RA from Gotland hatched with relatively longer bodies than Uppland individuals and had relatively deeper and short tails as young tadpoles. Our results highlight the diversity of induced responses to predators in anuran amphibians: predator presence affects the timing of hatching and morphology of young tadpoles, but these responses vary depending on the species and predator considered." (Authors)] Address: Laurila, A., Dept of Population Biology, Uppsala University, Norbyvagen 18D, 75236, Uppsala Sweden. E-Mail: anssi.laurila@ebc.uu.se
- 3607.** Lucas, M.J. (2002): Spinning Jenny and Devil's darning needle. ISBN 0-9544035-09: viii + 88 pp. (in English). [This attractive book - including 25 colour illustrations - on anthrop-odonatology is structured in the following main chapters: "Folknames" (pp.1-12), "Folklore, myth and legend" (pp. 13-20), "Literature, poetry and music" (pp. 39), "Illustrations, sculpture and carvings" (pp. 40-62), "Art nouveau" (pp. 63-64), "Religion" (pp. 65-66), "Food, medicine and decorations" (pp. 67-68), "Stamps" (pp. 69-76), and "Miscellaneous" (pp. 77-79). The Bibliography comprises more than 150 references. The presented evidence from various fields is not exhaustive (e.g. music and stamps), but even so, the book gives a wealth of (introducing) information.] Address: Lucas, M. Jill., 8 Camborne Dr., Fixby, Huddersfield, Yorks., HD2 2NF, UK
- 3608.** Malkmus, R. (2002): Die Verbreitung der Libellen Portugals, Madeiras und der Azoren. *Nachr. naturwiss. Mus. Stadt Aschaffenburg* 106: 117-143. (in German with English summary). [64 odonate taxa are known from continental Portugal, from the Madeira archipelago 6 species, and from the Azores 4 species. The "continental" species are mapped on the basis of the UTM grid, while the rest is only listed. The maps were prepared after critically revising museum specimens and published data. They include museum-, literature-, and field-collection-data of the author.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany
- 3609.** Malkmus, R. (2002): Weitere Funde von *Macromia splendens* (Pictet) in Portugal (Anisoptera: Corduliidae). *Nachr. naturwiss. Mus. Aschaffenburg* 106: 144-147. (in German with English summary). [Six additional records from northeastern Portugal resulting from trips in 1997 and 2000 enhance the known distribution of *M. splendens* on the Iberian peninsula in a significant way. The localities - situated along the rivers Tâmega, Tua, Côa, and Anguiera - are described in detail, co-occurring species (e.g. *Gomphus graslinii* and *Oxygastra curtisii*) are listed.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany
- 3610.** Meurgey, F. (2002): Contribution a la connaissance des odonates de la Guadeloupe (Antilles Françaises): signalement de *Tholymis citrina* (Hagen, 1876) et resultats des prospections 2001. *Bull. Soc. Sci. not. Quest Fr. (N.S.)* 24(3): 135-145. (in French with English summary). [The results of an odonatological survey in Guadeloupe Island, Lesser Antilles (Dec. 2001-Jan. 2002) are reported; 13 localities are described and mapped, and 16 species (including a first record of *T. citrina*) are listed. So far, 31 species were recorded from the island.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12 rue Voltaire, F-44000 Nantes, France
- 3611.** Meurgey, F. (2002): Nouveau site de reproduction pour *Gomphus vulgatissimus* (Linné, 1758) en Loire-Atlantique (Odonata, Gomphidae). *Bull. Soc. Sci. not. Quest Fr. (N.S.)* 24(4): 215-217. (in French with English summary). [La Sevre, near Clisson, France; the locality is described and information on the occurrence of the species in the department is provided.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12 rue Voltaire, F-44000 Nantes, France
- 3612.** Mitra, T.R. (2002): Geographic distribution of Odonata (Insecta) of eastern India. *Memoirs of the Zoological Survey of India* 19(1): 208 pp. (in English). [294 odonate species and subspecies are known to occur in eastern India. The geographic scope of eastern India

includes the fauna of the states Arunachal, Pradesh, Assam, Bihar, Manipur, Mizoram, Nagaland, Orissa, Sikkim, Tripura, and West Bengal. The monograph compiles the available odonatological information, contains keys for the identification of the species, their variations from the reference collections present in the Zoological Survey of India, compiles descriptions available in the Fauna of British India volumes, and outlines the geographical distribution in detail. "It also embodies description of new species of *Calicnemia* and *Gomphidia* and five indeterminate species, females of *Agriocnemis nana*, *Indothemis limbata limbata*." This is a little bit obscure, because *C. sudhaae* and *G. leonoraee* were described in Mitra, T.R. (1994): Observations on the habits and habitats of adult dragonflies of eastern India with special reference to the fauna of West Bengal. Rec. zool. Survey India (Occ. pap.) 166: 1-40. The indeterminate taxa are *Crocothemis indica* Sahni, 1964 = *C. servillia* (Drury, 1773), *Crocothemis misrai* Baijal and Agarwal, 1956 = *Trithemis aurora* (Burmeister, 1839), *Orthetrum ganeshii* Mehrotra, 1961 and *O. chandrabali* Mehrotra, 1961 = *Orthetrum triangulare* (Selys, 1878), and *Ictinogomphus distinctus* Ram (1985) = probably a synonym of *Ictinogomphus rapax* (Rambur, 1842), *Bradinyoga saintjohanni* Baijal & Agarwal, 1955 = *Bradinyoga saintjohanni geminata* (Rambur, 1842). The geographic distribution of the taxa is discussed in detail. A bibliography and an index contribute significantly to this valuable and commendable publication.] Address: Mitra, T.R., "M" Block, New Alipore, Kolkata 700 053, India

**3613.** Monnerat, C.; Gonseth, Y. (2002): Jahresbericht 2001. Odonata 2000. Nachrichten des Schweizer Zentrum für die Kartographie der Fauna 23: 6-7;-23-24. (in German and French). [In the framework of preparing the Red List of endangered Swiss Odonata, trends of population development of selected species were analyzed using a statistic program. The results were compared with the opinion and field experiences of dragonfly experts. A special survey of the rare *Brachytron pratense* was realized to check the trends. It is concluded that the opinion of the experts fits best to the reality. In addition, some so called data sheets on *Ceragrion tenellum*, *Sympetma paedisca*, *Gomphus similimus*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Calopteryx virgo*, *C. splendens*, *Sympetrum flaveolum*, *Lestes dryas*, *L. virens*, *Epiteca bimaculata*, *Coenagrion mercuriale*, and *Ophiogomphus cecilia* were prepared for publication in 2002. Furthermore, an update of the dragonfly atlas of Switzerland was discussed with the experts, and its scope was defined.] Address: Monnerat, C., Centre suisse Cartogr. Faune, Terreaux 14, CH-2000 Neuchatel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**3614.** Mustow, S.E. (2002): Biological monitoring of rivers in Thailand: Use and adaptation of the BMWP score. *Hydrobiologia* 479: 191-229. (in English). ["The performance of the BMWP biotic score, which is based on macroinvertebrates (including Odonata), in accurately classifying 23 sites on the River Ping system in northern Thailand, was assessed through comparison with physical and chemical data. Sites were located on the main River Ping, a highly polluted tributary (Kha Canal), a relatively unpolluted tributary (River Taeng) and an upland stream tributary system (River Klang). Data were collected between December 1990 and September 1993. The purpose of the research was to determine

whether the BMWP score, originally developed in the U.K., could be employed successfully in Thailand and potentially also in other subtropical and tropical developing countries. Biological monitoring techniques such as the BMWP score are low-tech, rapid means of assessing water quality, and involve significantly lower financial costs than chemical monitoring techniques. The BMWP score was capable of distinguishing between sites that were heavily impacted by organic pollution and relatively unpolluted sites, and showed some potential to identify lower levels of pollution. The overall performance was considered to be similar to that recorded in the U.K. It was noted during the study that several of the taxa used in the BMWP score were absent in Thailand and that other taxa were present that would potentially be useful indicators. The BMWP score was therefore modified by removing 15 taxa not present in Thailand and adding 11 replacement taxa. Also, in the modified score, 6 sets of families were combined due to taxonomic difficulties and 7 odonatan families were allocated lower scores. The modified procedure, named the BMWPTHAI score, did not significantly alter the way in which sites were classified, but was easier to use. There is strong potential for application of the BMWPTHAI score in Thailand and other developing countries, although some further testing is first recommended." (Author)] Address: Mustow, S.E., White Young Green Environmental, Arndale Court, Headingley, Leeds, LS6 2UJ, UK. E-Mail: stephen.mustow@wyg.com

**3615.** Muzlanov, Yu.A. (2002): Chronological dynamics of the distribution of wing venation anomalies in intrapopulation groups of *Calopteryx splendens* Harr. damselflies. *Ekologiya* (Moscow) 3: 209-214. (in Russian with English summary). ["The long-term dynamics of the number of full (normal) veins, venation anomalies, and linear parameters of the wings of *C. splendens* males from neighboring population groups were analyzed. Correlation analysis showed that some of the anomalies may emerge in addition to the full veins, whereas others are formed instead of them. The demoiselles from even-year generations had a significantly greater number of developmental abnormalities. This may have been caused by the sharp increase in the radiation level in the summer of 1986 due to the Chernobyl accident, which could have resulted in significant hereditary disorders manifested in the succession of generations of this genetic group. The emergence of venation abnormalities in demoiselle wings is a stochastic process, strengthened by both environmental and genetic stress. These anomalies may be considered as markers of the stability of ontogenetic processes, which greatly reflect the specific genotypic traits of individuals within a population. The analysis of average values for venation abnormalities in demoiselle wings is a more precise instrument for assessing ontogenetic stability than the levels of fluctuating asymmetry and general phenotypic variance." (Author)] Address: Muzlanov, Yu.A., Zarevskaya Secondary School of General Education, Zarya, Ryazan Russia

**3616.** Negishi, J.N.; Inoue, M.; Nunokawa, M. (2002): Effects of channelisation on stream habitat in relation to a spate and flow refugia for macroinvertebrates in northern Japan. *Freshwater Biology* 47(8): 1515-1529. (in English). ["1. The effects of channelisation on macroinvertebrates were examined in relation to a spate and flow refugia. Habitat components that can function as flow refugia were identified in a small, low-gradient

stream in northern Hokkaido, Japan. 2. Macroinvertebrates and their habitat characteristics (depth, current velocity and substratum) were sampled and measured in natural and channelised sections on three occasions: before, during and immediately after a spate. For macroinvertebrate sampling and habitat measurements, five (riffle, glide, pool, backwater and inundated habitats) and three (channelised-mid, channelised-edge and inundated habitats) habitat types were classified in the natural and channelised section, respectively. 3. The rate of velocity increase with discharge was compared among habitat types to determine which habitat types were less affected by increased discharge. The rate was the highest in riffles followed by glides and channelised-mids. Backwaters maintained low current velocity even at high flow. In addition, current velocity in both natural and channelised inundated habitats was low relative to other habitat types during the spate. 4. Through the spate, total density of macroinvertebrates in channelised-mids and taxon richness in both channelised-mids and edges decreased. In the natural section, however, such a significant decrease was not found except for taxon richness in pools. This indicated that the spate had a greater impact on assemblages in the channelised section. Riffle assemblages exhibited a rapid recovery immediately after the spate, suggesting the existence of flow refugia in the natural section. Among the habitat types we examined, backwaters and inundated habitats appeared to have acted as flow refugia, because these habitats accumulated macroinvertebrates during the spate. 5. The lower persistence of the macroinvertebrate assemblage in the channelised section was attributable to the lower availability of flow refugia such as backwaters and inundated habitats. Our results emphasised the importance of considering flow fluctuations and refugia in assessing the effects of channelisation. In addition, the lateral heterogeneity of stream channels should be considered in stream restoration and management." (Authors) "Davidius" ist listed in table 4.] Address: Negishi, J.N., Dept Forest Sci., Fac. Agriculture, Hokkaido Univ., Sapporo, Japan. E-mail: artp1496@nus.edu.sg

**3617.** Nel, A.; Huguet, A. (2002): Revision of the enigmatic Upper Carboniferous insect *Campyloptera eatoni* Brongniart, 1893 (Insecta: Odonatoptera). *Organisms Diversity & Evolution* 2(4): 313-318. ["*Campyloptera eatoni* Brongniart, 1893, the type species of the type genus of the Upper Carboniferous family Campylopteridae Handlirsch, is redescribed. It is not a Megasecoptera as previously supposed, but an Odonatoptera with a specialized wing venation. Although it has a more basal position than the Meganeuridae because of the absence of any nodal or subnodal structure, it has acquired a simple vein MA and a widening area between MP and CuA, convergently with the highly derived Discoidalia clade that includes the modern Odonata. A new diagnosis is given for Campylopteridae and its type genus, *Campyloptera* Brongniart. *Campylopteroidea* Rohdendorf, 1962 falls as a new junior synonym under Odonatoptera Martynov, 1932." (Author)] Address: Nel, A., Laboratoire d'Entomologie, CNRS UMR 8569, Museum National d'Histoire Naturelle, 45 Rue Buffon, F-75005, Paris, France. E-Mail: anel@mnhn.fr

**3618.** Nokkola, A.; Laukkanen, A.; Nokkola, C. (2002): Mitotic and meiotic chromosomes in *Somatochlora metallica* (Cordulidae, Odonata). The absence of localized centromeres and inverted meiosis. *Hereditas* 136(1): 7-

12. (in English). ["Spermatogonial metaphase chromosomes were examined in two dragonfly species, *Somatochlora metallica* (Cordulidae) and *Aeshna grandis* (Aeshnidae), and the behaviour of male meiotic chromosomes was studied in *S. metallica*. Both in *S. metallica* and *A. grandis* the male mitotic metaphase chromosomes from cells treated with colchicine consisted of two; equidistantly aligned chromatids, showing no primary constriction. In meiosis the chromosomes of *S. metallica* males showed telokinetic activity during the first meiotic division, and kinetic activity was restricted in the middle parts of chromosomes during the second division. The kinetic behaviour of the chromosomes both in mitosis and meiosis showed that they were holocentric. One chiasma arises interstitially in each bivalent in *S. metallica* male meiosis. The chiasmata retain their interstitial position at metaphase I and do not terminalize. At metaphase I bivalents co-orient with homologous telomere regions towards the opposite poles. Thus genuine dyads segregate at the first anaphase. Meiosis in these male dragonflies is thus pre-reductional or conventional, not post-reductional or inverted, as has been previously proposed." (Authors)] Address: Nokkala, S., Laboratory of Genetics, Department of Biology, University of Turku, FIN-20014, Turku, Finland. E-mail: seppo.nokkala@utu.fi

**3619.** Novelo-Gutierrez, R. (2002): Two new Mexican larvae of the genus *Erpetogomphus* Hagen in Selys (Odonata: Gomphidae). *Journal of the New York Entomological Society* 110(3-4): 370-375. ["Detailed descriptions and illustrations of the larvae of *Erpetogomphus* *boa* Selys and *E. cophias* Selys, are provided. Comparison with other larvae of the *crotalinus*-subgroup (sensu Garrison, 1994) is also included. Both species are easily separable by general body coloration, length and shape of ligula, and details of male's epiproct." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**3620.** Ocharan, R.; Ocharan, F.J. (2002): Odonatos del Valle de Cuatango (Alava). *Boletín de la Asociación Española de Entomología* 26(1-2): 97-110. (in Spanish with english summary). ["Complete data about 39 species of Odonata collected from 1994 to 1996 in the Valley of Cuatango and certain localities in its surroundings (Alava, North of Spain) are given; this is one of the "valleys of transition" between the atlantic Cornisa Cantabrica and the mediterranean Valley of Ebro River. A bibliographical revision of the previous records of Odonata in the province of Alava is offered. The records for *Gomphus vulgatissimus* and *Oxygastra curtisi* noticeably increase their distribution areas already known in the Iberian Peninsula." (Authors)] Address: Ocharan, R., Area de Zoología. Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, C/ Catedrático Rodrigo Uria s/n., 33071, Oviedo, Asturias, Spain. E-Mail: rocharan@correo.uniovi.es

**3621.** Oo, T.T.; Storch, V.; Becker, N. (2002): Studies on the bionomics of *Anopheles dirus* (Culicidae: Diptera) in Mudon, Mon State, Myanmar. *Journal of Vector Ecology* 27(1): 44-54. (in English). ["This study examined some environmental factors influencing the larval habitats of *Anopheles dirus* (breeding in wells) in Mudon, Myanmar, from May 1998 to March 2000. The lar-

val/pupal density was found to be directly proportional to rainfall and indirectly proportional to the well water level. Shade, vegetation and debris on the surface of well water were important factors influencing the abundance of the aquatic stages of *An. dirus*. Salinity had an inverse correlation with the larval and pupal density. Other mosquito species associated with *An. dirus* were identified. Important predators of the mosquito larvae were larvivorous fish, damselfly and dragonfly nymphs. All wells examined were lined with lateritic rocks. Chemical analysis of water samples from wells was conducted." (Authors)] Address: Becker, N., German Mosquito Control Association/KABS, Ludwigstr. 99, 67165, Waldsee, Germany Germany

**3622.** Pilgrim, E.M.; Roush, S.A.; Krane, D.E. (2002): Combining DNA sequences and morphology in systematics: testing the validity of the dragonfly species *Cordulegaster bilineata*. *Heredity* 89: 184-190. (in English). [Morphological techniques are combined with DNA sequences to determine the taxonomic status of *C. bilineata*. The latter and *C. diastatops* are very similar in morphological features, therefore the status of *C. bilineata* as a valid species is in question. Here, male morphological measurements and internal transcribed spacer 1 (ITS-1) sequences of rDNA are compared between the two taxa. "The male hamule measurements (where copulation occurs) show little difference between the taxa in question, but the anal appendage measurements (where the 6 first contacts the female) show marked divergence between the two taxa. Cluster analysis with these anal appendage measurements correctly assigns almost all individuals measured into their respective taxon. PCR amplification products of ITS-1 display a -50 bp size difference between *C. bilineata* (n = 4) and *C. diastatops* (n = 5) regardless of collection site. Sequence data or these amplifications show 51 bp missing in one locus in the ITS-1 of *C. bilineata* relative to *C. diastatops*. A lone population of *C. diastatops* from Wisconsin has three individuals with ITS-1 products that match the size of both *C. bilineata* and *C. diastatops*. One individual from this population appears to yield two ITS-1 amplification products that match both *C. bilineata* and *C. diastatops*. Although this population may be evidence for hybridization between the 2 taxa, such hybridization is not necessarily sufficient to disqualify the validity of a separate species designation for *C. bilineata*. Morphology and ITS-1 sequences depict a high degree of divergence that is consistent with species-level differences." (Authors)] Address: Pilgrim, E. M., Dept Biol., Utah St. Univ., Logan, UT 84322, USA

**3623.** Richardson, J.M.L. (2002): Burst swim speed in tadpoles inhabiting ponds with different top predators. *Evolutionary Ecology Research* 4(5): 627-642. (in English). ["Selection is likely to favour anti-predator strategies that are effective against predators encountered frequently. Larval anuran communities fall along a gradient of pond permanency and pond permanency also affects the type of top predator (including Odonata) present. These environmental factors combine to create distinct categories of pond types. In this study, I quantified the predator avoidance trait burst swim speed and related traits for 14 anuran species found in three pond types and within three taxonomic families. Absolute swim speed differed significantly among species and among taxonomic families. Inclusion of size in the model revealed a three-way interaction between size, habitat and taxonomic family. Tail beat frequency and body

shape differed significantly among species, but with no pattern by family or habitat. Functional relationships among traits also did not differ among family by habitat groups. The evolution of swim speed was significantly correlated with the evolution of increased size. In general, these results suggest that anurans have invaded new pond types using multiple mechanisms to cope with the predators that are present." (Authors)] Address: Richardson, J., Department of Zoology, University of Toronto, 25 Harbord St., Toronto, ON, M5S 3G5, Canada. E-mail: jmlr@zool.utoronto.ca

**3624.** Sabo, J.L.; Power, M.E. (2002): Numerical response of lizards to aquatic insects and short-term consequences for terrestrial prey. *Ecology* 83(11): 3023-3036. (in English). [Experiments with reduced (-) and ambient (+) subsidies in Mendocino Co., California, USA have shown that relative changes in lizard (*Sceloporus occidentalis*) abundance in - subsidy and + subsidy treatments were consistent with relative odonate abundance (e.g. *Argia* spp., *Archilestes californicus*, "*Ophiogomphus bicolor*" (?)), which represent one of the lizard's most common prey types (~20% by biomass).] Address: Sabo, J.L., Dept Biol., Arizona St. Univ., P.O. Box 871501, Tempe, AZ 85287-1501, USA

**3625.** Samways, M.J. (2002): Caring for the multitude: Current challenges. *Biodiversity & Conservation* 11(2): 341-343. (in English). [The author comments on some current challenges from the conservation resp. biodiversity point of view. Among others, dragonflies are used to focus on taxonomic problems (most of the invertebrates are undescribed) and the function of umbrella species to preserve biodiversity. Some relections are made on the importance of giving vernacular names to and red listing of invertebrates, the importance of soil dwelling organisms on the ecosystem-level, and the importance of invertebrates in general for "ecosystem health".] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

**3626.** Schlee, J. (2002): Zur Libellenfauna der Rieselfelder Windel in Bielefeld-Senne. *Ber. naturwiss. Ver. Bielefeld und Umgebung* 42: 355-364. (in German). [In 1997, nature conservation measures including creating some water bodies on the the sewage farm Windel near Bielefeld, Nordrhein-Westfalen, Germany were started. Between 1998 and 2001, odonate surveys were made to access the effects of the conservation measures. In total, 27 odonate species could be observed including *Sympetrum flaveolum*, *S. fonscolombii*, *Brachytron pratense*, *Gomphus pulchellus*, *Orthetrum coerulescens*, *Ischnura pumilio*, *Cordulia aenea*, and *Erythromma viridulum*. In 2002, *Sympecma fusca* reproduced in the sewage farm (pers. comm. of the author).] Address: Schlee, J., c/o Biol. Station Gütersloh / Bielefeld e.V., Niederheide 63, D-33659 Bielefeld, Germany. E-mail: BioStationGT-BI@t-online.de

**3627.** Schlüpmann, M. (2002): Zönosen der Odonaten stehender Kleingewässer im Hagener Raum - Artenzahlen, ihre Ermittlung und die Abgrenzung von Libellengemeinschaften. *Decheniana* 155: 59-76. (in German, with English summary). [Nordrhein-Westfalen, Germany; 312 stagnant ponds within the area of the town of Hagen and their odonate fauna were analysed. Statistics was applied to define affinities between spe-

cies groups, and to develop odonate coenoses.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: Martin.Schluepmann@t-online

**3628.** Stevens, M.; Riedel, H.-W. (2002): Verbreitung der Larven der Quelljungfern (Cordulegaster) (Odonata, Cordulegastridae) im Raum Bergisch Gladbach. *Decheniana* 155: 105-112. (in German, with English summary). [Nordrhein-Westfalen, Germany; in the framework of saprobial examinations of 75 sample sites along running waters, *Cordulegaster boltonii* was recorded at 7 sample sites, while *Thecagaster bidentata* was traced only one time. These records are mapped together with literature data and records from unpublished expertises and a Ms thesis. The localities are described in detail, and the regional distribution of the species is discussed.] Address: Riedel, H.-W., Stadt Bergisch Gladbach, Fachbereich Umwelt und Technik, Wilhelm-Wagner Platz, D-51429 Bergisch Gladbach, Germany

**3629.** Switzer, P.V. (2002): Territory quality, habitat selection, and competition in the Amberwing Dragonfly, *Perythemis tenera* (Say) (Odonata: Libellulidae): population patterns as a consequence of individual behavior. *J. Kans. ent. Soc.* 75(3): 145-157. (in English). ["Basic habitat selection theory predicts that individuals will prefer relatively high quality habitats over low quality habitats. This preference may affect settlement patterns, with higher quality habitats being occupied first and more frequently. If locations vary in quality and good locations are limited, individuals may compete for the best locations rather than settle in lower quality sites. Thus, any factors which influence the number of individuals in an area may potentially affect patterns of habitat occupation. In this study, I tested these ideas using the settlement and fighting patterns of a territorial dragonfly, *P. tenera*. Females consistently arrived later and departed earlier than males. Male and female arrival, and male departure, was correlated with temperature, with earlier arrivals and later departures on warm days. More males were present at the pond as the summer progressed and on warmer days, but the number of females was not related to date or temperature. The amount of fighting for territories increased as the number of males increased. Individuals tended to occupy high quality sites (i.e., sites with a higher number of matings per minute occupied) first within a day, and were more likely to occupy low quality sites when the number of males on the pond was relatively high. The locations that were occupied first during a day were of relatively higher quality and more likely to be occupied by site-faithful males (i.e., males returning to their previous day's location) than those occupied later in the day. Finally, higher quality sites were occupied more often, had more fighting on them, and had a higher proportion of escalated fights than lower quality sites. These results indicate that patterns of competition and habitat occupation are a result of relationships among local breeding population size, individual behavior (e.g., preference for sites and reaction to environmental conditions), and habitat availability and quality." (Author)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**3630.** Sy, T.; Schulze, M. (2002): Die Libellenfauna der Steckbyer Heide im Naturschutzgebiet "Steckby-Lödderitzer Forst" (Insecta, Odonata). *Naturwissen-*

*schaftliche Beiträge Museum Dessau* 14: 56-71. (in German). [Catchment of River Elbe, Sachsen-Anhalt, Germany; in 1999 and 2000, 34 (including 24 autochthonous) odonate species were collected. The study aimed to get information on conservation measures necessary to protect the biodiversity of the area. The following species are discussed in detail: *Lestes barbarus*, *L. virens*, *Aeshna affinis*, *Anaciaeschna isocetes*, *Cordulegaster boltonii*, *Ophiogomphus cecilia*, and *Leucorrhinia pectoralis*.] Address: Sy, T., RANA-Büro für Ökologie und Naturschutz, Am Kirchtor 27, D-06108 Halle (Saale), Germany

**3631.** Ternois, V. (2002): Un paradis pour les libellules. Situé au coeur de la Chamgagne humide, l'étang du Grand Verdat est un site naturel remarquable pour l'étude des libellules. Quarante espèces y sont recensées. *L'est Eclair*, 06.09.2002: 3. (in French). [This report in a French newspaper refers to the Odonata of the lake Grand Verdat. *Sympetrum danae* is introduced with a picture. ] Address: Ternois, V., route de Sauvagny, F-52220 Anglus, France

**3632.** Walia, G.K.; Sandhu, R. (2002): Comparative chromosome data on twenty three species of family Coenagrionidae (Zygoptera: Odonata). *Bionature* 22(2): 79-97. (in Chinese with English summary). ["Karyological investigations have been carried out on 23 species of seven genera belonging to family Coenagrionidae. These have been collected from states of North-west and North-East India during pre-monsoon and post-monsoon seasons. Among these; 21 are male species and 4 are female species. In males, 16 species reveal  $2n=27$  as diploid chromosome number and  $2n=25$  in remaining five species. In females, all the species possess  $2n=28$  as diploid chromosome number. All the species have XO-XX type sex determining mechanism. Autosomal fragmentation has been observed in *Agriocnemis obscura* (female) [= *Agriocnemis rubescens* Selys, 1877]), *Ceriagrion coromandelianum* (male), *Coenagrion dyeri* (female) [= *Cercion calamorum* (Ris 1916)], *Pseudoagrion decorum* (male) and *Pseudoagrion rubriceps* (male & female). Chromosome number varies from 27-60 in gonial metaphase plates. Sex element could not be differentiated in the fragmented stages. Behaviour and morphology of chromosomes during meiosis have been studied and compared within family and within genera." (Author)] Address: Sandhu, R., Department of Zoology, Punjabi University, Patiala, 147 002, India

**3633.** Westhuis, W.; Fritzlar, F. (2002): Tier- und Pflanzenarten, für deren globale Erhaltung Thüringen eine besondere Verantwortung trägt. *Landschaftspflege und Naturschutz in Thüringen* 39(4, Sonderheft): 97-135. (in German). [Against the background of global responsibility of the state of Thüringen, Germany for fauna and flora, W. Zimmerman introduces to *Coenagrion mercuriale* and *C. ornatum*.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**3634.** Woodward, G.; Hildrew, A.G. (2002): The impact of a sit-and-wait predator: Separating consumption and prey emigration. *Oikos* 99(3): 409-418. (in English). ["Reviews of the impact of invertebrate predators in enclosure/exclosure experiments suggest that much of the apparent depletion of prey is due to prey emigration induced by the predators. However, these generalisati-

ons derive mainly from studies of invertebrate predators that are predominantly active searchers (usually stoneflies) and of prey with strong avoidance responses (mainly mayflies). We examined the impact of a large sit-and-wait predator, the nymph of the dragonfly *Cordulegaster boltonii*, which has recently invaded Broadstone Stream as a new top predator. Field enclosure / enclosure experiments were conducted to assess the impact of the invader on the benthos. Depletion of prey varied seasonally and among taxa, and was highest when prey density and encounter rates were high. Mobile prey, although least likely to show a statistically significant response because of high exchange rates, were those most strongly depleted. Experimental channels were used to separate the relative contribution of consumption and emigration to total impact for the two most depleted prey species. Depletion of prey was due solely to consumption and predators did not induce emigration. We therefore urge caution in making generalisations about the impacts of invertebrate predators, since sit-and-wait and searching predators potentially have very different impacts." (Authors)] Address: Woodward, G., Dept of Zoology and Animal Ecology, Univ. College Cork, Cork, Ireland. E-Mail: g.woodward@ucc.ie

**3635.** Worthen, W.B. (2002): The structure of larval odonate assemblages in the Enoree River basin of South Carolina. *Southeastern Naturalist* 1(3): 205-216. (in English). ["Odonate larvae were collected at 127 sites in the Enoree River and nine of its tributaries in the summers of 1999 and 2000. Mean odonate abundance, species richness, and Simpson's diversity were compared across tributaries and the main channel of the Enoree River with one-way ANOVA. These indices were significantly lower in Brushy Creek, Rocky Creek, and the Upper Enoree than in the other streams (Tukey multiple comparison test,  $p < 0.05$ ). These three streams also differed from the others in species composition (MANOVA  $p < 0.0001$ ), as measured by changes in the relative abundances of the five most abundant species: *Progomphus obscurus*, *Boyeria vinosa*, *Macromia illinoensis*, *Cordulegaster maculata*, and *Ophiogomphus mainensis*. For example, *O. mainensis* was nearly absent from Brushy, Rocky, and the Upper Enoree, but was a significant component of the assemblages in other streams. *Cordulegaster maculata* was rare in Rocky Creek but dominated the Upper Enoree where other species were less abundant. Brushy, Rocky, and the Upper Enoree are areas of either rapid residential development or known industrial contamination. The different structure of odonate assemblages in these streams may reflect the impact of these local anthropogenic effects." (Author)] Address: Worthen, W.B., Biology Department, Furman University, Greenville, SC, 29613, USA. E-Mail: worthen@furman.edu

**3636.** Zhang Y.-C.; Liu, B.; Zheng, Z.-m.; Li, L. (2002): DNA extraction and RAPD-PCR of insect specimens preserved with different methods. *Acta Entomologica Sinica* 45(5): 693-695. (in Chinese with English summary). ["Genomic DNA were extracted and amplified using the polymerase chain reaction and arbitrary primers from specimens of seven insect species: *Chrysomela vigintipunctata* (Scopoli) (Coleoptera: Chrysomelidae), *Harmonia axyridis* Pollas and *Coccinella septempunctata* Linnaeus (Col.: Coccinellidae), *Agrotis ypsilon* (Rottemberg) (Lepidoptera: Noctuidae), *Crocothemis servilia* Drury (Odonata: Libellulidae), and *Oxya abentata*

*Willmense* and *O. chinensis* (Thunberg) (Orthoptera: Caltantopidae). Of the specimens assayed, some had been naturally dried, some oven-dried and the remainder had been preserved in alcohol. The results suggest that, with respect to DNA extraction, oven-dried specimens and those preserved in alcohol are better than naturally dried specimens. Extraction of DNA extraction using the CTAB method was easier, and more economical than other methods." (Authors)] Address: Zhang Ying-Chun, College of Life Science, Shaanxi Normal University, Xian, 710062, China. E-Mail: yingchunzcn@yahoo.com.cn

**3637.** Zimmermann, W. (2002): Checkliste der Libellen (Odonata) Thüringens. Stand 31.10.2002. *Checklisten Thüringer Insekten und Spinnentiere* 10: 5-11. (in German). [This is an update of Zimmermann's 1993-list, rising the number of Thuringian species by 9 to a total of 62 Odonata. More recent activities to study and map the odonate fauna of Thuringia, Germany are outlined. The species are listed and classified according to their regional abundance and the status (autochthonous, invasive, range extension). A few species are briefly commented.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**3638.** Zimmermann, W. (2002): Zur Libellenfauna der Hochmoore und Sauer-Zwischenmoore des Thüringer Waldes. *Naturschutzreport* 19: 101-115. (in German). [The paper summarizes long lasting researches of the odonate fauna of 10 bogs and transition mires in Thüringen, Germany, starting in the 1960th. A total of 19 species was found, 14 are to consider as autochthonous. *Aeshna juncea*, *Somatochlora alpestris*, *S. arctica*, and *Leucorrhinia dubia* are considered on the regional level as characteristic odonate species for bogs and transition mires. These species are annotated in detail. Very intensive surveys of the Saukopfmoor result in an nearly constant species spectrum over 30 years. *L. dubia* is the eu-dominant species in the total of the surveyed habitats.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**3639.** Zurek, R. (2002): Upper Vistula River: Response of aquatic communities to pollution and impoundment. VIII. Zooseston. *Polish Journal of Ecology* 50(2): 201-221. (in English). ["Zooseston of the Vistula River section almost 340 km long was investigated in the years 1997/98. In 99 samples collected 90 species of rotifers, 16 cladocerans, 9 copepods and other animals belonging to: Harpacticoidea, Oligochaeta, Nematoda, Chironomidae, Odonata, Simuliidae, Tardigrada and Coelenterata were found. Multiple regression analysis showed that the number of rotifers is significantly correlated with basic chemical indicators of water trophic state - phosphate, nitrate and nitrite as well as with the number of copepods which are usually predators. The numbers of copepods depends on the availability of possible prey, i.e. rotifers and cladocerans. Multiple regression confirmed known dependence of cladocerans from trophic conditions. Clustering of similarity matrices showed complex structure of sestonic assemblages on rhithral-potamal gradient additionally modified by hydrotechnical constructions. These constructions broke old river continuum. Ordination of sites gave complex pattern not only representing a simple gradient rhithral - potamal but also all transient stages caused by hydrotechnical construction (large dam reservoir) or by inflows of polluted waters from the tributaries. Ecologi-

cal meaning of principal component ordination for river zooseston assemblages is not simple and might be susceptible of various interpretations." (Author)] Address: Zurek, R., Karol Starmach Institute of Freshwater Biology, Polish Academy of Sciences, str. Slawkowska 17, 31-016, Cracow, Poland. E-Mail: zurek@zbw.pan.krakow.pl

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**3640.** Abbott, J.C.; Behrstock, R.A.; Larsen, R.R. (2003): Notes on the distribution of Odonata in the Texas Panhandle, with a summary of new state and county records. *Southwestern Naturalist* 48(3): 444-448. (in English). ["Previously, no Odonata have been reported from 44 Texas counties (17%), mainly from the northern Panhandle. Adult dragonflies and damselflies collected since September of 1999 are reported from 24 sites in 14 counties throughout the Texas Panhandle. A total of 35 species is discussed, representing 73 new county records and 4 new state records. First records of Odonata are included for 6 counties." (Authors)] Address: Abbott, J.C., Section of Integrative Biology, University of Texas, Austin, TX, 78712, USA. E-Mail: jcabbott@mail.utexas.edu USA

**3641.** Adams, M.J.; Pearl, C.A.; Bury, R.B. (2003): Indirect facilitation of an anuran invasion by non-native fishes. *Ecology Letters* 6(4): 343-351. (in English). ["Positive interactions among non-native species could greatly exacerbate the problem of invasions, but are poorly studied and our knowledge of their occurrence is mostly limited to plant-pollinator and dispersal interactions. We found that invasion of bullfrogs is facilitated by the presence of co-evolved non-native fish, which increase tadpole survival by reducing predatory macroinvertebrate densities. Native dragonfly nymphs in Oregon, USA caused zero survival of bullfrog tadpoles in a replicated field experiment unless a non-native sunfish was present to reduce dragonfly density. This pattern was also evident in pond surveys where the best predictors of bullfrog abundance were the presence of non-native fish and bathymetry. This is the first experimental evidence of facilitation between two non-native vertebrates and supports the invasional meltdown hypothesis. Such positive interactions among non-native species have the potential to disrupt ecosystems by amplifying invasions, and our study shows they can occur via indirect mechanisms." (Authors)] Address: Adams, M.J., Forest and Rangeland Ecosystem Science Center, USGS, 3200 SW Jefferson Way, Corvallis, OR, 97331, USA. E-Mail: MichaelAdams@usgs.gov

**3642.** Allen, P. (2003): Cuba 20 March - 5 April 2000. *Argia* 15(1): 16-17. (in English). [The paper lists some odonate species from the hills of Pinar del Rio Province, western Cuba from a trip in April 2000.] Address: Allen, P., Little Thatch, North Gorley, Fordingbridge Hants SP6 2PE, UK

**3643.** Altwegg, R. (2003): Hungry predators render predator-avoidance behavior in tadpoles ineffective. *Oikos* 100(2): 311-316. (in English). ["Behavioral responses of prey to their predators can critically alter community dynamics. Whether or not a prey responds, clearly depends on the effectiveness of that response.

The effectiveness on the other hand is predicted to depend on predator behavior. Actively searching predators can render the behavioral responses in their prey ineffective. Nevertheless, most studies investigating the optimal reaction of prey treated predators as immobile elements of the environment. I experimentally manipulated activity of poolfrog (*Rana lessonae*) tadpoles by keeping them at low and high food levels, and exposed them to three species of invertebrate predators (*Aeshna cyanea*, *Anax imperator*, and *Dytiscus marginalis*), whose activity also was manipulated through different food levels. Satiated, less active predators were more likely to kill hungry, more active tadpoles, but hungry predators killed hungry and satiated tadpoles about equally often. This result suggests that reducing their activity is a more effective strategy for tadpoles if the predators themselves are less active. On the other hand, against hungry, highly motivated predators, the behavioral avoidance strategies were essentially ineffective. Antipredator behavior is generally thought to stabilize the dynamics of predator-prey systems. The results presented here, however, suggest that the community dynamical consequences of antipredator behavior also critically depend on decisions made by predators." (Author)] Address: Altwegg, R., Dept of Biology, Univ. of Victoria, Victoria, BC, V8W 3N5, Canada. E-Mail: altwegg@uvic.ca

**3644.** Angelibert, S.; Giani, N. (2003): Dispersal characteristics of three odonate species in a patchy habitat. *Ecography* 26: 13-20. (in English). ["Dispersal has a potentially profound effect on the dynamics of populations especially when a population occupies a patchy habitat. Ponds surrounded by terrestrial landscape are an example of patchy distribution of physical conditions and constitute "islands" for odonates. Few studies have focussed on dispersal in odonates. We have used the direct method of dispersal observing (capture-mark-recapture technique) in order to estimate the degree of linkage in three patchy populations of odonate localised on three ponds. We also examined the differences in dispersal ability within and among three species (*Coenagrion puella*, *C. scitulum*, and *Libellula depressa*). The ponds were situated in southwest France on a limestone plateau. In this arid area, these ponds constitute the only surface water available and are relatively sparsely distributed. The size of the ponds ranged from 48 to 79 m<sup>2</sup> and they were 200 and 775 m apart. We demonstrated that three factors influence the dispersal ability of these odonates. The first is represented by the abiotic factors and especially weather conditions. This determines the number of days that dispersal is possible. The second is interspecific differences. We showed that sensitivity to weather conditions, species size and species behaviour influence dispersal ability. The third factor is the intraspecific characteristics. We demonstrated that there are differences in dispersal ability according to sex and age. To conclude, we discuss the importance of pond management to maintain the existing odonate populations and to facilitate introduction of new populations in this region where little exchange occurs between ponds." (Authors)] Address: Angelibert, S. CESAC UMR 5576, Bcjr 4R3, Univ. Paul Sabatier, 118 Route de Narbonne, F-31062 Toulouse, Cedex, France. E-mail: angelibe@cict.fr

**3645.** Anonymus (2003): Migrant insect summary (May to August 2003). A summary of some of the highlights by the telephone information service InsectLine.

Atropos 20: 42-45. (in English). [UK; Records of the following species are briefly commented: *Anax parthenope*, *Erythromma viridulum*, *Libellula depressa*, *Sympetrum flaveolum*, *S. fonscolombii*, *Lestes barbarus*.] Address: not stated

**3646.** Aspöck, H. (2003): 25 Jahre Österreichische Entomologische Gesellschaft. *Denisia* 8: 279-319. (in German with English summary). [The paper outlines the history of the Austrian entomological society and includes plenty photographs with many well known entomologists. Odonatologists seem to have had no significant role in founding the society. Only Günther Theischinger, now Australia, is pictured several times.] Address: Aspöck, H., Abt. Medizinische Parasitologie, Klinisches Institut für Hygiene der Universität Wien, Kinderspitalgasse 15, A-1095 Wien, Austria. E-mail: horst.aspoeck@univie.ac.at

**3647.** Beckemeyer, R. (2003): Short-term economic troubles and the potential destruction of irreplaceable taxonomic and biodiversity treasures: the University of Nebraska-Lincoln catastrophe. *Argia* 15(2): 16-17. (in English). [In response of budget shortfalls, all research divisions of the Nebraska State Museum, which also harbours a collection of Odonata and current activities on odonatalogical subjects including a mapping project, were "scrapped". Roy Beckemeyer is drawing a very pessimistic picture of the future of entomological research in USA due to economic problems continuing across the USA.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3648.** Bernard, M.F.; Fordyce, J.A. (2003): Are induced defenses costly? Consequences of predator-induced defenses in Western toads, *Bufo boreas*. *Ecology* 84(1): 68-78. (in English). ["Induced defenses are widespread in nature, and in amphibian larvae they are often expressed as altered behavior and changes in tail shape, color, and size. Theory predicts that induced defenses should be costly in the absence of a predator threat. No costs have been found for these defenses after metamorphosis. In this study, we tested for induced defenses in western toads, *Bufo boreas*, and measured larval and postmetamorphic consequences of these responses. Larvae were raised in either the presence or absence of nonlethal predator cues (including *Aeshna* sp.). Defense response of these larval treatments were measured during the larval stage and shortly after metamorphosis using both predator bioassays and quantification of the putative chemical defense common in toads, bufadienolides. We found no differences in larval morphology, growth rate, or development rate between the predator and control treatments. In the larval bioassays, some types of invertebrate predators consumed significantly fewer of the *B. boreas* larvae that were reared with predator cues compared to the control treatments. Bufadienolides were not present in *B. boreas* larvae. In the postmetamorphic bioassays, tiger salamanders (*Ambystoma tigrinum*) had longer handling times when consuming *B. boreas* that had developed in larval environments without predator cues compared to predator-treatment *B. boreas*. However, postmetamorphic *B. boreas* from predator cue larval environments had significantly higher concentrations of bufadienolides than did those from larval environments without predators, suggesting that these defenses are ineffective against tiger salamanders. Our results demonstrate

that there is plasticity in the chemical defenses of toads and suggest that induced larval defenses may incur costs that are only apparent after metamorphosis." (Authors)] Address: Bernard, M.F., Section of Evolution and Ecology, Center for Population Biology, University of California, Davis, California 95616 USA. E-mail: mfbenard@ucdavis.edu

**3649.** Bernard, R. (2003): *Aeshna crenata* Hag., a new species for the fauna of Latvia (Anisoptera: Aeshnidae). *Notul. odonatol.* 6(1): 8-10. (in English). [In 2001 *A. crenata* was discovered in a small area in NE Lithuania (Bernard, 2002, *Opusc. zool. flumin.* 202). In order to solve the puzzle of its range in this part of Europe, intensive searches were carried out in July 2002 in SE Estonia, SE Latvia and NE Lithuania (northward of the known localities). Only 1 locality of *A. crenata* was found, in the Rezekne district in Latvia: 2 small forest lakes (A, B), 400 m distant, 4.8-5.1 km NW of Andrupene, 2.15-2.65 km W of western shores of S part of Viraudas Lake, 56°13'10" N, 27°20'25"-50" E. The habitats are described along with the co-occurring odonate species including the rare *Nehalennia speciosa*.] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**3650.** Bick, F.H. (2003): At-risk Odonata of conterminous United States. *Bull. American Odonatol.* 7(3): 41-56. (in English). [U.S. species at risk, their distribution, habitat, and conservation status are outlined: *Enallagma pictum*, *E. recurvatum*, *Ischnura gemina*, *Nehalennia pallidula*, *Neoneura aaroni*, *Aeshna persephone*, *Stenogomphus consanguis*, *Gomphus diminutus*, *G. sandrius*, *G. septima*, *G. westfalli*, *Ophiogomphus acuminatus*, *O. arizonicus*, *O. australis*, *O. edmundo*, *Progomphus bellei*, *Stylurus potulentus*, *S. townesi*, *Cordulegaster sayi*, *Macromia margarita*, *Somatochlora hineana*, *S. calverti*, *S. margarita*, *S. ozarkensis*, *Williamsonia lintneri*, *Libellula jesseana*.] Address: Bick, G.H., 141 W. Columbus St., Port Angeles, WA 98362, USA

**3651.** Biggs, K. (2003): *Illotum thermometer*. *Argia* 15(2): 18-19. (in English). [Kathy Biggs correlates the behaviour of *Sympetrum illotum* with air-temperature.] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: bigsnest@sonic.net

**3652.** Bocanegra, O.R.; Lewis, J.M. (2003): A preliminary list of the Odonata of Terrell county, Texas. *Argia* 15(1): 11-13. (in English). [USA; a total of 46 species (including *Libellula comanche* from 21 May 1996) was collected at three localities in 2001 and 2002.] Address: Bocanegra, O.R., U.S. Fish and Wildlife Service, 711 Stadium Drive, Suite 252, Arlington, Texas 76011, USA

**3653.** Böhm, K. (2003): Erster Fortpflanzungsnachweis von *Anax parthenope* in Nordrhein-Westfalen (Odonata: Aeshnidae). *Libellula* 22(1/2): 31-34. (in German, with English summary). [Germany; "In summer of 2002, three exuviae were collected at a pond in Düsseldorf (51°21' N, 6°44' E). The late emergence date is interpreted as an indication for a bivoltine development." (Author)] Address: Böhm, K., Erich-Müller-Str. 6, D-40597-Düsseldorf, Germany

**3654.** Botsch, H.-J. (2003): Aktualisierung der Stadtbiotopkartierung Würzburg. *Berichte des bayerischen Landesamtes für Umweltschutz* 171: 76-78. (in German). [In 1983, for the first time the habitats in the town

of Würzburg, Bavaria, Germany were mapped and assessed for nature conservation purposes. In 2000 and 2001, the mapping was renewed. The odonatological results are very briefly commented: 55 water bodies harbouring 22 species were surveyed. Only *Gomphus vulgatissimus* is specified.] Address: Botsch, H.-J. E-mail: helmut.botsch@lfu.bayern.de

**3655.** Brackenbury, J. (2003): Escape manoeuvres in damselfly larvae: Kinematics and dynamics. *Jour. exp. Biol.* 206(2): 389-397. (in English). ["The kinematics and hydrodynamics of rapid escape manoeuvres executed by final-stage larvae of *Enallagma cyathigerum* were investigated using videography combined with a simple wake-visualisation technique. Two kinds of escape manoeuvres were identified: first, a 'rapid flex', comparable with the rapid C-start of fish, and, second, a 'rapid twist' that involves a helical contraction of the body inducing motion in the yaw, pitch and roll planes. In both cases, the initial flexion phase is concerned with re-orientating the body, the extensional phase with acceleration of the body in the new direction. The behaviour of the caudal fin during twist indicates considerable independence of movement and aspect control within the three constituent lobes. Dye deposited beneath the resting larvae showed a thrust jet shed into the wake at the end of the extension phase. The estimated momentum of the ring vortex containing the jet was similar to that imparted to the body at the start of the translational phase. Similarities between the swimming dynamics of damselfly larvae and fish are discussed, as well as the wider implications of these findings to other aquatic vertebrates whose normal, steady swimming appears to be based on unsteady manoeuvres." (Author)] Address: Brackenbury, J., Department of Anatomy, University of Cambridge, Downing Street, Cambridge, CB2 3DY, UK. E-Mail: jhb1000@cam.ac.uk

**3656.** Braun, M.; Braun, U.; Müllen, T. (2003): Zum Vorkommen der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) an der unteren Lahn und an der Ahrmündung. *Fauna Flora Rheinland-Pfalz* 10(1): 273-277. (in German). [Rheinland-Pfalz, Germany; new records from the river Lahn, resulting from June 2003, and the river Ahr (17. July 2003) are briefly documented and discussed.] Address: Braun, M., SGD Nord, Stresemannstr. 3-5, 56068 Koblenz, Germany

**3657.** Braune, E. (2003): Live and get dry: A spatially explicit population model for Namibian Odonata. *Verhandlungen der Gesellschaft für Ökologie* 33: 297. (in English). [Verbatim: Within the scope of a BIOTA Southern Africa subproject a model for the dispersal of dragonflies in the arid regions of western Namibia was developed. The aim of this model is to predict changes in the diversity of Odonata under changing habitat conditions. These changes may be induced e.g. by intensive use of water resources or by climate change and may lead to a reduction of habitat quality and quantity. The modeling system consists of three parts: First, on the local level, habitat suitability models based on a one-year-monitoring program were calculated using logistic regression. Parameters used were biotic and abiotic parameters recorded during the monitoring, e.g. vegetation diversity, as well as parameters derived from remote sensing data based on LANDSAT 7 ETM+ satellite images like the density of open waters in the surrounding of the investigation sites or the NDVI. The second part of the model consists of a population dynamic mo-

del based on discrete difference-equations described by extended Leslie-matrices. The parameters of the model are formulated as dependent on food availability in the aquatic habitat. Interspecific competition in the larval stage of the dragonflies is also incorporated. This model depicts the typical life-cycle of tropical-centered dragonflies with a pattern of multivoltinism. Finally, the third part of the model combines the habitat suitability models and the population dynamics via a grid-based approach. In each grid cell the population dynamics is calculated in dependence of the respective habitat quality. Dispersal processes are modeled by a stochastic distribution of mature and immature adults in dependence of the relative population density and the suitability of the habitat. During the dispersal process there is a differentiation between long-distance and short-distance dispersal, so that even habitats in greater distances can be occupied provided that they exhibit a better habitat quality. By applying different scenarios of changing habitat quality, e.g. grazing cattle reducing the vegetation diversity, or habitat quantity, e.g. building of dams in the upper course of a river reducing, the available amount of water downstream, to the grid-based replication of the landscape, this model system offers the possibility to analyze the spatio-temporal development of Namibian Odonata and the consequences of changes in the environment. This grid-based formulation of a landscape can be used to apply different scenarios of changing habitat quality or quantity. So e.g. the destruction of habitats or of the vegetation diversity by grazing cattle can be simulated. Another possible scenario is the building of dams leading to a reduction of the available amount of water downstream. This model system offers the possibility to analyze the spatio-temporal development of Namibian Odonata and the consequences of changes in the environment.] Address: Braune, Eva, Institute of Geocology, Technical University of Braunschweig, Germany. E-mail: e.braune@tu-bs.de

**3658.** Bried, J. (2003): Notes on an *Epiaeschna heros* feeding swarm. *Argia* 15(2): 19-20. (in English). [Noxubee National Wildlife Refuge, Mississippi, USA; "Obviously these ±128 Swamp Darners weren't making an effort to avoid intraspecific competition. It seemed more the opposite. Have studies shown competitive facilitation within adult odonate populations? In other words, is there documented proof that individuals within a species work together to perpetuate their own population, such as by finding greater predator protection strength in numbers or by increasing foraging capacity?"] Address: Bried, J., Mississippi State Univ., Dept Biol. Sci., Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jasonbried@hotmail.com

**3659.** Bried, J.; Bennett, L.; Brown, R. (2003): Requesting Mississippi Odonata information. *Argia* 15(2): 22-23. (in English). [The odonate fauna of Mississippi, USA is poorly known. Data on Odonata are urgently requested.] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jasonbried@hotmail.com

**3660.** Briers, R.A.; Biggs, J. (2003): Indicator taxa for the conservation of pond invertebrate diversity. *Aquatic Conservation* 13(4): 323-330. (in English). ["1. Ponds are a valuable re for the conservation of freshwater biodiversity, but are often extremely numerous in a given

area, making assessment of the conservation value of individual sites potentially time consuming. 2. The use of indicator taxa, the species richness of which is representative of total site species richness, may provide one way to improve the efficiency of survey work. However, such indicators are poorly developed for freshwater systems. 3. A data set was used describing the occurrence of macroinvertebrate taxa in ponds in Oxfordshire, UK, to assess the extent to which variation in the species richness of selected taxa most consistently represented variation in all other taxa. 4. Coenagriidae (Odonata) and Limnephilidae (Trichoptera) reflected the variation in species richness of other taxa most consistently, with Coenagriidae showing the best overall performance as an indicator taxon. 5. For both suggested indicator taxa, selection of sites based solely on the presence of at least one species of indicator would represent over 95% of all species recorded across all sites. 6. Further investigation in different geographical regions is necessary to establish whether these relationships are consistent over a wider area." (Authors)] Address: Briers, R.A. Inst. of Biological Sciences, University of Wales, Edward Llwyd Building, Aberystwyth, Ceredigion, SY23 3DA, UK. E-Mail: rob@aber.ac.uk

**3661.** Brockhaus, T.; Fischer, U. (2003): Übersicht zur "Entomofauna Saxonica" unter besonderer Berücksichtigung der FFH-Arten und der "vom Aussterben bedrohten Arten" in Sachsen. 3. Libellen-Odonata. Mitt. Sächs. Entomol., Suppl. 1: 38-40. (in German). [The paper briefly outlines dragonfly research activities in Sachsen, Germany, reaching back to 1743. Odonata are assessed as one of the best surveyed insect groups in Sachsen. The present status of geographical coverage and "white gaps" are documented. Some species are very briefly discussed. Starting in the 1990th, records of mediterranean species are increasing in a remarkable way. Populations of running water dwellers are spreading in significant way due to improvement of water quality.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**3662.** Buczynski, P. (2003): *Aeshna affinis* (Vander L.) (Odonata: Aeshnidae) in the valley of River Bug in the year 2000. Wiad. entomol. 22(1): 48-49. (in Polish). [On 11. Aug. 2000, *A. affinis* was recorded at three localities along the river Bug: Dorohusk, Uhanka ad Dorohusk, and Gródek ad Hrubieszów. These localities are briefly described, and the occurrence of *A. affinis* in south-eastern Poland is discussed. A German translation of the paper is available from IDF or the author.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3663.** Buczynski, P. (2003): New locality of *Orthetrum coerulescens* (Fonscolombe, 1837) (Odonata: Libellulidae) in the southeastern Poland. Wiad. entomol. 22(1): 49-50. (in Polish). [On 25. Aug. 2001, a male *O. coerulescens* was recorded at Wieprów Ordynacki ad Tomaszów Lubelski. The locality is briefly described, and the rarity of the species in southeastern Poland is discussed. It is assumed that the potential habitats are insufficiently surveyed for the species. A German translation of the paper is available from IDF or the author.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3664.** Buden, D.W.; Miller, J.Y. (2003): The butterflies of Pohnpei, eastern Caroline Islands, Micronesia. Pacific Science 57(1): 1-8. (in English). ["14 species of butterflies are recorded from Pohnpei, Micronesia, seven for the first time. None is endemic to the island; all are widely distributed in the western Pacific, including parts of Indo-Australia, with many extending into or beyond southeastern Asia. A long history of plant introductions and agricultural experimentation may have facilitated dispersal of butterflies to the island and provided a broad selection of host plants for those arriving otherwise unassisted. At least one, and possibly two or more, unidentified species apparently confined to deep forest habitats were seen but not collected during this study. Compared with the local odonate fauna, the butterflies of Pohnpei differ in reaching their greatest abundance and species diversity in the lowlands, in lacking endemic species, and probably in having a higher turnover rate." (Authors)] Address: Buden, D.W., Division of Natural Science and Mathematics, College of Micronesia-FSM, Kolonia, P.O. Box 159, Pohnpei, FM 96941, Micronesia. E-Mail: donbuden@comfsm.fm

**3665.** Burbach, K. (2003): Verbreitung und Habitate von *Leucorrhinia albifrons* in Bayern (Odonata: Libellulidae). Libellula Supplement 4: 105-132. (in German, with English summary). ["*L. albifrons* has been observed in at least 29-32 locations in 15 areas in Bavaria, Germany. Since 1995 the species has been recorded at only five locations. Three of these observations are from confirmed breeding sites; the other two are of a single male. At one of the breeding sites the species has probably been extirpated due to changes in habitat structure. The two remaining breeding sites have been known since 1993 and 1998, respectively. Characteristic habitat factors are low nutrient levels, the presence of vegetation immediately below the water surface and the (near) absence of fish. pH-value is apparently of little significance, since *L. albifrons* is known to occur in acidic as well as in calcareous bodies of water. The aquatic vegetation differs accordingly: whereas under calcareous conditions stoneworts (Characeae) and pondweeds (*Potamogeton* spp.) may be predominant, under acidic conditions floating sphagnum mats are common. Probable causes for the decline of the species are the eutrophication of breeding sites and the introduction of fish. The latter occurs even in smaller bodies of water, which are not suitable for stocking with fish. Especially the introduction of fish spp. which churn up the pond bottom or destroy vegetation (carp, grass carp) is likely to have contributed to the significant decline. Suggestions for the protection of the species are presented. The implementation of a monitoring programme for the last remaining populations is proposed." (Author)] Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising E-Mail: klaus.burbach@gmx.de

**3666.** Burmeister, E.-G.; Börzsony, L. (2003): *Polythore spaeteri*, spec. nov. from the Peruvian tropical rainforest (Panguana), with remarks on its ecology (Odonata, Zygoptera, Polythoridae). Spixiana 26(1): 43-48. (in English). ["A new species of *Polythore* from the area of Panguana (Prov. Huanuco, Peru) is described and compared with species of the groups of *Polythore* (Bick & Bick 1985, 1986, 1990a, 1990b). The coloration of wings in ♂♂ and ♀♀ and the structure of the penis differ from all other species. The observation of ♂♂ and ♀♀ in tandem or copula can open some aspects into the aquatic biotopes of the larvae. Larvae of *Polythore*

have not been described." (Authors)] Address: Burmeister, E.-G. Zoologische Staatssammlung München, Münchhausenstr. 21, D-81247, München, Germany

**3667.** Carvalho, A.D.L.; Salgado, L.G.V. (2002): Description of the larva of *Aeshna pauloi* Machado, 1994 (Odonata, Aeshnidae), with a key to the identification of the known larvae of the genus occurring in the states of Rio de Janeiro and Sao Paulo, Brazil. *Boletim Museu Nacional Rio de Janeiro Zoologia* 485: 1-8. (Portuguese, with English summary) ["The ultimate instar larva of *Aeshna pauloi* Machado, 1994 is described and figured, based on material from southeastern Brazil. A key to the known larvae of the genus occurring in the states of Rio de Janeiro and Sao Paulo, Brazil, is appended." (Authors)] Address: Carvalho, A.D.L., Departamento de Entomologia, Museu Nacional/UFRJ, Quinta da Boa Vista, Sao Cristovao, 20940-040, Rio de Janeiro, RJ, Brazil

**3668.** Cating, P.M. (2003): How important are dragonflies to Swallow-tailed Kites? *Argia* 15(1): 14-16. (in English). [On the opportunity observing *Elanoides forficatus* (Aves) preying on *Epiaeschna heros* cf. in southern Florida, USA on 20 April 2001, the author compiles all available information on the subject.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**3669.** Catling, P.M. (2003): Exuviae from under the bridge - A threat to dragonfly collections? *Argia* 15(1): 18. (in English). [The paper reports on the loss of exuviae by the dermestid beetle *Anthrenus* sp.. Some considerations on preserving collections of dried material are made.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**3670.** Clausen, W. (2003): Die Bestandsentwicklung von *Coenagrion ornatum* in Ostwestfalen, Nordrhein-Westfalen (Odonata: Coenagrionidae). *Libellula* 22 (1/2): 1-10. (in German with English summary). ["An isolated population at the NW border of its range, at ditches near Stemwede (52°24'51"N, 8°29'30"E) NE Osnabrück was monitored from 1990 to 2002. After a harsh frost period without snow and total freezing of most of the ditches in winter 1995 to 1996 there was a drastic decline. Additionally, because of a reduction of mowing intensity, the ditches were overgrown with reeds and the population tended to be extinct. Extra mowing near mid-May 2002 at some parts of the ditches brought back a little population" (Author)] Address: Clausen, W., Zur Bockwindmühle 60, D-32351 Stemwede, Germany. E-Mail: WernerClausen@freenet.de

**3671.** Combes, S.A.; Daniel, T.L. (2003): Flexural stiffness in insect wings. II. Spatial distribution and dynamic wing bending. *Jour. exp. Biology* 206(17): 2989-2997. (in English). ["The dynamic, three-dimensional shape of flapping insect wings may influence many aspects of flight performance. Insect wing deformations during flight are largely passive, and are controlled primarily by the architecture and material properties of the wing. Although many details of wing structure are well understood, the distribution of flexural stiffness in insect wings and its effects on wing bending are unknown. In this study, we developed a method of estimating spatial variation in flexural stiffness in both the spanwise and chordwise direction of insect wings. We measured dis-

placement along the wing in response to a point force, and modeled flexural stiffness variation as a simple mathematical function capable of approximating this measured displacement. We used this method to estimate flexural stiffness variation in the hawkmoth *Manduca sexta*, and *Aeshna multicolor*. In both species, flexural stiffness declines sharply from the wing base to the tip, and from the leading edge to the trailing edge; this variation can be approximated by an exponential decline. The wings of *M. sexta* also display dorsal/ventral asymmetry in flexural stiffness and significant differences between males and females. Finite element models based on *M. sexta* forewings demonstrate that the measured spatial variation in flexural stiffness preserves rigidity in proximal regions of the wing, while transferring bending to the edges, where aerodynamic force production is most sensitive to subtle changes in shape." (Authors)] Address: Combes, S.A., Department of Biology, University of Washington, Seattle, WA, 98195, USA. E-Mail: scombes@u.washington.edu

**3672.** Corbet, P.S. (2003): Reproductive behaviour of Odonata: the history of a mystery. *International Journal of Odonatology* 6(2): 185-193. (in English) ["The main, externally visible components of odonate reproductive behaviour were known from published accounts for about 300 years before sperm displacement during copulation was first described. The latter discovery, revealed by Jonathan Waage in 1979, revolutionised the interpretation of odonate reproductive behaviour, allowing it for the first time to be interpreted convincingly in the context of sexual selection and the evolution of mating systems. This insight has been a prerequisite for elegant, ongoing work on mechanisms of sperm displacement and sperm precedence in Odonata." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@crean-mill.u-net.com

**3673.** Cordoba-Aguilar, A.; Salamanca-Ocana, J.C.; Lopezaraiza, M. (2003): Female reproductive decisions and parasite burden in a calopterygid damselfly (Insecta: Odonata). *Animal behaviour* 66: 81-87. (in English). ["There is currently a gap in sexual selection theory about how much the environment drives female mating decisions. We present field data that suggest that female sexual behaviour in the damselfly *Calopteryx haerorrhoidalis* is influenced by parasite burden. Male wing pigmentation in *Calopteryx* is a sexually selected trait that signals a male's ability to cope with eugregarine parasites (an intestinal parasite that feeds on the adult's ingested food). Because adult *C. haerorrhoidalis* females also show wing pigmentation, we examined whether this trait is similarly influenced by parasite burden and whether it may signal the female's reproductive value. Male *C. haerorrhoidalis* defend riverine substrates that females use for oviposition. After copulation and during oviposition, females are guarded by the copulating male against intruder males. Alternatively, females may avoid mating and 'steal' an oviposition site within a male's territory. In the present study, we found that the amount of female wing pigmentation was negatively correlated with the number of eugregarines present. Females with more parasites produced fewer eggs, survived fewer days, spent less time during courtship, 'inspected' fewer males before mating, had a lower mating success, were guarded for less time during oviposition and engaged in fewer 'stealing' events during oviposition. The reduced egg production and survival of

heavily infected females may result from eugregarine depletion of the females' consumed food reserves. Thus, to offset reduced longevity, heavily infected females may accept a mating more rapidly and mate with fewer males. 'Stealing' behaviour may be related to the female's differential use of sperm from some males, particularly high-quality males. Interestingly, males that mated with low-pigmented females showed greater variance in wing pigmentation than did males that mated with high-pigmented females. Possibly, female wing pigmentation may signal a female's reproductive value, which provides females with longer mate-guarding episodes and reduced interference from intruder males. This study points out one possible constraint, intestine parasites, that females may face during mating decisions. Because females in bad condition mate with males in both good and bad condition, this constraint may be pervasive enough to weaken the intensity of selection for a male sexually selected trait, wing pigmentation, and help to maintain its variation in phenotypic expression." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**3674.** Córdoba-Aguilar, A. (2003): A description of male and female genitalia and a reconstruction of copulatory and fertilisation events in *Calopteryx haemorrhoidalis* (Vander Linden) (Odonata: Calopterygidae). *Odonatologica* 32(3): 205-214. (in English). ["The genitalia have a "design" remarkably similar to those of other representatives of the family. The main female structures are the bursa copulatrix, a T-shaped spermatheca, a pair of vaginal plates bearing a variable number of mechanoreceptive sensilla, and a ganglion located at the VIII abdominal segment. The 6 intromittent organ is a curved, sclerotised aedeagus that ends in a distal penis head. This latter structure bears 2 lateral appendages which are covered by recurved spines. A construction of the fertilisation and copulatory events is proposed based on descriptive and experimental evidence in other zygopterans as well as in this species. The female genital anatomy suggests fertilisation occurs in the manner proposed for other odonates. Experimental evidence shown in this work suggests that, during fertilisation, the egg stimulates the mechanoreceptive sensilla and elicits contractile activity of the muscles that surround the sperm storage organs (SSOs). The contractile activity is likely to be mediated by the VIII abdominal segment ganglion. As a consequence of the muscular contractions, the SSOs eject sperm which arrive to the site where the egg is and fertilise it. During copulation, the aedeagus "imitates" the presence of an egg in the vaginal plates and stimulates the mechanoreceptive sensilla inducing spermathecal sperm ejection. It is likely that spermathecal sperm is ejected to the bursa copulatrix where it is removed by the penis head and lateral appendages. After this sperm displacement process, the copulating male's sperm, stored in the seminal vesicle, is transferred, through a canal-like passage, by the aedeagus to the SSOs. Since females exhibit a considerable intra- and inter-individual variation in sensillum distribution and number on the plates, it is discussed whether this may have an adaptive significance in terms of retaining more control over stored sperm for females during male stimulation." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Ap-

do. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**3675.** Córdoba-Aguilar, A. (2003): A note on territorial and mating behaviour in the dragonfly *Pseudoleon superbus* (Hag.) (Anisoptera: Libellulidae). *Notul. odonol.* 6(1): 10. (in English). ["[...] Here I provide a short report on this species' sexual behaviour which was observed in Plan del Rio, Veracruz on June 9, 2002, from 13:00 to 15:00 h. Individuals of both sexes were seen in the river that surrounds this locality. Five males were seen patrolling each of five different ponds of varying diameter (3-20 m) and shallowness (0.30-3.0 m) which were fed by the river. [...] males were overtly aggressive against conspecific whenever these appeared on the pond, they were chased over distances as long as 30 m. Males also showed fidelity for concrete sites on the ponds. Given these activities, this species seems to exhibit territorial behaviour. During observations, two females were seen arriving to two ponds at different times (13:30 and 13:56 h resp.). They were taken with no apparent pre-copulatory courtship by the territorial male. Copulation was in the air and took 5 and 7 seconds for each pair. Soon after this, females went directly to sites with submerged vegetation and started an in-flight oviposition. [...] mating males showed non-contact guarding during oviposition. During this, copulating males chased approaching males (number of males chased for each male: 3 and 5, resp.). In one occasion, a male chased a conspecific male and while this pair was some metres away from the pond, another male took the ovipositing female in copulation which lasted 5 seconds. The female continued oviposition even when the previous copulating male came back after 58 seconds, but no copulation ensued." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**3676.** Couteyen, S.; Papazian, M. (2003): Contribution a la connaissance des Odonates de l'île de la Reunion 6. Description de la larve de *Coenagriocnemis reuniensis* (Fraser, 1957) (Odonata, Coenagrionidae). *Entomologiste* 59(1-2): 9-12. (in French with English summary). [The larva of the endemic *C. reuniensis* is described. Some information on the biology of the species is included.] Address: Couteyen, S., 188 Chemin Nid Joli, F-97430, Le Tampon, La Reunion, France

**3677.** Mauersberger, R., (2003): *Crocothemis erythraea* recorded in northeastern Germany (Odonata: Libellulidae). *Libellula* 22(1/2): 55-60. (in German, with English summary). [Three males of *C. erythraea* were observed on July 29, 2002, and one male on June 17, 2003 at glacial formed lakes near Rheinsberg (53,1°N) resp. near Neustrelitz (53,4°N), Brandenburg, Germany. The specimen activity pattern were focused on shallow bays with dense structures consisting of *Ceratophyllum*, *Myriophyllum*, *Utricularia*, and *Nymphaea*, together with other dragonfly species e.g. *Leucorrhinia caudalis*. It is to be considered as the northernmost records in Germany.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-Mail: [foerdervereinUckermaerk.Seen@t-online.de](mailto:foerdervereinUckermaerk.Seen@t-online.de)

**3678.** Crumrine, P.W.; Crowley, P.H. (2003): Partitioning composition of risk reduction in a dragonfly-fish intraguild predation system. *Ecology* 84(6): 1588-1597.

(in English). ["Risk to prey imposed by intraguild predation (IGP) can be influenced by a number of factors, yet to date, few studies have measured the contributions of these factors to overall risk. A three-species IGP system with larvae of the dragonfly *Anax junius* as IG (top) predators, larvae of the dragonfly *Plathemis lydia* as IG prey (intermediate predators), and fathead minnow hatchlings (*Pimephales promelas*) as shared prey was used to estimate the contribution of the following three factors to shared-prey mortality rate in combined predator treatments: (1) the trophic effect of the IG predator on IG prey density; (2) the effect of reduced shared prey consumption by the IG prey in the presence of the IG predator; and (3) the effect of alternative prey for the IG predator. These factors were integrated into a model of multiple predator effects. To quantify minnow mortality, *P. promelas* were exposed to *A. junius* only, *P. lydia* only, *A. junius* and *P. lydia*, or neither in a two-by-two factorial design. Additional treatments, in which one or both predators were unable to feed, were used to isolate behavioral (activity level) changes in dragonfly larvae. When predators preyed in combination on *P. promelas* their impact was less than that of the summed effects of the two predators, each in the absence of the other a result termed risk reduction. *A. junius* consumed a significant number of *P. lydia* when they were present (i.e., IGP), and behavioral interactions between *A. junius* and *P. lydia* were asymmetric. The presence of *A. junius* caused *P. lydia* to become less active, while the presence of *P. lydia* elicited a diet shift in *A. junius* to include some *P. lydia*. Interactions between predator species, specifically IGP, influenced prey survival. Trophic and behavioral effects of IGP were similar in magnitude. These results highlight the importance of trophic and behavioral interactions in predator-prey systems and also suggest that effects of multiple predators may not be predictable based on the sum of individual effects. Determining the effects of multiple predators requires the identification of mechanisms that contribute to nonadditive prey responses." (Authors)] Address: Crumrine, P.W., Department of Biology and Center for Ecology, Evolution and Behavior, University of Kentucky, Lexington, Kentucky 40506-0225 USA. E-mail: pwcumrO@uky.edu

**3679.** Czaplak, D. (2003): A *Phyllocyba* in Texas. *Argia* 15(1): 18-19. (in English). [On 25 May 2002, at Santa Ana NWR, Hidalgo County, Texas, USA, a female *Phyllocyba* was photographed. Due to the unclear taxonomic status of *P. breviphylla* and *P. elongata*, it was at present not possible to identify the specimen. In any case, the taxa is a new addition to the odonate fauna of USA.] Address: Czaplak, D., 13641 Amnassador Drive, Germantown MD 20874, USA. E-mail: Dma3@aol.com

**3680.** Daigle, J.; Thom, T. (2003): 2003 Eglin AFB, Florida meeting. *Argia* 15(2): 8-9. (in English). [Eglin Air Force Base in Niceville, Florida is known to many odonatologists, yes it is: Remember the MOAB (Massive Ordinance Air Burst), the huge bomb which was tested before the Iraq war, and which's power of destruction was send on your television screen several times a day. One of the astonishing things of the country is, that the Air Force Base is employing an aquatic biologist - Theresa Thom - to inventory the invertebrates of the air base. The meeting intended to help surveying the Odonata, including a new *Ophiogomphus* still to describe.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**3681.** Daigle, J.; Mauffray, B.; Beaton, G. (2003): 2003 SE meeting at Lafayette, Georgia. *Argia* 15(2): 9-10. (in English). [The regional meeting held in late May 2003 intended to contribute to the knowledge of the odonate fauna of three counties (Chattooga, Dade, Walker County) in the extrem northwest of Georgia, USA. Two new state records (*Arigomphus villosipes*, *Lestes eurinus*) and several second state records succeeded. Some emphasis ist given to *Gomphus lineatifrons*.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**3682.** de Araujo-Coutinho, C.J.P.; Viviani Cunha, A.; Serra-Freire, N.M.; de Mello, R.P. (2003): Evaluation of the impact of *Bacillus thuringiensis* serovar israelensis and temephos, used for the control of *Simulium* (*Chironomidae*) *pertinax* Kollar, 1832 (Diptera, *Simuliidae*) on the associated entomofauna, Paraty, state of Rio de Janeiro, Brazil. *Memorias do Instituto Oswaldo Cruz* 98(5): 697-702. (in English). ["The study was set up to evaluate the impact of two commercial larvicide formulations, *Bacillus thuringiensis* serovar israelensis base (Bti) at 15 ppm/l min and temephos at 0.03 ppm of active ingredient, used to control *Simulium pertinax* populations, on associated non-target entomofauna occupying the same breeding sites. The experiments were carried out on the Pedra Branca and Muricana rivers, on the slopes of Serra do Mar massif, municipality of Paraty, state of Rio de Janeiro, Brazil. B. t. i. was applied to the river Pedra Branca and temephos to the river Muricana. On both rivers, treatment and control sections were labeled as such, each one with two observation posts: slow moving water and fast water regions respectively. Artificial substrata was used to evaluate the abundance of associated entomofauna. Attached immature stages of arthropods were removed from both of its surfaces fortnightly. Were collected, from the two rivers, 28 477 specimens of the entomofauna associated with *S. pertinax*. The families *Hydropsychidae*, *Chironomidae*, *Bactidae*, *Simuliidae*, *Blephariceridae* and *Megapodagrionidae* were represented. These was an impact of temephos on the entomofauna associated with *S. pertinax* only in *Simuliidae* and *Chironomidae*, and to B. t. i. only in *Simuliidae*. However, the reduction in their numbers was not statistically significant." (Authors)] Address: de Araujo-Coutinho, C.J.P., Laboratorio de Simulideose e Oncocercose, Departamento de Entomologia, Instituto Oswaldo Cruz-Fiocruz, Av. Brasil 4365, 21045-900, Rio de Janeiro, RJ, Brazil. E-Mail: coutinho@ioc.fiocruz.br

**3683.** De Marmels, J. (2003): *Lamproneura lucerna* gen. nov., sp. nov. from Venezuela, and *Cyanallagma ferenigrum* sp. nov., a remarkable new species from Brazil (Odonata: Protoneuridae, Coenagrionidae). *Int. Jour. Odonatology* 6(2): 99-107. ["*Lamproneura lucerna* gen. nov., sp. nov. (Protoneuridae) is described from a male from the Turimiquire mountains, in northeastern Venezuela. Penis morphology places the new genus close to *Forcepsioneura*, *Psaironeura* and *Ropponeura*. The first Venezuelan record of the genus *Phasmoneura* (*P. exigua* (Selys 1886) is presented. *Cyanallagma ferenigrum* sp. nov. (Coenagrionidae) is described from a ♂ and a ♀ from Mato Grosso, Brazil. Morphologically, this species seems to bridge the gap between the *A-dustum*-group of *Acanthagrion* and southeastern *Cyanallagma*." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de

Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**3684.** Deliry, C. (2003): Nouveaux articles, études ou notes concernant les libellules dans la région Rhônes-Alpes-Dauphiné. *Sympetrum piémontais* 51: 1-2. (in French). [France; 15 publications containing information on Odonata, nearly exclusively unpublished expertises, are compiled.] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: president@sympetrum.org

**3685.** Deliry, C. (2003): Nouvelles espèces dans les départements. *Sympetrum piémontais* 51: 2. (in French). [France: Ain, Hautes-Alpes, Ardèche, Drôme, Isère, Loire, Rhône, Savoie, Haute-Savoie; the species are listed without additional information.] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: president@sympetrum.org

**3686.** Devin, S.; Piscart, C.; Beisel, J.N.; Moreteau, J.C. (2003): Ecological traits of the amphipod invader *Dikerogammarus villosus* on a mesohabitat scale. *Archiv für Hydrobiologie* 158(1): 43-56. (in English). ["Since 1995, *Dikerogammarus villosus* SOWINSKI, a Ponto-Caspian amphipod species, has been invading most of Western Europe's hydrosystems. *D. villosus* geographic extension and quickly increasing population density has enabled it to become a major component of macrobenthic assemblages in recipient ecosystems. The ecological characteristics of *D. villosus* on a mesohabitat scale were investigated at a station in the Moselle River. This amphipod is able to colonize a wide range of substratum types, thus posing a threat to all freshwater ecosystems. Rivers whose dominant substratum is cobbles and which have tree roots along the banks could harbour particularly high densities of *D. villosus*. A relationship exists between substratum particle size and the length of the individuals, and spatial segregation according to length was shown. This allows the species to limit intra-specific competition between generations while facilitating reproduction. A strong association exists between *D. villosus* and other Ponto-Caspian species, such as *Dreissena polymorpha* and *Corophium curvispinum*, in keeping with Invasional Meltdown Theory. Four taxa (*Coenagrionidae*, *Calopteryx splendens*, *Corophium curvispinum* and *Gammarus pulex*) exhibited spatial niches that overlap significantly that of *D. villosus*. According to the predatory behaviour of the newcomer, their populations may be severely impacted." (Authors)] Address: Devin, S., Laboratoire B.F.E., Equipe de Démocologie, Université de Metz, Avenue du Général Delestraint, Campus Bridoux, 57070, Metz, France. E-Mail: devin@sciences.univ-metz.fr

**3687.** Dijkstra, K.-D. (2003): Dragonflies and damselflies (Odonata) in Bwindi Impenetrable and Semliki National Parks, Uganda. Final report for the project: "Biogeography and ecology of dragonflies (Odonata) of South and West Ugandan forests", 1 September 2003. In collaboration with: Viola Clausnitzer, Philipps-University of Marburg, Marburg, Germany and John Joseph Kisakye & Derek Pomeroy, Makerere University Institute for Environment and Natural Resources, Kampala, Uganda: 8 pp. (in English). [65 species from Bwindi Impenetrable, and 91 species from Semliki National Parks are listed in tables and briefly commented according to their (biogeographical) range, ecology, sampling locality. The species composition of both

parks is compared, and some remarkable species including some new to science are briefly discussed.] Address: Dijkstra, K.-D., Gortestraat 11, 2311 MS Leiden, The Netherlands, kddijkstra@hetnet.nl

**3688.** Dijkstra, K.D.; Lempert, J. (2003): Odonate assemblages of running waters in the Upper Guinean forest. *Archiv für Hydrobiologie* 157(3): 397-412. (in English). ["In order to describe the assemblages of adult Odonata of running waters in the Upper Guinean forest, 36 sites in Liberia and Ghana were analysed using Non-metric Multidimensional Scaling. Five groups were identified, which correspond with different assemblages in the sequence of habitats from small streams to large rivers. Taxonomically related species demonstrate distinct ecological segregation within this gradient, occupying different sections of running waters, or different microhabitats therein. The balance of sun and shade, resulting from a varying degree of habitat openness, is thought to be an important factor in habitat selection, but it is difficult to distinguish from other factors associated with stream size. Anthropogenic opening of stream habitat (e.g. by deforestation or damming) can downscale the present fauna, i.e. result in the invasion of species of downstream habitats (more open) and the disappearance of upstream (dense forest) species." (Authors)] Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany. E-mail: jochen.lempert@gmx.de

**3689.** Dijkstra, K.-D. (2003): Problems in Chlorocypha classification: four cases from West Africa and a discussion of the taxonomic pitfalls (Odonata: Chlorocyphidae). *International Journal of Odonatology* 6(2): 109-126. (in English). ["The taxonomy of Chlorocypha species is problematic due to variability and the paucity of morphological characters. Subspecies *radix* of *C. glauca* is raised to specific rank. *C. sharpae* is found to be a synonym of *C. luminosa*. The synonymy of *C. jejuna* with *C. luminosa* is rejected. The former species is similar to the Southern African *C. consueta* and differences are stated. *C. dispar ovulosa*, *Libellago dispar fraseri* and *C. mutans* are synonyms of *C. pyriformosa*, although the lost type series of *fraseri* appears to have contained immature specimens of *C. dispar*. Trends in African chlorocyphid variation, subsequent taxonomic pitfalls and suggested guidelines to deal with them are discussed. The main problems are age and environment related melanization intensity, dark patterns caused by reversible temperature-induced colour change, especially in teneral, and the switch between reddish and bluish colours in species with bicoloured abdomens." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**3690.** Donnelly, N. (2003): Dragonflies as hitchhikers? A puzzling record of *Gomphus graslinellus* from eastern New York. *Argia* 15(1): 17-18. (in English). [On 14-VIII-1996, *G. graslinellus* was recorded in Newsburgh River, New York, far away from its known most eastern localities in Ohio, USA. N. Donnelly questions, if the specimen might have hitchhiked on a truck coming from the Midwest to New England. He refers to additional cases of possible hitchhiking: *Epiaeschna heros* in Panama, and *Pachydiplax longipennis* on an oil rig in the North Sea, Europe.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

- 3691.** Donnelly, N. (2003): Northeastern Great Plains - a side trip on the way to California. *Argia* 15(2): 14-15. (in English). [Some highlights from several places in North Dakota, USA are briefly documented; emphasis is given to the *Leucorrhinias*.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 3692.** Drost, C.A.; Paxton, E.H.; Sogge, M.K. Whitfield, M.J. (2003): Food habits of the Southwestern Willow Flycatcher during the nesting season. *Studies in Avian Biology* (26): 96-103. (in English). ["The food habits and prey base of the endangered Southwestern Willow Flycatcher (*Empidonax traillii* extimus) are not well known. We analyzed prey remains in 59 fecal samples from an intensively-studied population of this flycatcher at the Kern River Preserve in southern California. These samples were collected during the nesting season in 1996 and 1997 from adults caught in mist nets, and from nestlings temporarily removed from the nest for banding. A total of 379 prey individuals were identified in the samples. Dominant prey taxa, both in total numbers and in percent occurrence, were true bugs (Hemiptera), flies (Diptera), and beetles (Coleoptera). Leafhoppers (Homoptera: Cicadellidae), spiders (Araneae), bees and wasps (Hymenoptera), and dragonflies and damselflies (Odonata) were also common items. Diet composition was significantly different between years, due to a large difference in the numbers of spiders between 1996 and 1997. There was also a significant difference between the diet of young and adults, with the diet of young birds having significantly higher numbers of odonates and beetles. There was a trend toward diet differences between males and females, but this was not significant at the  $P = 0.05$  level." (Authors)] Address: Drost, C.A., U.S. Geological Survey, Southwest Biological Science Center, Colorado Plateau Field Station, 2255 North Gemini Drive, Flagstaff, AZ, 86001, USA
- 3693.** DuBois, R.B. (2003): Unreliability of taxonomic keys to larval *Leucorrhinia*. *Argia* 15(1): 13-14. (in English). [Applying taxonomic keys to identify *Leucorrhinia intacta* and *L. proxima* from northern Wisconsin, USA, resulted in a failure to separate the specimens in a correct way.] Address: DuBois, R.B., DNR, 6250 S. Ranger Road, Brule WI 54820, USA
- 3694.** Dumont, H.J. (2003): Odonata from the Republic of Mongolia and from the Autonomous Region of Inner Mongolia. *International Journal of Odonatology* 6 (2): 127-146. (in English). ["Thirty-five dragonfly species are reported from Mongolia and Inner Mongolia. Three are first records (*Coenagrion johanssoni*, *Erythromma najas humerale* Selys 1887, *Sympetrum speciosum haematoneura* Fraser). A non-parametric test is used to determine the total number of species to be expected. It suggests that the current number of 62 may be asymptotically complete, except for some specific zones like the Bulgan valley in the south-west, and the upper catchment of the Amur River, which have a distinctive fauna. From a biogeographic point of view, the Mongolian fauna is predominantly of impoverished Eurosibirian extraction. The south of Mongolia (the Gobi) and adjacent Inner Mongolia are, however, enriched with a significant fraction of East-Mediterranean and Irano-Turanian species, taking advantage of the Dzungarian corridor(s). This is particularly true of the fauna found in the small cis-Altai 'exclave' of the extreme south-west of the country. True Oriental species are rare, but East Palaearctic species (e.g. of the genus *Cercion*) are well-represented, especially south and east of the Gobi desert, which itself remains in need of further exploration." (Author) *Coenagrion lunulatum*, *Cercion v-nigrum*, *Orthetrum brunneum lineostigma*, *Sympetrum speciosum haematoneura*, and *S. hypomelas* are figured, and discussed in detail.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be
- 3695.** Dunkle, S. (2003): Minutes of the 2003 DSA meeting. *Argia* 15(2): 21-22. (in English). [20-21 June 2003, Williams, California] Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E, Spring Creek Parkway, Plano, TX 75074, USA
- 3696.** Dyrz, A.; Flöckl, H. (2003): Nestling food of the congeneric and sympatric Rusty-margined and Social flycatchers. *Journal of Field Ornithology* 74(2): 157-165. (in English). ["We studied the food of nestling Rusty-margined (*Myzotetes cayanensis*) and Social flycatchers (*M. similis*) in 1998 and 1999 at Barro Colorado Island, Panama. Food samples were taken from nestlings by fecal analysis and the neck-collar method. In both species most food items were beetles, winged ants, dragonflies, spiders, and seeds of *Miconia* spp. Water animals (mainly backswimmers, freshwater snails, and dragonfly larvae) constituted 7.8%-13.5% of animal prey. The nestlings of the Social Flycatcher received significantly more flying insects, while the proportion of fruits and seeds was significantly higher in the diet of Rusty-margined Flycatcher nestlings. Length of animal prey varied from 4-25 mm in the Rusty-margined Flycatcher and 2-50 mm in the Social Flycatcher, and the length of fruits and seeds were 4-11 mm and 2-19 mm, respectively. The average length of animal food was larger in the Rusty-margined Flycatcher despite its slightly smaller size. The number of broods with nestlings or fledglings present in the study area was positively correlated with the abundance of fruits in the Social Flycatcher." (Authors)] Address: Dyrz, A., Department of Avian Ecology, Wrocław University, Sienkiewicza 21, 50-335, Wrocław, Poland. E-Mail: dyrz@biol.uni.wroc.pl
- 3697.** Ellenrieder, N. von; Garrison, R.W. (2003): A synopsis of the genus *Triacanthagyna* (Odonata: Aeshnidae). *International Journal of Odonatology* 6(2): 147-184. (in English) ["This synopsis of adult *Triacanthagyna* includes the revalidation of two species thought to be synonyms (*T. nympha* and *T. obscuripennis*), the description of a new species (*T. williamsoni*; type locality: Peru, Tingo Maria), keys to both sexes, illustrations of diagnostic characters, and distribution maps of all species. A phylogenetic assessment of the nine species is included, using outgroup comparison and parsimony algorithm. The cladistic analysis shows *Triacanthagyna* to be partitioned into two monophyletic groups: (1) two species lacking humeral, interpleural and metapleural dark stripes on pterothorax and with male cerci narrowing gradually at tip (*T. septima* and *T. obscuripennis*), and (2) six species with male cerci bearing subbasal teeth (*T. satyrus*, *T. caribbea*, *T. ditzleri*, *T. williamsoni*, *T. nympha* and *T. trifida*)." (Authors)] Address: Ellenrieder, Natalia von, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, USA. E-Mail: odo\_nata@hotmail.com

- 3698.** Ellenrieder, N. von (2003): A synopsis of the Neotropical species of 'Aeshna' fabricius: The genus *Rhionaeschna* Förster (Odonata: Aeshnidae). *Tijdschrift voor Entomologie* 146(1): 67-207. (in English). ["This study includes a revisionary, phylogenetic and biogeographical analysis of Neotropical components of *Aeshna* Fabricius characterized by a midventral tubercle on abdominal sternum I. Phylogenetic relationships of the Neotropical species of *Aeshna* were inferred based on 39 adult characters. Ingroup taxa included 68 out of the 85 species currently assigned to *Aeshna*, and two species each of *Andaeshna* De Marmels and *Anaciaeschna* Selys. *Oreaeschna dictatrix* Lieftinck was chosen as outgroup. The strict consensus tree obtained after successive weighting revealed that *Aeshna* is not monophyletic; some of its species are more closely related to *Anaciaeschna* or *Andaeshna*. The name *Aeshna* should consequently be restricted to the Holarctic group including the type species *Aeshna grandis* Fabricius. In the present synopsis the generic name *Rhionaeschna* Förster is assigned to the New World group characterized by the presence of a conical tubercle on abdominal sternum I, comprising 39 species formerly assigned to *Aeshna*. The synopsis includes keys to adults of both sexes, diagnoses, biological notes, distribution maps and more than 400 diagnostic illustrations. *Rhionaeschna demarmelsi* sp. n. is described, *R. maita* Förster is considered a junior synonym of *R. brevifrons* (Hagen), *R. planaltica* (Ris) is considered a valid species, not a synonym of *R. variegata* (Fabricius), *R. planaltica* (Calvert) is raised to specific rank, 'Aeshna' *williamsoniana* Calvert, formerly included in the subgenus *Hesperaeschna* Cockerell, is excluded from *Rhionaeschna*, and lectotypes are designated for *R. maita*, *R. intricata* (Martin), *R. multicolor* (Hagen), *R. bonariensis* (Rambur), *R. diffinis* (Rambur), and *R. perralta*. Females of three species and larvae of 16 species are still unknown. *Rhionaeschna* occurs from southern Argentina to southern Canada, but is primarily Neotropical with its highest diversity along the Andean mountain range between Venezuela and Bolivia. It is absent from the Amazon basin, only three species occur north to the Neotropical region. The sister group of *Rhionaeschna* includes some African species of 'Aeshna' (*A. rileyi* Calvert, *A. subpupillata* McLachlan and *A. moori* Pinhey). *Rhionaeschna* plus the African clade constitute the sister group of *Andaeshna*, *Anaciaeschna*, *Anax* Leach, *Hemianax* Selys and several species of 'Aeshna' of uncertain affinities (i.e. *A. affinis* Vander Linden, *A. brevistyla* Rambur, *A. ellioti* Kirby, *A. mixta* Latreille, *A. isoceles* Muller and *A. williamsoniana*); the phylogenetic relationships within this complex are not yet known and their resolution is beyond the scope of this study. *Rhionaeschna* is absent from the Brazilian shield. Its related species and genera ('*A. rileyi*', '*A. subpupillata*', '*A. moori*' in Africa; '*A. brevistyla*' in Australia and New Zealand, *Andaeshna* in the Andes and '*A. williamsoniana*' in Central America, '*A. isoceles*' and highest species numbers of *Anaciaeschna*, *Hemianax* and *Anax* species in the Indo-Australian region) display a low diversity in Africa, which suggests a trans-Pacific rather than trans-Atlantic (Gondwanian) track, as has been hypothesized for other groups of similarly distributed odonates." (Author)] Address: Ellenrieder, Natalia von, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, USA. E-Mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)
- 3699.** Ellenrieder, N. von; Muzón, J. (2003): Description of the last larval instar of *Ischnura fluviatilis* Selys (Coenagrionidae). *Bull. American Odonatology* 7(3): 57-60. ["The last larval instar of *I. fluviatilis* is described and compared with the species distributed in South America which larvae are known, i.e., *I. capreola* and *I. ramburii*. In addition, a modification of the Westfall & May (1996, *Damselflies of North America*, Scientific Publ.) larval key is proposed." (Author)] Address: von Ellenrieder, Natalia, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, 90007 CA, USA. E-mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)
- 3700.** Ferreira-Peruquetti, P.; Trivinho-Strixino, S. (2003): Notas sobre relações foréticas entre espécies de Chironomidae e Odonata do Estado de São Paulo, Brasil. *Entomotropica* 18(2): 149-151. (in Portuguese, with English summary). [The note reports phoresy between larvae of Chironomidae and larvae of Odonata in streams of Campos do Jordão and Luiz Antônio (São Paulo State, Brazil). *Thienemanniella* sp. Kieffer, 1911 (Orthocladiinae: Corynoneurini) was attached on *Argia modesta*, and *Rheotanytarsus* Thienemann & Bause, 1913 (Chironominae: Tanytarsini) on *Elasmotheremis cannacrioides*, *Heteragrion* sp., and *Castoreschna* sp.] Address: Ferreira-Peruquetti, Patrícia, Trivinho-Strixino, Susana, Universidade Federal de São Carlos, Departamento de Hidrobiologia, Laboratório de Entomologia aquática, C.P. 676, CEP 13565-905, São Carlos, SP, Brasil
- 3701.** Fleck, G.; Bechly, G.; Martinez-Delclos, X.; Jarzembowski, E.; Coram, R.; Nel, A. (2003): Phylogeny and classification of the Stenophlebioptera (Odonata: Epiproctophora). *Ann. Soc. Entomol. France* 39(1): 55-93. (in English with French summary). ["The Juraheterophlebiidae, new family of the "heterophlebioid" lineage, the Henrotayiidae, new family of the "anisopteroid" lineage, the Prostenophlebiidae and the Liassostenophlebiidae, new families of the Stenophlebioptera, and three new genera and species of the Stenophlebiidae are described from the Mesozoic of Germany, Spain, England, Kazakhstan, and Mongolia. The phylogenetic positions of the families Erichschmidiidae and Gondvanogomphidae are discussed. A tentative phylogenetic analysis of the Anisopteromorpha is proposed. This significantly extends our knowledge on the palaeogeographical distribution of the Stenophlebioptera and the Epiproctophora ("dragondamselflies")." (Authors)] Address: Nel, A., Entomologie, CNRS UMR 8569, Museum National d'Histoire Naturelle, 45 Rue Buffon, F-75005, Paris, France. E-Mail: [anel@mnhn.fr](mailto:anel@mnhn.fr)
- 3702.** Freeland, J.R.; May, M.; Lodge, R.; Conrad, K.F. (2003): Genetic diversity and widespread haplotypes in a migratory dragonfly, the common green darner *Anax junius*. *Ecological Entomology* 28(4): 413-421. (in English). ["1. Species that undertake regular two-way migration may be expected, through population connectivity, to exhibit some level of genetic similarity over broad spatial scales. Although seldom following two-way migration, highly mobile insect species tend to exhibit either low haplotype diversity and no phylogeographic structuring, or relatively high haplotype diversity and pronounced phylogeographic structuring. 2. This study reveals the first wide-scale genetic characterization of a migratory dragonfly, *A. junius*. Unusually for insects, north-south two-way migration is common in this species, although not obligatory. In at least part of its

range, some individuals follow an extended developmental period and overwinter in a state of diapause. 3. Mitochondrial sequence data were obtained from 92 *A. junius* individuals collected from 35 sites across Canada, U.S.A., and Mexico. These revealed 38 haplotypes, some of which were extremely widespread, although the majority (27 haplotypes) was found in only one individual. In contrast to previous studies on mobile insects, the overall pattern was of relatively high haplotype diversity in the absence of phylogeographic structuring. 4. Migrants and non-migrants, which sometimes shared haplotypes, were distributed across multiple genetic lineages. This suggests that, contrary to some earlier assertions, developmental pathways in this species may be plastic. Such plasticity would allow highly mobile species to adapt to a range of environmental conditions, and may be key to the widespread distribution of multiple haplotypes." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3703.** Gilard, B. (2003): Nouvelles des région. SFO Auvergne (03, 15, 43, 63). Société française d'odonatologie. La lettre des sociétaires 33: 8-9. (in French). [The distribution of *Coenagrion lunulatum* is very restricted in France; the main population is concentrated to the region of the Auvergne. The author briefly outlines the current status of the species. In addition, he lists some interesting observations from the departments of Cantal, Haute-Loire, and Puy-d-Dôme.] Address: Gilard, B., 10, place du 8 mai, F-63490 Sauxillanges, France

**3704.** Glotzhober, R.C.; Chapman, E. (2003): Second location for two rare Odonata in Ohio, *Nannothemis bella* and *Ladona julia*, (Odonata: Libellulidae) discovered at Singer Lake Bog, Summit County, Ohio. *Great Lakes Entomologist* 34(2) (2001): 63-66. ["Previously [...] *L. julia* and *N. bella* were known in Ohio from only one extant population each: *L. julia* from extreme northwest Ohio in Williams County and *N. bella* from west-central Ohio in Champaign County. During the summer of 2000 populations of each of these species were found in close proximity to each other at Singer Lake, a wetlands complex in southern Summit County in northeastern Ohio. This new location is also home to a population of another rare Ohio dragonfly, *Dorocordulia libera* (Odonata, Corduliidae) that was discovered during 1999. The Singer Lake wetlands are proving to be a very significant habitat for Ohio Odonata." (Authors)] Address: Glotzhober, R.C., Ohio Historical Society, 1982 Velma Avenue, Columbus, OH, 43211-2497, USA

**3705.** Gronowski, T. (2003): Dragonflies (Odonata) of the Łuknajno Lake nature reserve. *Parki Narodowe i Rezerваты Przyrody* 22(4): 543-548. (in Polish with English summary). [In 2001 and 2002, 26 odonate species were sampled in the Łuknajno Lake nature reserve (Great Masurian Lakes, NE Poland). This lake is a small (680 ha) and shallow, eutrophic lake, with a rich and diverse emergent and submerged vegetation, and which occupies 20% of the lake area. Most of the dragonfly species are widespread and common in Poland, but *Anax parthenope* and *Anaciaeschna isocela* are rare in the north-east part of the country. An additional rare species is *Leucorrhinia pectoralis*.] Address: Gronowski, T., Zakład Zoologii Uniwersytet Warszawski, ul. Banacha 2, 02 - 097, Warszawa, Poland. E-mail: gronowski@biol.uw.edu.pl

**3706.** Günther, A. (2003): Eiablage von *Sympetrum vulgatum* auf ein parkendes Auto (Odonata: Libellulidae). *Libellula* 22(1/2): (in German with English summary). ["A tandem pair was observed placing eggs onto the metallic-green bonnet of a car that was parked in a sunlit place. Less than 50 eggs could be found on the car." (Author)] Address: Günther, A., TU Bergakademie, IÖZ, AG Biologie/Ökologie, Leipziger Straße 29, D-09599 Freiberg, Germany. E-Mail: andre.guenther@ioez.tu-freiberg.de

**3707.** Guerbaa, K. (Ed.) (2003): Atlas des libellules du Limousin. *Epops*, Hors Série 1: 110 pp. (in French). [In the beginning of the 20th century, René Martin surveyed the odonate fauna of the Limousin region in France. With focus on these data, the results of a mapping project referring to the period of 1980 to 2001 are presented and discussed. More than 15000 species/location data sets are used to provide distribution maps. These are briefly commented. The style of the small book is very sophisticated: Black and white drawings - in most cases realised by Catie Faurie - and some black and white photographs build a very harmonic unit with the brief but competent textes. The book can be obtained by the Société Limousine d'Odonatologie et la SEPOL, 11, Rue Jauvion, F-87000 Limoges, France. Please add 10,- Euro to your order.] Address: Guerbaa, K., 1, rue de la Madonnette, F-87250 Bessines-sur-Gartempe, France

**3708.** Haas, F.; Waloszek, D.; Hartenberger, R. (2003): *Devonohexapodus bocksbergensis*, a new marine hexapod from the Lower Devonian Hunsrück Slates, and the origin of Atelocerata and Hexapoda. *Organisms Diversity & Evolution* 3(1): 39-54. (in English). ["We describe a new arthropod (approximately 75 mm long) from the Lower Devonian (Lower Emsian) Hunsrück Slates near Bundenbach, western Germany. The specimen is from an isolated piece of rock found on the quarry dump, precluding precise resolution of stratigraphic age. The Hunsrück Slates are marine sediments with a rich fauna of exclusively marine taxa, suggesting that our fossil was also marine. The animal has a small head with large compound eyes and long, filiform, myocerate antennae. Its trunk is divided distinctly into a thorax with three segments and three pairs of slender legs, and a post-thoracic domain composed of 35-40 limb-bearing segments of which the anteriormost are paired, stout, and ventrally-oriented leglets; the 3 ultimate limb-bearing segments bear longer, posteriorly-oriented and apparently specialised appendages. The overall appearance of the new form is reminiscent of Archaeognatha or Odonata. It is interpreted as a representative of the Hexapoda because of the possession of a three-segmented thorax and three pairs of legs that are clearly distinct from the posterior set. The large number of leg-bearing post-thoracic segments discriminates it from the Insecta, which possess 11 "abdominal" segments maximally, originally also leg-bearing. The formal systematic classification of the organism is: (Hexapoda (*Devonohexapodus bocksbergensis*+Insecta ("entognaths"+Ectognatha))). The morphology of the fossil and its environment suggest that the hexapody of hexapods did not evolve as an adaptation to terrestrial locomotion, but was already developed in the marine habitat. No terrestrial arthropods have changed their original tagmosis for biomechanical reasons, for example, no "myriapods" have reduced their leg numbers or modified their trunk to evolve a thorax and ab-

domen similar to insects. Walking exclusively on uniramous prosomal legs in the Chelicerata also occurred well before terrestrialization of this other euarthropodan group. It is not unlikely that the last common ancestor of the Hexapoda was large and that the small size of extant "entognaths" evolved due to reduction in their stem lineage. Being marine, the new fossil also has considerable impact on hypotheses about the early evolution of Atelocerata ("myriapods"+Hexapoda). For example, if their last common ancestor was aquatic, terrestrialization took place at least twice and tracheal breathing probably evolved independently in both taxa after terrestrialization." (Authors)] Address: Haas, F., Section for Bio-systematic Documentation, University of Ulm, Helmholzstr. 20, D-89081, Ulm, Germany. E-Mail: haas.smns@naturkundemuseum-bw.de

**3709.** Haden, G.A.; Shannon, J.P.; Wilson, K.P.; Blinn, D.W. (2003): Benthic community structure of the Green and Colorado rivers through Canyonlands National Park, Utah, USA. *Southwestern Naturalist* 48(1): 23-35. (in English). ["We sampled the aquatic benthos at 6 remote sites on the Colorado and Green rivers through Canyonlands National Park, Utah, USA. This study provides the first published description of benthic standing mass, invertebrate community composition, and primary carbon for this portion of the Colorado River system. High suspended sediment concentrations prohibited growth of primary producers. The primary carbon for benthic invertebrates was terrestrial organic matter. The invertebrate community was composed of 49 taxa, mostly mayflies, caddisflies, and diptera, which were dominated by filterer/collector species. A smaller portion of the community was made up of predatory stoneflies and odonates. Standing mass of invertebrates on cobble substrates within a given site was stable over the multiyear sample period (1993 through 1996) and was comparable with other southwestern streams (overall mean = 0.41 g/m<sup>2</sup> ash-free dry mass ± 0.01 SE). Invertebrate standing mass at each site was controlled by the availability of primary carbon. Primary carbon availability was controlled by supply to the site and retention within the site. Both aspects might be influenced by anthropogenic alteration of the river basin and discharge patterns upstream of the study site." (Authors)] Address: Haden, G.A., Dept of Biological Sciences, Northern Arizona University, P.O. Box 5640, Flagstaff, AZ, 86011, USA. E-Mail: Allen.Haden@nau.edu

**3710.** Hagen, H. von (2003): Artspezifische Exuvienhaltungen bei der Emergenz von drei Libelluliden auf Mallorca (Odonata: Libellulidae). *Libellula* 22(1/2): 25-29. (in German with English summary). ["At agricultural irrigation tanks, exuviae of *Selysiothermis nigra* were fixed to the substrate by their legs only, whereas *Crocothemis erythraea* and *Orthetrum cancellatum* additionally have contact with their abdomen two. The latter differ in the symmetry of the leg positions." (Author)] Address: von Hagen, H., Akazienweg 28, D- 58452 Witten, Germany. E-Mail: H.vonHagen@web.de

**3711.** Haines, T.A.; May, T.W.; Finlayson, R.T.; Mierzykowski, S.E. (2003): Factors affecting food chain transfer of mercury in the vicinity of the Nyanza site, Sudbury River, Massachusetts. *Environmental Monitoring & Assessment* 86(3): 211-232. (in English). ["The influence of the Nyanza Chemical Waste Dump Superfund Site on the Sudbury River, Massachusetts, was assessed by analysis of sediment, fish prey organisms,

and predator fish from four locations in the river system. Whitehall Reservoir is an impoundment upstream of the site, and Reservoir 2 is an impoundment downstream of the site. Cedar Street is a flowing reach upstream of the site, and Sherman Bridge is a flowing reach downstream of the site. Collections of material for analysis were made three times, in May, July, and October. Sediment was analyzed for acid-volatile sulfide (AVS), simultaneously-extracted (SEM) metals (As, Cd, Cr, Hg, Pb, Sb, Zn), and total recoverable Hg. The dominant predatory fish species collected at all sites, largemouth bass (*Micropterus salmoides*), was analyzed for the same suite of metals as sediment. Analysis of stomach contents of bass identified small fish (yellow perch *Perca flavescens*, bluegill *Lepomis macrochirus*, and pumpkinseed *Lepomis gibbosus*), crayfish, and dragonfly larvae as the dominant prey organisms. Samples of the prey were collected from the same locations and at the same times as predator fish, and were analyzed for total and methyl mercury. Results of AVS and SEM analyses indicated that sediments were not toxic to aquatic invertebrates at any site. The SEM concentrations of As, Cd, and Cr were significantly higher at Reservoir 2 than at the reference sites, and SEM As and Cd were significantly higher at Sherman Bridge than at Cedar St. Sediment total Hg was elevated only at Reservoir 2. Hg was higher at site-influenced locations in all fish species except brown bullhead (*Ameiurus nebulosus*). Cd was higher in bluegill, black crappie (*Pomoxis nigromaculatus*), and brown bullhead, and Cr was higher in largemouth bass fillet samples but not in whole-body samples. There were no seasonal differences in sediment or prey organism metals, but some metals in some fish species did vary over time in an inconsistent manner. Predator fish Hg concentration was significantly linearly related to weighted prey organism methyl Hg concentration. Largemouth bass Hg was significantly lower at Reservoir 2 in our study than in previous investigations in 1989 and 1990. High concentrations of inorganic Hg remain in river sediment as a result of operation of the Nyanza site, and fish Hg concentrations in river reaches downstream of the site are elevated compared to upstream reference sites. However, the differences are relatively small and Hg concentrations in largemouth bass from the site-influenced locations are no higher than those from some other, nearby uncontaminated sites. We hypothesize that this results from burial of contaminated sediment with cleaner material, which reduces bioavailability of contaminants and possibly reduces methylation of mercury." (Authors)] Address: Haines, T.A., Leetown Science Center, Orono Field Station, U.S. Geological Survey, Orono, ME, USA. E-Mail: haines@maine.edu

**3712.** Hamada, N.; Oliveira, S.J. de (2003): Food items of larvae of *Rimanella arcana* (Needham, 1933) (Odonata: Amphipterygidae) in Central Amazonia, Brazil. *Entomotropica* 18(2): 153-155. (in English, with Portuguese summary). ["The objective of the present study was to determine the prey of *R. arcana* larvae by means of stomach content analyses. A total of 39 larvae were dissected; three of them (7.7%) had empty stomachs. The following taxa were present in the stomach content of *R. arcana*: Diptera: Simuliidae (83.3%), Chironomidae (61.1%), Empididae (5.6%); Trichoptera: Hydroptilidae (19.4%), Hydropsychidae (8.3%); Ephemeroptera: Baetidae (8.3%); Lepidoptera: Crambidae (2.8%), and Acarina (5.6%). Simuliidae and Chironomidae were the most frequent food items of *R. arcana* lar-

vae, and both families also were the most abundant in the riffles and waterfalls of the study area." (Authors)] Address: Hamada, Neusa, Coordenação de Pesquisas em Entomologia, Instituto Nacional de Pesquisas da Amazonia, Caixa Postal 478, CEP 69011-970 Manaus, AM, Brazil. E-mail: nhamada@inpa.gov.br.

**3713.** Hawking, J.H.; New, T.R. (2003): Interpreting dragonfly diversity to aid in conservation assessment: Lessons from the Odonata assemblage at Middle Creek, north-eastern Victoria, Australia. *Journal of Insect Conservation* 6(3) (2002): 171-178. (in English). ["In order to evaluate single-occasion sampling in compiling inventories for Odonata, larvae were sampled on 20 occasions from 1987-1990 at a site on Middle Creek, north-eastern Victoria, and adults sought also on each visit to more fully evaluate the diversity of the assemblage, and limitations of depending on a single life stage for this purpose. A total of 18 species (7 Zygoptera, 11 Anisoptera) included 15 species collected as larvae and 16 as adults. Few species were common as larvae, and about half the 2806 specimens identified were *Austrogomphus cornutus* Watson. *Orthetrum caledonicum* (Brauer) and *Ischnura heterosticta* (Burmeister) were also abundant, and these three species were also the most common as adults. The number of species obtained ranged from 2-9 on different occasions, and represent different 'habitat groups' within the local fauna. The Middle Creek odonate fauna appears to be much richer than that of a nearby site on the Kiewa River (12 species), and reasons for this are discussed. Seasonal variation in species representation and relative abundances are noted. Any single sample occasion provided insufficient knowledge of the total assemblage to interpret odonate diversity reliably." (Authors)] Address: New, T.R., Department of Zoology, La Trobe University, Bundoora, Vic., 3083, Australia

**3714.** Herbeck, J.T.; Novembre, J. (2003): Codon usage patterns in cytochrome oxidase I across multiple insect orders. *Journal of Molecular Evolution* 56(6): 691-701. (in English). ["Synonymous codon usage bias is determined by a combination of mutational biases, selection at the level of translation, and genetic drift. In a study of mtDNA in insects (including Odonata), we analyzed patterns of codon usage across a phylogeny of 88 insect species spanning 12 orders. We employed a likelihood-based method for estimating levels of codon bias and determining major codon preference that removes the possible effects of genome nucleotide composition bias. Three questions are addressed: (1) How variable are codon bias levels across the phylogeny? (2) How variable are major codon preferences? and (3) Are there phylogenetic constraints on codon bias or preference? There is high variation in the level of codon bias values among the 88 taxa, but few readily apparent phylogenetic patterns. Bias level shifts within the lepidopteran genus *Papilio* are most likely a result of population size effects. Shifts in major codon preference occur across the tree in all of the amino acids in which there was bias of some level. The vast majority of changes involves double-preference models, however, and shifts between single preferred codons within orders occur only 11 times. These shifts among codons in double-preference models are phylogenetically conservative." (Authors)] Address: Herbeck, J.T., JBP Center for Comparative Molecular Biology and Evolution, Marine Biological Laboratory, Woods Hole, MA, 02543, USA. E-Mail: herbeck@mbl.edu

**3715.** Hoess, R. (2003): Ist *Sympetrum meridionale* in der Schweiz heimisch? Funde von 1998-2002 und Anmerkungen zu Habitat, Phänologie, Verhalten und Morphologie (Odonata: Libellulidae). *Libellula* 22(1/2): 61-86. (in German, with English summary). ["*S. meridionale* has been evidenced in Switzerland annually since 1998 with a total of 41 records from 20 localities. No large scale immigration was noticed although records exist from different parts of Northern and Western Switzerland. Reproduction is sure or probable at several waters. At four localities, the species was present in several years during this period. Individuals found in Eastern Switzerland in 2002 probably originate from a larger population near Chavornay in Western Switzerland. With one exception, parasitic mites on the wings were not recorded before 2002. Ecological and phenological data are summarized. Copulation and oviposition are described as well as eggs and exuviae from reared specimens. Diagnostic features of the imago are stressed out in order to facilitate future recording. Documentation by collecting voucher specimens or photographing is considered important and necessary." (Author)] Address: Hoess, R., Normannenstrasse 35, CH-3018 Bern, Schweiz. E-Mail: ReneHoess@lst.ch

**3716.** Johansson, F.; Brodin, T. (2003): Effects of fish predators and abiotic factors on dragonfly community structure. *Journal of Freshwater Ecology* 18(3): 415-423. (in English). ["We compared the community structure of odonates (Odonata) in 13 waters in northern Sweden, which differed with respect to fish presence and abiotic factors. Richness and abundance of odonates were estimated by collecting exuviae during the whole emergence season of 1999. Redundancy analysis revealed that fish presence influenced the community composition of the odonate larvae. While species richness per sample was not affected by the presence of fish, total abundance of odonates was higher in waters without fish. In waters with fish, *Aeschna juncea* and *Leucorrhinia dubia* showed lower abundances, whereas *Erythromma najas* and *Cordulia aenea* showed higher abundances. The abundances of *Coenagrion hastulatum*, *Libellula quadrimaculata*, and *Leucorrhinia rubicunda* did not differ between waters with and without fish. Of the six abiotic factors analyzed only water acidity was associated with odonate community structure." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science Animal Ecology Group, Umea University, 90187, Umea, Sweden. E-Mail: frank.johansson@eg.umu.se

**3717.** Johansson, F. (2003): Latitudinal shifts in body size of *Enallagma cyathigerum* (Odonata). *Journal of Biogeography* 30: 19-34. (in English). [Body size pattern for populations of *E. cyathigerum* across a south-north transect covering localities in Spain, Belgium, Sweden, and Norway was sampled. In total 253 newly emerged adults were collected from fourteen localities. "Body size was measured using thorax length, length of right front wing and length of right hind tibia. These body size estimates were thereafter related to latitude and mean temperature in January and July. Body size showed a U-shaped pattern with latitude, being large at low and high latitudes and small at intermediate latitudes. The same U-shaped pattern was found for mean January and July temperature, with large animals at low and high temperatures. The U-shaped relationship between body size and latitude is suggested to be a combination of two effects: (1) the length of the season favourable

for growth and development, and (2) variation in life cycle length with latitude." (Author)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**3718.** Jordan, S.; Simon, C.; Polhemus, D. (2003): Molecular systematics and adaptive radiation of Hawaii's endemic damselfly genus *Megalagrion* (Odonata: Coenagrionidae). *Systematic Biology* 52(1): 89-109. (in English). ["Damselflies of the endemic Hawaiian genus *Megalagrion* have radiated into a wide variety of habitats and are an excellent model group for the study of adaptive radiation. Past phylogenetic analysis based on morphological characters has been problematic. Here, we examine relationships among 56 individuals from 20 of the 23 described species using maximum likelihood (ML) and Bayesian phylogenetic analysis of mitochondrial (1,287 bp) and nuclear (1,039 bp) DNA sequence data. Models of evolution were chosen using the Akaike information criterion. Problems with distant outgroups were accommodated by constraining the best ML ingroup topology but allowing the outgroups to attach to any ingroup branch in a bootstrap analysis. No strong contradictions were obtained between either data partition and the combined data set. Areas of disagreement are mainly confined to clades that are strongly supported by the mitochondrial DNA and weakly supported by the elongation factor 1alpha data because of lack of changes. However, the combined analysis resulted in a unique tree. Correlation between Bayesian posterior probabilities and bootstrap percentages decreased in concert with decreasing information in the data partitions. In cases where nodes were supported by single characters bootstrap proportions were dramatically reduced compared with posterior probabilities. Two speciation patterns were evident from the phylogenetic analysis. First, most speciation is interisland and occurred as members of established ecological guilds colonized new volcanoes after they emerged from the sea. Second, there are several instances of rapid radiation into a variety of specialized habitats, in one case entirely within the island of Kauai. Application of a local clock procedure to the mitochondrial DNA topology suggests that two of these radiations correspond to the development of habitat on the islands of Kauai and Oahu. About 4.0 million years ago, species simultaneously moved into fast streams and plant leaf axils on Kauai, and about 1.5 million years later another group moved simultaneously to seeps and terrestrial habitats on Oahu. Results from the local clock analysis also strongly suggest that *Megalagrion* arrived in Hawaii about 10 million years ago, well before the emergence of Kauai. Date estimates were more sensitive to the particular node that was fixed in time than to the model of local branch evolution used. We propose a general model for the development of endemic damselfly species on Hawaiian Islands and document five potential cases of hybridization (*M. xanthomelas* X *M. pacificum*, *M. eudytum* X *M. vagabundum*, *M. orobates* X *M. oresitrophum*, *M. nesiotis* X *M. oahuense*, and *M. mauka* X *M. paludicola*)." (Authors)] Address: Jordan, S., Laboratoire d'Ecologie Alpine, UMR CNRS 5553, Universite Joseph Fourier, 38041, B.P. 53, Grenoble Cedex 9, France. E-Mail: steve.jordan@ujf-grenoble.fr

**3719.** Kämpf, H. (2003): Entwicklung von vier Gomphiden-Arten in einem Baggersee in Nordbayern (Odonata: Gomphidae). *Libellula Supplement* 4: 99-104. (in

German, with English summary). ["From 5 May 2001 to 15 July 2001, the almost daily collecting of gomphid exuviae at a 150 m-strip of the banks of a gravel-pit lake near Neuses, Upper Franconia, Bavaria, Germany, for the first time provided the record of the joint development of *Gomphus flavipes*, *G. pulchellus*, *G. vulgatisimus*, and *Ophiogomphus cecilia* in standing waters." (Author)] Address: Kämpf, H., Am Eichenwald 22a, D-91301 Forchheim, Germany

**3720.** Kalkman, V.J.; Wasscher, M.; Pelt. G.J. Van (2003): An annotated checklist of the Odonata of Turkey. *Odonatologica* 32(3): 215-236. (in English). ["In addition to the checklist, species of which the taxonomic status has changed, or with significant changes in the known distribution, are annotated. At present a total of 96 species (6 of which are divisible into 2 or more subspecies) are now known to occur in Turkey with certainty, and at least 15 species and an additional 5 subspecies are to be expected. *Ischnura fountainei* is new to the Turkish fauna. The sole Turkish record of *Ophiogomphus cecilia* pertains to *O. reductus* which is here mentioned for the first time from Turkish territory." (Authors)] Address: Kalkman, V.J., National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nnm.nl

**3721.** Kauppinen, J.; Mappes, J. (2003): Why are wasps so intimidating: field experiments on hunting dragonflies (Odonata: *Aeshna grandis*). *Animal Behaviour* 66: 505-511. (in English). ["The mechanisms of aposematism (unprofitability of prey combined with a conspicuous signal) have mainly been studied with reference to vertebrate predators, especially birds. We investigated whether dragonflies, *Aeshna grandis*, avoid attacking wasps, *Vespula norwegica*, which are an unprofitable group of prey for most predators. As a control we used flies that were painted either black or with yellow and black stripes. The dragonflies showed greater aversion to wasps than to flies. Black-and-yellow-striped flies were avoided more than black ones, suggesting that aposematic coloration on a harmless fly provides a selective advantage against invertebrate predators. There was no significant difference in reactions to black-painted and black-and-yellow wasps, indicating that, in addition to coloration, some other feature in wasps might deter predators. In further experiments we offered dragonflies artificial prey items in which the candidate warning signals (coloration, odour and shape) were tested separately while other confounding factors were kept constant. The dragonflies avoided more black-and-yellow prey items than solid black or solid yellow ones. However, we found no influence of wasp odour on dragonfly hunting. Dragonflies were slightly, but not significantly, more reluctant to attack wasp-shaped prey items than fly-shaped ones. Our results suggest that the typical black-and-yellow stripes of wasps, possibly combined with their unique shape, make dragonflies avoid wasps. Since black-and-yellow stripes alone significantly decreased attack rate, we conclude that even profitable prey species (i.e. Batesian mimics) are able to exploit the dragonflies' avoidance of wasps." (Authors)] Address: Mappes, J., Dept of Biological and Environmental Science, University of Jyväskylä, P. O. Box 35, FIN-40014 University of Jyväskylä, Finland. E-mail: mappes@byl.jyu.fi

**3722.** Kemp, D.J.; Alcock, J. (2003): Lifetime resource utilization, flight physiology, and the evolution of contest

competition in territorial insects. *Am. Nat.* 162: 290-301. (in English). ["Adaptationist analyses of animal contests have contributed much to our understanding of behavioral evolution. One class of contest, however, the war of attrition, has proven difficult to interpret. In wars of attrition involving aerial displays, there is evidence that asymmetries in performance parameters such as flight energetics may be important determinants of contest resolution. This paradigm is not universal, however, and we presently lack a framework for understanding why certain biophysical parameters are important only in some cases. One possibility is that the relevance of these parameters is determined by evolutionarily conserved life-history-scale patterns of resource allocation and acquisition. We evaluated this hypothesis by investigating the correlates of competitive success in two territorial insects that exemplify markedly different lifetime patterns of resource utilization. We found that in the bot fly *Cuterebra austeni*, an extreme capital breeding species that depends entirely on energy acquired during its immature stages, territorial residency was most strongly correlated with a size-independent measure of energetic availability. In contrast, residency in the tarantula hawk wasp *Hemipepsis ustulata* was best predicted by variation in body size per se. Adult *H. ustulata* are able to supplement their larval-derived nutrient capital in the manner of an income breeder, and fuel reserves were independent of age and actually correlated negatively with residency in this species. These results underscore how the study of sexually selected phenomena may be enriched by an explicit consideration of life-history principles." (Authors) Odonata are discussed at several contexts.] Address: Alcock, J., Department of Biology, Arizona State University, Tempe, Arizona 85287-1501, USA. E-mail: j.alcock@asu.edu

**3723.** Ketelaar, R. (2003): Libellen vliegen vroeger en noordelijker: Een gevolg van klimaatverandering? *Levende Natuur* 104(3): 83-85. (in Dutch with English summary). ["Dragonflies are flying earlier and expanding northwards: An effect of climate change?: A balance of Dutch dragonflies in terms of changes in distribution shows that the number of increasing and decreasing species are approximately equal. However, it appears that species with a mainly southern distribution dominate the increasing group. The decreasing group consists mainly of more stenotopic species. Northern species generally decrease in The Netherlands. Not only changes in distribution are apparent, it is also shown that dragonflies have shifted their flight season. In an analysis for ten common species it is evidenced that for nine species the peak flight season is nowadays much earlier than in 1980, in some cases two weeks earlier. Climate change (especially warmer summers) is thought to be one of the driving factors behind these processes and this is shortly discussed." (Author)] Address: Ketelaar, R., Vlinderstichting, 6700 AM, Postbus 506, Wageningen, Netherlands. E-Mail: robert.ketelaar@vlinderstichting.nl

**3724.** Klausnitzer, B. (2003): Gesamtübersicht zur Insektenfauna Deutschlands. *Entomologische Nachrichten und Berichte* 47(2): 57-66. (in German with English summary). [The "Entomofauna Germanica", presenting the first complete and up-to-date overview of the German insect fauna with a total of 1327 pages, documents 33466 species from 30 orders. A decline in species numbers from north to south is fairly striking, for example in Auchenorrhyncha, Heteroptera, Neuroptera,

Coleoptera and Hymenoptera. In almost all studied groups Bavaria is the federal state with the highest species numbers; Baden-Württemberg frequently holds second rank. According Müller & Schorr (2001), the Odonata contribute to the German fauna 80 species; in the meantime, *Boyeria irene* found in Bavaria, has to be added to the German check-list.] Address: Klausnitzer, B., Lannerstr. 5, D-01219 Dresden, Germany

**3725.** Kleukers, R.; Reemer, M. (2003): Veranderingen in de Nederlandse ongewerveldenfauna. *Levende Natuur* 104(3): 86-89. (in Dutch with English summary). ["Changes in the Dutch invertebrate fauna: Until now range changes in Dutch invertebrates were only documented for a few, large and conspicuous species, e.g. *Argiope bruennichi*, *Volucella zonaria* and *Phanoptera falcata*. For the first time now a substantial part of the Dutch fauna was analysed, in a pilot study relying heavily on the expert judgement of the specialists of European Invertebrate Survey-The Netherlands. In total 1331 species of Apidae, Asilidae, Carabidae, Formicidae, Mollusca, Odonata, Orthoptera and Syrphidae were studied. In this paper we focus on the 339 species of which the northern border of the range runs through The Netherlands. No less than 101 species of this group have expanded their range to the north in the 20th century, especially in the groups Odonata, Syrphidae and Mollusca. In total 63 species were found to have retreated to the south, especially the Apidae. The expanding species of most groups are mainly eurytopic species, characteristic for disturbed, cultivated habitats. The declining species are mainly stenotopic species restricted to nature reserves. The Carabidae are an exception, as the expanding ground beetles seem to be mostly stenotopic." (Author)] Address: Kleukers, R., EIS-Nederland, 2300 RA, Postbus 9517, Leiden, Netherlands. E-Mail: eis@naturalis.nnm.nl

**3726.** Knijf, G. de; Anselin, A.; Goffart, P. (2003): Trends in dragonfly occurrence in Belgium (Odonata). *Proc. 13th Int. Coll. EIS, September 2001(2003)*: 33-38. (in English). ["The group 'Gomphus' collected 65 000 records of 69 species of Odonata, more or less equally scattered over Belgium. The best-investigated areas are the northern part and some river valleys in the south. Most hot spots can be found in the northeastern part, with a maximum of 48 species for 25 km<sup>2</sup>. Remarkable is the fact that 50% of the species occurs in less than 7% of the 5 km grid cells (UTM). We determined trends in occurrence by comparing three periods: before 1950, 1950-1989 and 1990-2000. Four species show a clear decline over the three periods, eight species give evidence of a historical decline but survive on a limited number of sites and eight species also display a historical decline but have been increasing during the last decade. Six species show a (very) clear increase over the three periods and two species display their increase only during the last ten years." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Klinkerstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3727.** Kühn, J.; Gutser, D. (2003): Beobachtung einer *Boyeria irene* bei Mittenwald, Oberbayern (Odonata: Aeshnidae). *Libellula* 22(1/2): 41-48. (in German, with English summary). [On 17 June 2002, a mature male of *B. irene* was watched extensively from little distance but could not be caught. It was hunting persistently on a clearance at an altitude of 1135 m (47°27,5'N 11°14'E),

southern Bavaria, Germany. This is the first observation of *B. irene* reported from Germany, and the 81th recorded odonate species in Germany. Possible immigration routes as well as the early date of the record are briefly discussed.] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.de

**3728.** Lajeunesse, M.J.; Forbes, M.R. (2003): A comparison of structural size and condition in two female morphs of the damselfly *Nehalennia irene* (Hagen) (Zygoptera: Coenagrionidae). *Odonatologica* 32(3): 281-287. (in English). ["Female colour polymorphism in coenagrionid damselflies is genetically determined for the 4 species so far studied. No size differences between female morphs have been reported. In another species, size differences between morphs do exist but the genetic basis of the polymorphism has not been explored. In *N. irene*, 2 female morphs exist: one is similar to the male in both colour and pattern (the androchrome), whereas the other differs from the male (the more common gynochrome). No differences are shown in lengths of wing, femur or tarsus between androchromes and gynochromes, nor any differences in multivariate estimates of size or in wet mass corrected for these size estimates were found. The study controls for time of season, which is known to influence the size of emerging temperate damselflies. The results concur with results from other spp. where the genetic basis of colour polymorphism is known." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**3729.** Landwer, B. H. P.; Sites, R.W. (2003): Redescription of the larva of *Gomphus militaris* Hagen (Odonata: Gomphidae), with distributional and life history notes. *Proc. Entomol. Soc. Washington* 105(2): 304-311. (in English). ["The final larval instar of *G. militaris* is described, diagnosed, and figured from exuviae and larval specimens from Missouri, Texas, and Kansas. A previous description was erroneously attributed to *G. militaris*, but actually pertained to *Arigomphus lentulus*. Thus, the use of many previously published characteristics to identify this species will result in misidentification. Larvae of *G. militaris* were common and widespread in ponds in the prairie region of Missouri. We report data on life history based on larval and adult collections." (Authors)] Address: Landwer, B., Entomology Museum, Department of Entomology, and Center for Agroforestry, University of Missouri, Columbia, MO 65211, USA. E-mail: bhl065@mizzou.edu.

**3730.** Lohr, M. (2003): *Crocothemis erythraea* auch in Niedersachsen (Odonata: Libellulidae). *Libellula* 22 (1/2): 35-39. (in German, with English summary). [On 26-VIII-2000, a male *C. erythraea* was found in a former gravel pit near Holzminden (51°49'N, 9°26'E), Niedersachsen, Germany. In 2001 and 2002 additional observations of the species in several gravel pits of the upper Weser floodplain (located in Nordrhein-Westfalen) were made. These findings are briefly discussed in the context of the recent range extensions of other thermophilous Odonata species (*Cercion lindenii*, *Aeshna affinis*, *Anax parthenope*).] Address: Lohr, M., Fachgebiete Tierökologie und Landschaftsökologie, Fachhochschule Lippe und Höxter, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-Mail: mlohr@fh-hoexter.de

**3731.** Mackenzie, R.A.; Kaster, J.L. (2003): A preservative-free emergent trap for the isotopic and elemental analysis of emergent insects from a wetland system. *Great Lakes Entomologist* 35(1) (2002): 47-51. (in English). ["This study reports a cost-effective, live emergent trap designed for the preservative-free use in both biogeochemical and ecological analyses of emerging insects. The trap proved to be advantageous in several ways. First, the simple design made the trap time-efficient since it was easy to set-up, change, and maintain. Second, live sampling not only provided uncontaminated organisms for elemental and stable isotopic analyses, it minimized disfigurement. This resulted in rapid and easy handling, as well as identification, of adult insects. Finally, trap avoidance by ephemeropterans and odonates, a common problem encountered in the literature, was minimal and organisms from both insect orders were successfully collected." (Author)] Address: Mackenzie, R., The Center for Great Lakes Studies at the Water Institute, University of Wisconsin-Milwaukee, 600 E. Greenfield Ave., Milwaukee, WI, 53204, USA

**3732.** Maczey, N. (2003): *Calopteryx splendens* und Straßenverkehr - Beobachtungen an einer Autobahnbrücke (Odonata: Calopterygidae). *Libellula* 22(1/2): 15-18. (in German with English summary). ["In 1998, during a short period of fierce wind, more than 30 specimens of *C. splendens* were recorded as traffic victims alongside a motorway crossing the river Dosse in Brandenburg, Germany. This surprisingly high number demonstrates that - under certain circumstances - local insect populations may be negatively influenced by heavy traffic." (Author)] Address: Maczey, N., Hospitalstr. 46, D-53840 Troisdorf, Germany. E-Mail: N.Maczey@cabi.org

**3733.** Maeto, K.; Kougo, K.; Kotani, E.; Miyata, H.; Sugimura, M. (2003): Geographical analysis of Odonata habitats in the Shimanto River basin, Shikoku, Japan. *Japanese Journal of Entomology* 6(1): 27-41. (in Japanese with English summary). ["We conducted a correspondence analysis (CA) of 88 species of Odonata (dragonflies) observed at 455 grid sites (ca. 0.5 kmX0.5 km) in the Shimanto River basin and adjacent areas in Shikoku, Japan. Multiple regression analyses of the two main axes of the CA ordination on the geographical features (altitude, relief) and vegetation of grid sites indicated that the degree of relief and the areal proportion of paddy fields were the main determinants of the species distribution of Odonata. The species were classified into 5 groups by k-means clustering based on the coordinate axes. Groups I and II mostly consisted of lentic species inhabiting ponds, marshes and paddy fields of flat lands. Groups III and IV were composed of lentic species mainly inhabiting marshes and paddy fields and lotic species in slow streams. Group V consisted of lotic species inhabiting mountain streams and spring s. Habitat requirements for the species appearing in the Red List of Kochi Prefecture are also discussed." (Authors)] Address: Maeto, K., Laboratory of Entomology, Faculty of Agriculture, Kobe University, Rokkodai-cho 1-1, Nada-ku, Kobe, 657-8501, Japan

**3734.** Malkmus, R. (2003): Die prächtige Smaragdlibelle - ein Juwel unter Portugals Libellen. *Natur & Museum* 133(7): 207-212. (in German). [The paper briefly compiles the present knowledge on the ecology (including an original observation of oviposition) and the dist-

ribution of *Macromia splendens* in Portugal. ] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**3735.** March, J.G.; Benstead, J.P.; Pringle, C.M.; Lukymis, M. (2003): Benthic community structure and invertebrate drift in a Pacific island stream, Kosrae, Micronesia. *Biotropica* 35(1): 125-130. (in English). ["Tropical Pacific island streams have poorly understood communities that deserve scientific attention. We examined benthic macroinvertebrates and fishes of the Inem River on Kosrae, Federated States of Micronesia. Larval chironomids, lepidopterans, odonates, and freshwater shrimps dominated the benthos and drift. Diel periodicity in drift was not evident. Nine fishes, two shrimps, and one snail species were identified. Kosrae's stream fauna appears even more depauperate than other Pacific high islands, possible due to its extreme isolation." (Authors)] Address: March, J.G., Department of Biology, Washington and Jefferson College, 60 South Lincoln St., Washington, PA, 15301, USA; E-Mail: jmarch@washjeff.edu USA

**3736.** Marinov, M. (2003): Chorology, biological and habitatic comments of the insects from the genus Odonata in Bulgaria. PhD thesis, University of Sofia, Institute of Zoology: 196 pp., 4 app.. (in Bulgarian). ["It summarizes the results either published, state and private collections as well as original information by the author received during the whole 119-years period (1892-2001) of the development of the odonatology in Bulgaria. The thesis consists of 11 chapters. 1. INTRODUCTION. Short general description of the Order Odonata and reasons for using dragonflies as subject of the investigation. 2. PHYSICO-GEOGRAPHIC REVIEW OF BULGARIA. Consequently situation, state borders, territory area, relief, geology and geomorphology, climate and water resources of Bulgaria are developed as abiotic factors influencing Odonata distribution pattern in Bulgaria. 3. ODONATOLOGICAL INVESTIGATIONS IN BULGARIA. Three periods are outlined according to the number of the publications published per year and the main contributions. Dragonflies are considered as well faunistically investigated insect group in Bulgaria. The main gaps are in regional investigations, species ecology and biology, dragonfly utility as bioindicators, population investigations. 4. GOALS AND OBJECTIVES. 5. MATERIAL AND METHODS. 6. RESULTS. Here each species is given with individual information about: 1) synonym list; 2) faunistical and taxonomic problems (if any); 3) biology and ecology (what is known for Bulgaria); 4) overall species distribution mapped for Europe and referenced for the rest of the area; 5) UTM map for the species' distribution in Bulgaria; 6) phenology and vertical distribution graphs. 7. DISCUSSION. Comments are given on the species' phenology, zoogeographic affiliation, distribution according to the main biotopes and habitats in Bulgaria as well as individual position in the First Conservation List developed for Bulgarian Odonata species. 8. CONCLUSIONS. Fourteen conclusions represent the main contributions made to the studying of Bulgarian Odonata fauna. 9. DEDUCTIONS. Fifteen deductions are given. They point the attention to some problems not solved during the current investigation and are given as some of the main tasks for future investigations. 10. REFERENCES. 11. ACKNOWLEDGEMENTS." (Author)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

**3737.** Masius, P. (2003): *Nehalennia speciosa* auf der Insel Usedom (Odonata: Coenagrionidae). *Libellula* 22 (1/2): 1-14. (in German with English summary). [In June 2001 the *N. speciosa* was recorded at a bog south of Ahlbeck, Island of Usedom, Mecklenburg-Vorpommern, Germany. The habitat is briefly described, and co-occurring odonate species are given.] Address: Masius, P., Erlanger Straße 69, D-95444 Bayreuth, Germany. E-Mail: Snoopy123dag@gmx.net

**3738.** May, M.; Corbet, P. (2003): Gathering useful information about the seasonal ecology of *Anax junius*. *Argia* 15(2): 15-16. (in English). ["A large question mark hangs over the movements and destination of adults of *Anax junius* after they fly southwards from southern Canada and northern states of the US in fall. Likewise, little is known about the northernmost latitude in North America at which resident populations of larvae can overwinter. It is likely to take a very long time if such information is going to be accumulated solely by chance observations. Much better that a planned survey could be undertaken that offers a high likelihood of early success. The knowledge that some populations of *A. junius* (occupying the same pond) have two components, one resident and one migratory, derives from a classic study by Robert Trotter in southern Ontario (Trotter 1971). [...] John Matthews, who is a student of John Abbot's at the Univ. of Texas, is currently looking ponds in Ontario, where Trotter worked, and in Texas. This approach has a lot of potential, despite its difficulties. I'm pretty sure that no one has studied the life history of any odonate species over a latitudinal and climatic range as great as that of *A. junius*, and no one has tied in phenology over such a range with migratory behavior. There's a chance to do something pretty unique here, if people can help us find additional suitable sites or even, if you're really interested and like working in mucky places on baking hot and miserably cold days, helping with." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3739.** McKee, D.; Harvey, I.; Thomas, M.; Sherratt, T.N. (2003): Mite infestation of *Xanthocnemis zealandica* in a Christchurch pond. *New Zealand Jour. Zool.* 30 (1): 17-20. (in English). ["Infestation of the common red-coat damselfly *Xanthocnemis zealandica* (McLachlan) with larval water mites (*Arrenurus* spp.) was examined in a single Canterbury population during November-December 2001. Teneral (immature adult damselflies) of both male and female morphs (androchrome and gynochrome) showed a similar prevalence of infestation, higher than the prevalence of infestation found in mature adults. As anticipated, mature adult males were more frequently infested than mature females, but there was no evidence that infestation reduced the mating activity of males. Up to 62 mites were found per infested host, although mean mite burdens were not significantly related to the size, gender or morph of the hosts." (Authors)] Address: McKee, D., School of Biological and Biomedical Sciences, University of Durham, Durham, DH1 3LE, UK. E-Mail: dermot.mckee@durham.ac.uk

**3740.** Mead, K. (2003): *Dragonflies of the North Woods*. Kollath-Stensaas Publishers. ISBN 0-9673793-6-9. 212 pp. (in English). [This attractive and very useful field guide covers the "northwoods" areas of Minnesota, Wisconsin, Michigan (USA), and western Ontario (Ca-

nada). It treats 102 Anisoptera only, except that six of the most common damselflies are illustrated and briefly described. This book can be assessed as an advanced field guide, that focus on identifying Anisoptera, and that goes beyond descriptions of species; it dwells on the problems of distinguishing similar species. Two pages are devoted to the thoracic patterns of *Aeshna*, showing color variants, followed by 30 additional pages on the Aeshnidae (they must be a favorite group of Kurt Mead). A second focus was set on the genus *Leucorhinia* with many useful advices for correct identification of the different stages of the very species. Fieldmark arrows point out the best distinguishing characteristics. Size-bars on the colour photos show the dragonfly's actual body length. This guide is very well illustrated with excellent - app. 200 - photographs. Throughout the text there are thoughtful and provocative behavioural observations, which will guide the user to becoming a good observer and not just an identifier. In addition you will find between the lines some useful information how to swing your net ... Quite unique is a chapter entitled "Binoculars for 'Dragonflying'"; binoculars are listed brand-wise with dates enabling persons interested in buying one for dragonflying to make a useful pre-selection. This is an excellent guide, with a didactical concept that could be interesting for other countries too. (Martin Schorr) Address: Mead, K., 6388 Lax Lake Rd., Finland, MN 5560, USA. <http://www.dragonfliesofthenorthwoods.com/>

**3741.** Meßlinger, U.; Winterholler, M. (2003): Bestandssituation und Ökologie von *Coenagrion lunulatum* in Franken (Odonata: Coenagrionidae). *Libellula Supplement 4*: 43-58. (in German, with English summary). [Between 1986 and 1995, 25 records of *C. lunulatum* have been documented for Bavaria between 1986 and 1995. In the following years, the species could be confirmed only at three localities. At one of these habitats further investigations regarding water chemistry, vegetation and biology of the species were carried out between 1998 and 2003. Effects of climatic change are discussed as a possible reason for the dramatic decline of *C. lunulatum* within Bavaria.] Address: Meßlinger, U., Am Weiherholz 43, D-91604 Flachslanden, Germany. E-Mail: [u.messlinger@t-online.de](mailto:u.messlinger@t-online.de)

**3742.** Meßlinger, U.; Faltin, I. (2003): Verbreitung und Ökologie von *Coenagrion ornatum* in Westmittelfranken (Odonata: Coenagrionidae). *Libellula Supplement 4*: 19-42. (in German, with English summary). [On the basis of confirmed indications for a regional distribution of *C. ornatum*, in the year 2001 a full-coverage search for the species was carried out in western Middle Franconia. "Altogether 734 creek and ditch sections were visited, and *C. ornatum* was recorded at 55 of those waters. The core population discovered in 1997 in the upper River Altmühl valley extended over 28 sites, being one of the greatest populations of the species within Bavaria. In the catchments of the Rivers Zenn, Wörnitz, Wieseln, Sulzach and Tauber *C. ornatum* was reported for the first time. All populations along these rivers were small or very small. A presentation of the current regional distribution of the species is given. Essential factors of habitat and the influence of the management of inhabited waters and adjacent meadows are discussed. The results of the study indicate knowledge gaps concerning the actual distribution of *C. ornatum*, emphasizing the probability of undiscovered populations in hitherto insufficiently investigated running water systems outsi-

de western Middle Franconia." (Authors)] Address: Meßlinger, U., Am Weiherholz 43, D-91604 Flachslanden, Germany. E-Mail: [u.messlinger@t-online.de](mailto:u.messlinger@t-online.de)

**3743.** Mirza, R.S.; Chivers, D.P. (2003): Influence of body size on the responses of fathead minnows, *Pimephales promelas*, to damselfly alarm cues. *Ethology* 109(8): 691-699. (in English). ["A wide diversity of aquatic organisms release chemical alarm cues upon encountering or being attacked by a predator. These alarm cues can be used by nearby individuals to assess local predation risk. Receivers warned by chemical alarm cues gain a survival benefit when encountering predators. Animals that are in the same prey guild (i.e. that co-occur and share the same predators) may learn to recognize each others' chemical alarm cues. This ability may confer an adaptive advantage if the prey animals are vulnerable to the same predators. However, if the prey grow to different sizes and as a consequence are no longer vulnerable to the same suite of predators, then there should no longer be an advantage for the prey to respond to each others' alarm cues. In this study, we exposed small and large fathead minnows (*Pimephales promelas*) to cues from syntopic injured damselfly larvae (*Enallagma boreale*), cues from injured mealworm larvae (*Tenebrio molitor*) and to distilled water. Small minnows exhibited antipredatory behaviour and increased shelter use in response to injured damselfly cues but not to the controls of injured mealworm or distilled water. On the contrary, large minnows exhibited no significant change in shelter use in response to any of the injured cues. These data demonstrate that fathead minnows exhibit an antipredator response to damselfly alarm cues, but only when minnows are small and members of the same prey guild as damselfly larvae. These results demonstrate the considerable flexibility in the responses to heterospecific alarm cues." (Authors)] Address: Mirza, R.S., Dept of Biology, Pennsylvania State University, 208 Mueller Laboratory, University Park, PA, 16802, USA. E-Mail: [rsm12@psu.edu](mailto:rsm12@psu.edu)

**3744.** Montero Moreno, J.R. (2003): A note on *Thaumatoneura inopinata* McLachlan 1897 in Rio Chiarria Costa Rica with a list of Costa Rican Megapodagrionidae. *Argia* 15(1): 17. (in English). [*T. inopinata* was recorded twice along waterfalls of Rio Chiarria near Turrialba in Feb. 1998 and in Oct. 1999.] Address: Montero Moreno, J.R., P.O. box 1913-1000, San Jose, Costa Rica

**3745.** Morales, M. E.; Wesson, D.M.; Sutherland, I.W.; Impoinvil, D.E.; Mbogo, C.M.; Githure, J.I.; Beier, J.C. (2003): Scientific note determination of *Anopheles gambiae* larval DNA in the gut of insectivorous dragonfly (Libellulidae) nymphs by polymerase chain reaction. *Journal of the American Mosquito Control Association* 19(2): 163-165. (in English). ["We examined the predator-prey relationship between larvae of the malaria mosquito *Anopheles gambiae* and nymphs of the dragonfly (Libellulidae). Studies were conducted to determine whether polymerase chain reaction (PCR) can be used to detect DNA of *An. gambiae* in the gut of libellulid nymphs, and to determine how long after feeding on *An. gambiae* that mosquito DNA remains detectable by PCR. Total DNA was extracted from the gut contents of libellulid nymphs by using 2 types of DNA extraction methods. The target sequence for the diagnostic PCR was the intergenic spacer regions of the ribosomal DNA gene locus. These sequences were analyzed by using

An. gambiae complex-specific primers. After analyzing nymphal gut contents with PCR at regular postfeed intervals, a 390-base pair product could be amplified. The presence of mosquito larvae was visually confirmed for up to 40 min after feeding. Regardless of the number of mosquito larvae ingested, libellulid gut contents could be amplified or visually seen up to 1 h of digestion. This result indicates the nymphs have a high rate of digestion and that PCR with An. gambiae complex primers will be best utilized within 1 h after feeding as a detection system. This study confirmed that dragonfly nymphs feed well on anopheline larvae, and that mosquito DNA, although rapidly digested, can be successfully recovered and detected from within nymphal digestive tracts." (Authors)] Address: Morales, Maria E., Department of Tropical Medicine, 1430 Tulane Avenue, University School of Public Health and Tropical Medicine, Tulane University, New Orleans, LA 70112, USA.

**3746.** Moroz, M.; Czachorowski, S.; Lewandowski, K. (2003): Preliminary investigation of water insects of the Reserve "Prostyr" (Belarus). Parki nar. Rez. przyr. 22: 117-124. (in Polish with English summary). [Reserve "Prostyr", Belarus (51°56'N 26°05'E); Calopteryx virgo, Lestes dryas, Aeshna grandis, Sympetrum flaveolum, S. pedemontanum.] Address: Moraz, M., Inst. Zool., Belarussian Academy of Sciences, Akademicheskaja 27, Minsk 220072, Belarus. E-mail: morozm@biobel.bas-net.by

**3747.** Moss, M.O.; Gibbs, G. (2003): Colour on the wings of Calopteryx damselflies. Quekett Journal of Microscopy 39(5): 491-497. (in English). ["The blue colour on the wings of the males of the two species of English damselflies of the genus Calopteryx is associated entirely with the veins and is a structural colour. Studies of the fine structure of sections of the veins of the banded demoiselle (C. splendens) by scanning electron microscopy have revealed a regular layered structure which could account for the blue colour by constructive interference as incident light is reflected by these layers. The dull brown pigment (described as an ommochrome) present in the membrane of the wing enhances the perceived intensity of the reflected blue light by absorbing the rest of the incident light." (Authors)] Address: Moss, M.O., School of Biological and Life Sciences, University of Surrey, Guildford, Surrey, GU2 7XH, UK

**3748.** Mrowinski, P.; Zawal, A. (2003): The new localities of Aeshna subarctica elisabethae Djak., 1922 in the Western Pomerania region. Wiad. entomol. 22(1): 47-48. (in Polish). [Poland; Równina Nowogardzka, UTM: VV95, 5-22-VIII-1999; Pojezierze Szczecineckie, UTM: XV03, 12-VI-2001.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**3749.** Muth, M. (2003): Aeshna caerulea im Landkreis Oberallgäu: Bestandssituation, Entwicklungsgewässer und Gefährdung (Odonata: Aeshnidae). Libellula Supplement 4: 71-97. (in German, with English summary). ["A. caerulea was monitored in the years 2000 and 2001 in the Allgäu Alps of the Bavarian Oberallgäu District, the distribution centre of the species within Bavaria and Germany. Thirty-one potential breeding habitats in subalpine bogs and minerotrophic ponds were

investigated. At altitudes between 1190 m and 1840 m above sea level the species was recorded at 16 localities. The bog and water types inhabited by A. caerulea in the region are characterized. Current populations and potential threats to the species by grazing cattle, wallowing red deer, and climate changes are discussed." (Author)] Address: Muth, M., Im Stiftallmey 4, D-87439 Kempten, Germany. E-Mail: muth.kempten@t-online.de

**3750.** Niehuis, M. (2003): Fund der Nordischen Moosjungfer - Leucorrhinia rubicunda (L.) - in der Südpfalz (Insecta: Odonata). Fauna Flora Rheinland-Pfalz 10(1): 279-284. (in German). [NSG Jockgrimer Tongruben, Rheinland-Pfalz, Germany; a record of L. rubicunda dated 4-VI-2003 is documented and discussed in detail. In addition, new records in southern Rheinland-Pfalz of the very rare L. caudalis are given.] Address: Niehuis, M., Inst. Naturwiss., Biologie, Universität Koblenz-Landau, Standort Landau, Im Fort 7, D-76829 Landau, Germany

**3751.** Novelo-Gutiérrez, R.; González-Soriano, E. (2003): The larva of Lestes alfonsoi González & Novelo (Zygoptera: Lestidae). Odonatologica 32(3): 289-294. (in English). ["Detailed description and illustrations are provided. A comparison with other Mexican larvae of the genus and a key to separate species are also included. Larva of L. alfonsoi seems not to be related to any of the known larvae of the genus, although it shares more features in common with the larva of L. alacer." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: e-soriano@mail.ibiologia.unam.mx

**3752.** Ogden, T.H.; Whiting, M. (2003): Genomic tissue library of Odonata: A call for specimens. Argia 15(2): 20-21. (in English). [Website: <http://odonata.byu.edu>; "... We have two immediate purposes for the obtained odonate specimens. First we want to investigate the relationships of the basal pterygote lineages (Ephemeroptera, Odonata, and Neoptera). The phylogenetic position of Odonata among the other orders has been controversial, and three main theories exist: (1) placement as sister group to Ephemeroptera (=Paleoptera); (2) placement as the most basal pterygote lineage; and (3) placement as sister to Neoptera. Second, we plan to address the higher-level phylogeny of Odonata using DNA sequence information combined with morphological data. Our goal, for the next year, is to sequence a wide range of exemplar taxa for multiple genes (~ 8 markers), combine this information with morphological data (collaboration with Andy Rehn), and use these data to gain new insights into odonate systematics and evolution. [...]" (Authors)] Address: T. Heath Ogden and Michael Whiting, Department of Integrative Biology, Brigham Young University, Provo, Utah 84602, USA, <heathogden@byu.edu> Department of Integrative Biology and Bean Life Science Museum, Brigham Young University, Provo, Utah 84602, USA, <michaelwhiting@byu.edu>

**3753.** Ogden, T.H.; Whiting, M.F. (2003): The problem with "the Paleoptera Problem:" sense and sensitivity. Cladistics 19(5): 432-442. (in English). ["While the monophyly of winged insects (Pterygota) is well supported, phylogenetic relationships among the most basal extant pterygote lineages are problematic. Ephemeroptera and Odonata represent the two most basal extant lineages

of winged insects, and determining their relationship with regard to Neoptera (remaining winged insects) is a critical step toward understanding insect diversification. A recent molecular analysis concluded that Paleoptera (Odonata + Ephemeroptera) is monophyletic. However, we demonstrate that this result is supported only under a narrow range of alignment parameters. We have further tested the monophyly of Paleoptera using additional sequence data from ISSrDNA, 28S rDNA, and Histone 3 for a broader selection of taxa and a wider range of analytical methodologies. Our results suggest that the current suite of molecular data ambiguously resolve the three basal winged insect lineages and do not provide independent confirmation of Odonata + Neoptera as supported via morphological data." (Authors)] Address: Ogden, T.H., Department of Integrative Biology, Brigham Young University, 401 WIDE, Provo, UT 84602-5255, USA. E-mail: heathogden@byu.edu

**3754.** Orr, A.G. (2003): A guide to the dragonflies of Borneo: Their identification and biology. Natural history publications (Borneo). Kota Kinabalu. ISBN 983-812-069-3. 195 pp. (in English). [With 275 named species so far recorded and doubtless many more yet to be discovered, Borneo has one of the richest and most exciting dragonfly faunas in the world. More than 40% of species occur nowhere else, making it the most distinctive sub-region of Sundaland. It is home to such spectacular species as *Tetracanthagyna plagiata*, the heaviest of all dragonflies, many beautiful picture-winged chlorocyphids and euphaeids, and high-altitude endemics such as *Matronoides cyaneipennis* restricted to Mount Kinabalu and nearby mountains. Species are figured by photographs, generally taken in nature, and half-wing coloured drawings (25 plates). Many are figured by both methods. About 60% of known species are shown, including almost all the distinctive and common species likely to be encountered by a casual visitor. Particular attention is given to the identification of the common but difficult medium-sized red dragonflies. The text augments the illustrations and provides - family- and species-wise - useful information on biology. Introductory chapters discuss structure and general biology, ecology and conservation, faunistics and biogeography and collecting techniques and photography. There is a complete and up to date checklist. Illustrated keys to families of adults give the reader an understanding of the structures used in classifying dragonflies and augment the usefulness of the illustrations of entire insects. Main larval forms are shown.] Address: Natural history publications (Borneo) SDN. BHD. A913, 9th Floor, Phase 1, Wisma Merdeka, P.O. Box 15566, 88864 Kota Kinabalu, Sabah, Malaysia. www.nhpborneo.com

**3755.** Orr, B. (2003): Review: Dragonflies of Victoria. *Austrolestes* 7: 1. (in English). [Review of: Theischinger, G.; Hawking, J.H. (2003): Dragonflies of Victoria: an identification guide to adult and larval dragonflies (Odonata). *Coop. Res. Cent. Freshw. Ecol.*, Albury / NSW. ISBN 1-876144-49-1. iv+65 pp.] Address: not stated

**3756.** Ott, J. (2003): Libellen im Stadtgebiet von Ludwigshafen. *Pollichia-Kurier* 19(2): 10-11. (in German). [The Schleusenloch situated near the town of Ludwigshafen, counts to the best investigated water bodies in Rheinland-Pfalz, Germany; the author reports on the history of the habitat. Special emphasis is given to the impacts caused by fishing, e.g. by introducing grass

carps to eliminate the vegetation in fishing waters. Nevertheless some odonate species (e.g. *Gomphus pulchellus*) profit from trampling by fishers and bather / swimmer. In addition he outlines the serious difficulties for Odonata to find suitable habitats in towns and agglomerations. A nice episode on puzzling people with dragonflies with numbers on their wings is added.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**3757.** Parr, A. (2003): Views and Reviews of books, publications, products and services: Dragonflies by Steve Brooks. *Atropos* 20: 55. (in English). [Review of the books abstracted as OAS 3386.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**3758.** Paulson, D. (2003): Down under again -- drought, dragonflies, and WDA. *Argia* 15(2): 12-14. (in English). [On the traces of the 1998 trip to Australia, Dennis Paulson and Netta Smith revisited some of the localities in January 2003. They report on the differences between the two years, which may be caused primarily by the severe drought in Australia in 2003. Some new places were visited, the most interesting species are documented. And a brief report on some essentials of the WDA meeting in Beechworth, NE Victoria is given.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3759.** Petzold, F. (2003): Nachweise von *Onychogomphus forcipatus forcipatus* an Seen in Schweden (Odonata: Gomphidae). *Libellula* 22(1/2): 49-54. (in German, with English summary). ["As *O. f. forcipatus* has been mainly been found at lakes in northern Germany, there was no evidence for this in Sweden. During the years of 1993, 1997 and 2002 there have been records of *O. forcipatus* at a total of five lakes in the southern part of central Sweden. At three lakes exuviae were recorded. All localities were lakes with tied into bigger waterscapes by over-ground affluxes and runoffs. The places of its evidence were mostly parts of the shore with no vegetation and stony, gritty ground. At one lake were findings of exuvia in a shallow and lee cove formed of detritus and mud and surrounded with *Carex*."] Address: Petzold, F., Pappelalle 73, D-10437 Berlin, Germany. E-Mail: falkpetzold@web.de

**3760.** Prud'Homme, E. (2003): Nouvelles des région. Département de Charente (16). *Société française d'odonatologie. La lettre des sociétaires* 33: 10-11. (in French). [Brief report on current odonatological activities including records of *Gomphus graslinii* and *Oxygastra curtisii*.] Address: Prud'Homme, E., rue des Colporteurs, F-16230 Nanclars, France. E-mail: eric.prud-homme6@wanadoo.fr

**3761.** Purse, B.V.; Hopkins, G.W.; Day, K.J.; Thompson, D.T. (2003): Dispersal characteristics and management of a rare damselfly. *Jour. Appl. Ecol.* 40: 716-728. (in English). ["1. *Coenagrion mercuriale* is a rare damselfly in Britain and mainland Europe and has been declining in the last 30 years. It has specialized habitat requirements and has been viewed, traditionally, as a poor disperser. Knowledge of its dispersal ability was considered in its Biodiversity Species Action Plan as essential for the formulation of appropriate conservation management strategies. 2. Mark-release-recapture studies of *C. mercuriale* in two large UK heathland popula-

tions were undertaken. Mature adults had a low rate of movement within continuous areas of habitat (average < 25 m movement), low emigration rates (1-3-11 -4%) and low colonization distances (maximum 1 km), all comparable to similarly sized coenagrionids. 3. Movements were more likely within than between patches of suitable habitat over short to medium distances (50-300 m). Between-patch movements were more likely between patches that were close together. Scrub barriers reduced dispersal. 4. The probability of dispersal between two recaptures depended on the length of the time interval between them. *C. mercuriale* performed considerable between-patch movements within a small fraction (1-2 days) of its mean mature adult life span (7-8 days). 5. Qualitative comparison of field colonization distances measured here and distances between UK sites occupied by *C. mercuriale* revealed that empty sites within large clusters of sites would probably be recolonized rapidly and dispersal events would be frequent. However, such events would occur rarely within small isolated sites or clusters of sites, leaving local populations prone to extinction. 6. Synthesis and applications. These data show that management effort should be directed towards maximizing the likelihood of *C. mercuriale* recolonizing sites naturally within 1-3 km of other populations (particularly within large clusters). Scrub boundaries should be removed between existing populations and empty, but suitable, sites to facilitate stepping-stone dispersal movements." (Authors)] Address: Purse, Bethan V., Institute for Animal Health, Pirbright Laboratory, Ash Road, Pirbright, Surrey GU24 0NF, UK. E-mail: beth.purse@bbsrc.ac.uk

**3762.** Purse, B.V.; Thompson, D.J. (2003): Emergence of the damselflies, *Coenagrion mercuriale* and *Ceragrion tenellum* (Odonata: Coenagrionidae), at their northern range margins, in Britain. *Eur. J. Entomol.* 100: 93-99. (in English). ["Emergence of *Coenagrion mercuriale* and *Ceragrion tenellum* was examined in a mixed population at their northern range margin in Britain. Mortality at emergence was quantified in *C. mercuriale*. Consistent with their larval diapause characteristics, both species had an asynchronous emergence pattern, typical of "summer" species. Daily emergence of *C. mercuriale* was positively correlated with the duration of sunlight on the previous day (controlling for season) and its emergence period was found to be shorter than that observed in its core populations in Central and Mediterranean Europe. No differences were found between the patterns of emergence of the sexes in either species. Sex ratio at emergence differed significantly from 1:1 (at 1.35 : 1 -males : females) in *C. mercuriale* but not in *Ceragrion tenellum* (at 1.04 : 1). Body size at emergence declined more steeply with time in females than in males of *C. mercuriale* because large size may confer a greater reproductive advantage in females (larger females may be more fecund) than males in non-territorial odonates. Percentage mortality of *C. mercuriale* at emergence was low (4.9% including deformed individuals), the main cause of mortality being deformity." (Authors)] Address: Purse, Beth, Population and Evolutionary Biology Research Group, Nicholson Building, University of Liverpool, School of Biological Sciences, Liverpool, L69 3GS, UK. E-mail: beth.purse@bbsrc.ac.uk

**3763.** Reeves, D. (2003): Obituary: Dr D.A.L. (Allen) Davies. *Austrolestes* 7: 3. (in English). [Some personal recollections resulting from a long lasting friendship with

Allen Davies.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3764.** Reeves, D. (2003): Species profile - *Aeshna brevistyla* Rambur, 1842 - Blue-spotted Hawker. *Austrolestes* 7: 2. (in English). [*Adversaeschna brevistyla* (Rambur 1842) is briefly described, figured by a b & w photograph, and endophytic oviposition behaviour is noted. ] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3765.** Reinhardt, K.; Samietz, J. (2003): Libellenfunde in Ostkasachstan (Odonata). *Entomologische Nachrichten und Berichte* 47(2): 71-76. (in German with English summary). ["During two excursions to East Kazakhstan 25 species of Odonata were recorded from 21 sites. A *Macromia* species whose exuviae resemble those of *M. bartenevi* represents the first record of the genus for Kazakhstan. The exuviae are illustrated and appear to differ morphologically from *M. amphigena fraenata*, raising doubts about the recently claimed synonymy of *M. bartenevi* with *M. amphigena fraenata*. Records of *Calopteryx cf. splendens*, *Coenagrion lunulatum*, *Libellula depressa*, *L. quadrimaculata*, *Leucorrhinia pectoralis*, and *Sympetrum flaveolum* reported from Eastern Kazakhstan in 1906 were confirmed. Six species were recorded from the surroundings of Ust-Kamenogorsk for the first time. Presumably, *Ischnura pumilio*, *Orthetrum brunneum*, and *L. depressa* were frequently overlooked and are more widespread than presently assumed." (Authors)] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: bgykr@leeds.ac.uk

**3766.** Relyea, R.A. (2003): How prey respond to combined predators: a review and an empirical test. *Ecology* 84(7): 1827-1839. (in English). ["Studies of phenotypic plasticity frequently ask how organisms respond to a change in their environment, but most organisms do not experience single environmental changes. Therefore, we need to move to the next step and understand how organisms respond to combinations of environmental changes. Recent studies of predator-induced plasticity have addressed how prey respond to different combinations of predators. I briefly review 22 studies of combined predator effects on prey phenotypes and identify four factors that make it difficult to interpret the results of these studies: (1) uncontrolled prey consumption, (2) a low number of prey traits, (3) a low number of predator combinations, and (4) confounded predator composition and total predator density. I address these challenges in an experiment that examined how wood frog tadpoles (*Rana sylvatica*) altered 12 behavioral, morphological, and life historical traits in response to four different caged predators ("*Erythemis* sp.", *Belostoma*, *Dytiscus*, and *Anax junius*). The predators were present alone at low density, alone at high density (2X), or combined into six pairwise combinations. When each predator was alone (at either low < or high density), tadpoles discriminated among different predators and produced predator-specific phenotypes. The doubling of predator density rarely induced more extreme prey phenotypes. When predators were combined, the tadpoles generally developed phenotypes that were similar to those induced by the more risky predator alone (90% of all traits examined, at either low or high density). These results suggest that tadpoles per-

ceive the risk of combined predators as being similar to the risk of the most dangerous predator in the pair, and not as a summed or averaged predation risk. The actual risk from these predator combinations remains to be tested. This appears to be the first study to take a comprehensive approach that controls prey consumption, examines a large number of prey traits, uses a large number of predator combinations, and separates the effects of predator composition and predator density. There is a clear need for more such studies to determine whether these results can be generalized to other taxa." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: relyea@pitt.edu

**3767.** Relyea, R.A. (2003): Predators come and predators go: the reversibility of predator-induced traits. *Ecology* 84(7): 1840-1848. (in English). ["While numerous studies have been conducted on the ecology and evolution of phenotypic plasticity, to really understand plasticity we need to expose organisms to different environments over several ontogenetic stages. In this way, we can examine whether organisms change their phenotypic strategy over ontogeny, whether there are developmental windows that constrain the development of plastic traits, and whether behavior is more reversible than morphology if the environment reverts back to its original state. I addressed these questions by examining predator-induced plasticity in gray treefrog tadpoles (*Hyla versicolor*). Using aquatic mesocosms, I reared tadpoles with a constant absence of predators, a constant presence of predators (*Anax longipes*), and the addition or removal of predators at three different times during their larval period. Tadpoles changed their phenotypic strategy over ontogeny; early in ontogeny they responded to predators by hiding, reducing their activity, and developing relatively deep tail fins. Later in ontogeny the tadpoles no longer employed behavioral defenses but relied on a combination of greater mass, deeper tails, and shorter bodies. The phenotypic changes were inducible throughout most of ontogeny, suggesting that there were few developmental windows. Activity, tail depth, and body depth were highly reversible early in ontogeny but less reversible later in ontogeny; because hiding was only used early in ontogeny, I could not assess its reversibility. This reversibility should affect not only the induced species, but will likely transmit the effects throughout the larger ecological community." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: relyea+@pitt.edu

**3768.** Rose, J.S. (2003): Dragonfly days, 16 - 19 May, 2003. *Argia* 15(2): 10-12. (in English). [Valley Nature Centre, Weslaco, Texas, USA; the paper lists odonate species from several places in the region including *Perrithemis domitia*, which is very rare in USA.] Address: Rose, J.S., Biology Dept, Box 90338, Duke University, Durham, NC 27708, USA. E-mail: jsr6@duke.edu

**3769.** Schleuter, M.; Haybach, A. (2003): Das Makrozoobenthos des Mains in den Jahren 1992-2001 - Eine Artenliste. *Lauterbornia* 48: 45-56. (in German with English summary). [10 odonate taxa are listed from river Main, Bavaria, Germany.] Address: Schleuter, M.; Haybach, A., Referat Tierökologie, Bundesanstalt für gewässerkunde, Kaiserin-Augusta-Anlagen 15-17, D-56068 Koblenz, Germany

**3770.** Schlüpmann, M. (2003): Zur Verbreitung, Phänologie, Ökologie und Einnischung des Plattbauches (*Libellula depressa* Linnaeus, 1758), des Vierflecks (*L. quadrimaculata* Linnaeus, 1785) und des Blaupfeils (*Orthetrum cancellatum* (Linnaeus, 1758)) im Raum Hagen (Insecta: Odonata: Libellulidae). *Dortmunder Beitr. Landeskunde, Naturwiss. Mitt.* 36/37: 113-162. (in German, with English summary). [On the fundament of an extensive odonatological survey in the region of the town Hagen, Nordrhein-Westfalen, Germany, habitat parameters for the three species were analysed in very detail. The focus is set on regional distribution, phenology, reproduction habitats in general and in detail (structure of vegetation, hydrochemical factors), competition effects of the three species, and conservation measures.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: Martin.Schluempmann@t-online

**3771.** Sirot, L.K.; Brockmann, H.J.; Marins, C.; Mutschett, G. (2003): Maintenance of a female-limited polymorphism in *Ischnura ramburi* (Zygoptera: Coenagrionidae). *Animal Behaviour* 66: 763-775. (in English). ["Colour" polymorphisms can be maintained in a population if all morphs have equal fitness on average, if fitness is frequency dependent or if fitness functions cross for some environmental or social variable. We studied female-limited colour polymorphism in the Rambur's fork-tail damselfly, *Ischnura ramburi*, in which one female morph looks like the male. The most commonly cited hypotheses to explain this polymorphism involve an advantage to andromorphs of avoiding costly matings through male mimicry. An alternative hypothesis argues that males learn the most common morph and that the polymorphism is maintained by a rare-morph advantage of mating avoidance, irrespective of male mimicry. We tested predictions of the male mimicry hypothesis, learned mate recognition hypothesis (LMR) and two new hypotheses. We used censuses and a mark-resight study to estimate density, sex ratio, morph frequency and mating frequencies. We observed interactions to test for male mimicry and female competition and to evaluate the frequency of mating attempts. Andromorphs were less likely than gynomorphs to receive mating attempts in encounters with males, but did not mate less frequently, or attack males or interrupt oviposition by other females more frequently. Contrary to the LMR hypothesis, the rarer morph was more likely to receive mating attempts. Andromorph frequency was greater in older females than in younger females, suggesting higher mortality or dispersal of gynomorphs. Our results support a modification of the male mimicry hypothesis, the signal detection hypothesis. Together with past studies, our results suggest that the female morphs may be alternative mating avoidance strategies." (Authors)] Address: Sirot, Laura, Dept of Zoology, University of Florida, 223 Bartram Hall, Gainesville, FL, 32611-8525. USA. E-mail: lsirrot@zoo.ufl.edu

**3772.** Stellmach, M. (2003): Landesweite naturschutzfachliche Bewertung der Auen im Rahmen des Auenprogramms Bayern. <http://www.bayern.de/lfu/tatbericht>: 27 pp. (in German). [The publication outlines a method to assess the Bavarian (Germany) floodplains. Odonata are among the indicator species: e.g. *Sympetrum flaveolum* (species of alternating water levels) and *S. pedemontanum* (species of early phases of vegetation succession).] Address: michael.stellmach@lfu.bayern.de

**3773.** Stewart, T. W.; Shumaker, T.L.; Radzio, T.A. (2003): Linear and nonlinear effects of habitat structure on composition and abundance in the macroinvertebrate community of a Large River. *Am. Midi. Nat.* 149: 293-305. (in English). ["We used an experiment and regression analyses to quantify effects of spatial variation in habitat structure abundance on a riverine macroinvertebrate community under winter conditions." Concrete slabs with different numbers of stones attached to upper faces were placed in the James River, Nelson County, Virginia, USA, and retrieved after 28 days "Erpetogomphus sp. nymphs were equally abundant in high and very high cover treatments, but were virtually absent in no cover, low cover, and intermediate cover treatments. Soft substratum is critical habitat for this burrowing taxon, and suitable quantities of particulate matter were apparently not present until stones covered almost the entire slab face and provided interstices where paniculate matter accumulated." (Authors)] Address: Stewart, T. W., Department of Biological Sciences, Ohio University, Athens 45701, USA

**3774.** Stoks, R.; McPeck, M.A.; Mitchell, J.L. (2003): Evolution of prey behavior in response to changes in predation regime: damselflies in fish and dragonfly lakes. *Evolution* 57(3): 574-585. (in English). ["In a large behavioral experiment we reconstructed the evolution of behavioral responses to predators to explore how interactions with predators have shaped the evolution of their prey's behavior. All *Enallagma* damselfly species reduced both movement and feeding in the presence of coexisting predators. Some *Enallagma* species inhabit water bodies with both fish and dragonflies, and these species responded to the presence of both predators, whereas other *Enallagma* species inhabit water bodies that have only large dragonflies as predators, and these species only responded to the presence of dragonflies. Lineages that shifted to live with large dragonflies showed no evolution in behaviors expressed in the presence of dragonflies, but they evolved greater movement in the absence of predators and greater movement and feeding in the presence of fish. These results suggest that *Enallagma* species have evolutionarily lost the ability to recognize fish as a predator. Because species coexisting with only dragonfly predators have also evolved the ability to escape attacking dragonfly predators by swimming, the decreased predation risk associated with foraging appears to have shifted the balance of the foraging/predation risk trade-off to allow increased activity in the absence of mortality threats to evolve in these lineages. Our results suggest that evolution in response to changes in predation regime may have greater consequences for characters expressed in the absence of mortality threats because of how the balance between the conflicting demands of growth and predation risk are altered." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**3775.** Stoks, R.; McPeck, M.A. (2003): Predators and life histories shape *Lestes* damselfly assemblages along a freshwater habitat gradient. *Ecology* 84(6): 1576-1587. (in English). ["Survey data from New England showed that assemblages of *Lestes* damselflies are organized along the entire gradient of pond permanence and predator presence. One assemblage occupies vernal ponds lacking large dragonfly predators and fish; four are largely confined to temporary ponds that typi-

cally contain dragonfly predators; one dominates fishless permanent ponds and lakes where dragonflies are the top predators; and one dominates permanent ponds and lakes where fish are the top predators. We determined the role of life history and predation in maintaining this striking pattern by conducting a series of transplant experiments in the field and a laboratory experiment manipulating presence and absence of local predators. Life history (1) shaped the ability of species to cope with drying regime, thereby excluding temporary-pond *Lestes* from vernal ponds and permanent-water *Lestes* from temporary ponds, and (2) generated size differences among species due to differences in the timing of hatching. This mediated the exclusion of temporary-pond *Lestes* from permanent water bodies through asymmetric intraguild predation by permanent-water *Lestes*. Dragonfly predation on permanent-water *Lestes* had an indirect positive effect on the survival of temporary-pond *Lestes*; however, this effect apparently is too small to allow coexistence of both *Lestes* groups. Predation by large dragonfly larvae excluded the *Lestes* species of vernal ponds from temporary ponds, and differential vulnerability to large dragonfly larvae and fish shaped the reciprocal dominance of *L. eurinus* and *L. vigilax* in fishless and fish-containing permanent water bodies, respectively. Taken together, these results show that life history constraints and predation both shape the distributions of *Lestes* species along the pond permanence gradient in New England. We discuss the importance of this freshwater habitat gradient in shaping local and regional species diversity." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**3776.** Suhling, F.; Richter, O. (2003): Mathematical modeling of priority effects and intraguild predation with applications to Namibian Odonata populations. *Verhandlungen der Gesellschaft für Ökologie* 33: 169. (in English). [Verbatim: The model presented in this paper allows the study of the survival of populations in dependence on the intensities of cannibalistic interactions and intraguild predation, on the density of unspecific prey, on specific growth rates, and on temporal priority in colonization. Moreover, we study the question under which circumstances populations of predators may coexist. The parameter values used in this study are mainly derived from ongoing laboratory and field studies on the dragonfly assemblage of temporary freshwater ponds in the Namibian semi-desert. These assemblages may consist of up to about 25 species, mostly of the family Libellulidae, of which, however, only about ten species colonize temporary pools, i.e. lay eggs. Although all successful colonizers show rapid development some, such as *Pantala flavescens* and *Sympetrum fonscolombii*, grow faster than others, e.g. *Trithemis kirbyi* and *Crocothemis erythraea*. Our model includes age and size structure in form of partial differential equations, which is a compromise between simplistic model approaches in form of ordinary differential equations and individual based models. The classical model for the development of size structured populations based on a partial differential equation for the size density distribution as a function of time was extended to include cannibalism, intraguild predation among two populations and foraging behaviour in form of size dependent functional response curves. The mathematical formulation of intra- and interspecific predator-prey interactions in size-structured populations lead

to integrals taking into account the interaction of all possible combinations of size classes. Introducing predation and cannibalism into the model leads thus to a system of coupled integro-differential equations, which are solved numerically by finite difference techniques. Models of this form possess a well-defined mathematical structure and are capable of capturing essential aspects of the interaction of age or size-structured populations. Figure 1 one shows as an example of model behaviour the effect of a "cohort splitting" occurring under shortage of nutrient resources due to intraspecific cannibalism. In this case, large larvae prey on small larvae of the same population and are thus able to survive and develop. The analysis of the model behaviour leads to the following conclusions 1. Cannibalism is a decisive factor of survival under scarce nutrition resources 2. Age cohorts of populations of different growth rates do not coexist under scarce nutrient resources 3. Foraging behaviour determines the window of opportunity for coexistence.] Address: Richter, O., Institute for Geocology, Technical University of Braunschweig, Germany. E-mail: o.richter@tu-bs.de

**3777.** Suhling, F.; Padeffke, T.; Johansson, F.; Richter, O. (2003): Mechanisms creating odonate community structure in desert wetlands. *Verhandlungen der Gesellschaft für Ökologie* 33: 282. (in English). [Verbatim: Temporary ponds in the Namibian semi-desert may be visited by a large number of dragonfly species even if the ponds are widely isolated from other aquatic habitats. At artificial ponds we identified 26 species, of which, however, only some colonised the ponds, i.e. laying eggs. The colonisers can be separated into two major groups. Group 1 consists of residents in the area, such as *Trithemis kirbyi* or are facultative migrants entering the area in small numbers, e.g. *Crocothemis erythraea* and *Orthetrum chrysostigma*. Species of group 2 are obligate migrants, which perform often long distance dispersal, normally in large aggregations, as obligate part of their life cycle [1], e.g. *Pantala flavescens* and *Sympetrum fonscolombii*. During two successive years almost exclusively migrants emerged successfully from the artificial ponds. Studies with early stadium larvae revealed that larvae of the migrants (group 2) are more active and have higher food intake than larvae of group 1; consequently the initial growth of the migrants was faster [2]. Fast growths allow species of group 2 to develop successfully under the conditions of temporary wetlands with short duration. Moreover, differences in growth should affect the outcome of interspecific interactions because size differences are the major driver for intraguild predation in dragonfly larvae [3, 4]. We tested the hypothesis that the larvae of the migrant *S. fonscolombii* grow faster and will be the superior predator to the larvae of the resident *T. kirbyi* when the eggs of both species are laid at the same time and place, because size differences of two or more instars will cause an increased mortality due to predation in a two-species interaction experiment [5]. We found that under these conditions *T. kirbyi* became almost extinct. However, the interaction between migrants and residents may also be altered by temporal differences in oviposition at a given habitat, i.e. temporal priority. At our artificial ponds we observed first ovipositions of *T. kirbyi* 11 days before those of *S. fonscolombii*. We therefore tested the hypothesis that the species that arrives first at the water (i.e. has temporal priority) is a superior predator to the later arriving species. We found that *T. kirbyi* survives and even dominates the competitive superior *S. fonscolombii* when the latter was introduced to the system 11 days later than *T. kirbyi*. References: [1] Corbet PS (1999) *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester. [2] Johansson F, Suhling F (subm.) Behaviour and growth of dragonfly larvae along a permanent to temporary water habitat gradient. [3] Anholt BR (1994) Cannibalism and early instar survival in a larval damselfly. *Oecologia* 99, 60-65. [4] Wissinger SA (1989) Seasonal variation in the intensity of competition and predation among dragonfly larvae. *Ecology* 70, 1017-1027. [5] Padeffke T, Suhling F (2003) Temporal priority and intra-guild predation in temporary waters: an experimental study using Namibian desert dragonflies *Ecol. Entomol.*: in press.] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**3778.** Switzer, P.V.; Eason, P.K. (2003): Space use in territorial amberwing dragonflies: are residents female maximizers or neighbor minimizers?. *Behavioral Ecology and Sociobiology* 54(4): 321-328. (in English). [Residents of mating territories interact with different categories of conspecifics: females, nonneighbor males, and neighbor males. Interaction with these different types of conspecifics is likely to have different costs and benefits; for example, interactions with females will be beneficial, while interactions with neighbors are more likely to be costly. In this study, we investigated patterns of intrusions and space use in territorial male amberwing dragonflies (*Perithemis tenera*) to test the idea that residents will adjust their use of space to maximize their beneficial interactions with conspecifics while minimizing their costly interactions with conspecifics. Because territories were arranged linearly around the edge of a pond, each resident had two neighbors, one of which was often closer to the focal resident than the other. Residents experienced more intrusions by neighbors and fewer intrusions by females on the side of their closer neighbor. Residents generally perched on the side of their territory that experienced the fewest intrusions by neighbors and the most intrusions by females, but the pattern was more strongly related to neighbor intrusions than female intrusions. Subsequent to pursuits of neighbors and females, residents tended to shift their perches away from where they pursued neighbors but toward where they pursued females. Nonneighbor intrusions were not affected by neighbor proximity, nor did residents adjust their space use in response to nonneighbor intrusions. Our results suggest that residents do adjust their space use in response to intrusions by conspecifics, that their adjustment depends on the type of conspecific that intruded, and that residents may be using a simple decision rule such as "move away from male intrusions, move closer to female intrusions" to adjust their within-territory space use.] (Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**3779.** Sy, T. (2003): Zur Libellenfauna des Naturschutzgebietes "Reudnitz" in der Dahleener Heide (Odonata). *Entomologische Nachrichten und Berichte* 47(1): 19-26. (in German, with english summary). [Sachsen, Germany; 13 water bodies of different trophic level were surveyed in 1999 and 2000. A total of 30 odonate species was recorded, including several rare species. *Lestes virens*, *Coenagrion hastulatum*, *Aeshna affinis*, *Cordulegaster boltonii*, *Orthetrum coerulescens*, *Leucorrhinia albifrons*, *L. rubicunda*, and *L. dubia* are dis-

cussed in detail.] Address: Sy, T., RANA-Büro für Ökologie und Naturschutz, Am Kirchtor 27, D-06108 Halle (Saale), Germany

**3780.** Taylor, J. (2003): Backyard dragonflies in Perth. *Austrolestes* 7: 4. (in English). [Australia; "Two years ago we moved to our present house in the western suburbs. It has a large swimming pool in full sun that has not been turned into a dragonfly pond as yet. This summer I had the idea that I could make the pool dual purpose -pool and pond. At the beginning of February I purchased a pair of kiddies plastic pool/sandpits in the form of scallop shells and floated them in the pool. They were not stable, so I tied rubber foam pipe insulation around the edge, to hold them level while swimmers used the pool. The ponds were filled with tap water and I added some lilies and material netted from local lakes to seed them with pond fauna. Initially there was a problem with midge and mosquito larvae, but these were soon controlled with a few gambia fish. The fish are no longer needed, since there are now ample insect predators. I don't know how much these ponds have influenced visiting dragonflies - but there are always dragonflies present and almost every day in late March and early April I have seen mating pairs laying eggs in the ponds."; *Orthetrum caledonicum*, *Diplacodes haematodes*, *Hemicordulia australiae*, *H. tau*, *Trapezostigma stenoloba*, *Pantala flavescens*, *Hemianax papuensis*, *Ischnura aurora*, *Xanthagrion erythroneurum*. "It is interesting that in the early stages of the ponds, dragonflies did not seem to recognise them as being any better than the pool for laying eggs in. But now they lay there almost exclusively. *Xanthagrion* persistently tried to lay on the creepy crawly pipe, *Hemicordulia* lays anywhere, even on glazed tiles. *Trapezostigma* makes a single plunge to dip its abdomen into the pool and then flies off. [...]". This pool is compared with a shady pool overhung by a huge gum tree. "When going out at night with a torch to look for emerging adults I found that *Hemianax* larvae have an interesting nocturnal behaviour of gently jetting themselves through open water over two metres deep, presumably to catch unsuspecting planktonic life. When caught in the torchlight they zip off at great speed." (Author)] Address: not stated

**3781.** Tennessen, K. (2003): Minter J. Westfall, Jr. passed away. *Argia* 15(2): 2-5. (in English). [Minter Westfall (28 January 1916 - 20. July 2003) had an enormous influence on odonatology worldwide, and especially on today leading North-American odonatologists. Ken Tennessen, Mike May, Jerrell Daigle, Carl Cook, Bill Mauffray, and Nick Donnelly (in his introduction into the current issue of *Argia*) contributed some personal stories of a rich common odonatological life with Minter Westfall.] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**3782.** Thakoor, S.; Chahl, J.; Srinivasan, M.V.; Young, L.; Werblin, F.; Hine, B.; Zornetzer, S. (2003): Bioinspired engineering of exploration systems for NASA and DoD. *Artificial Life* 8(4) (2002): 357-369. (in English). ["A new approach called bioinspired engineering of exploration systems (BEES) and its value for solving pressing NASA and DoD needs are described. Insects (for example honeybees and dragonflies) cope remarkably well with their world, despite possessing a brain containing less than 0.01% as many neurons as the human brain. Although most insects have immobile eyes with

fixed focus optics and lack stereo vision, they use a number of ingenious, computationally simple strategies for perceiving their world in three dimensions and navigating successfully within it. We are distilling selected insect-inspired strategies to obtain novel solutions for navigation, hazard avoidance, altitude hold, stable flight, terrain following, and gentle deployment of payload. Such functionality provides potential solutions for future autonomous robotic space and planetary explorers. A BEES approach to developing lightweight low-power autonomous flight systems should be useful for flight control of such biomorphic flyers for both NASA and DoD needs. Recent biological studies of mammalian retinas confirm that representations of multiple features of the visual world are systematically parsed and processed in parallel. Features are mapped to a stack of cellular strata within the retina. Each of these representations can be efficiently modeled in semiconductor cellular nonlinear network (CNN) chips. We describe recent breakthroughs in exploring the feasibility of the unique blending of insect strategies of navigation with mammalian visual search, pattern recognition, and image understanding into hybrid biomorphic flyers for future planetary and terrestrial applications. We describe a few future mission scenarios for Mars exploration, uniquely enabled by these newly developed biomorphic flyers." (Authors)] Address: Thakoor, Sarita, Jet Propulsion Laboratory, Caltech, Pasadena, CA, 91109, USA. E-Mail: sarita.thakoor@jpl.nasa.gov

**3783.** Trapero Quintana, A.; Naranjo López, N. (2003): Revision of the order Odonata in Cuba. *Bulletin of American Odonatology* 7(2): 23-39. (in English). [The list of the Odonata of Cuba is updated to 81 species. The species are annotated. In addition, the paper contains a brief history on studying Cubanian Odonata, an analysis of the altitudinal distribution of the odonate species, remarks to zoogeographic relationships, endemic species, and distribution maps on a regional level.] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Santiago, Cuba

**3784.** Tunmore, M. (2003): A Stowaway Southern Oak Bush-cricket *Meconema meridionale* and other observations from Holland. *Atropos* 20: 59-60. (in English). [*Chalcolestes viridis*, *Coenagrion lunulatum*, and *Erythromma viridulum* are listed without site information.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

**3785.** Valley, S. (2003): 2003 DSA annual meeting in Williams, CA and post meeting trip to Owens Valley, June 19-25. *Argia* 15(2): 5-8. (in English). [The paper includes some information about the business meeting of DSA, the lectures, and focus on the results of several field trips. Species list of the following localities are presented: Bear Creek, Colusa County, Pope Creek, Napa County, Guenoc Pond, Lake County, Putah Creek, Yolo/Solano county, Big Chico Creek and Cherry Hill Campground, Butte County, Horseshoe Lake in Bidwell Park, New York Creek, ? County, a grass lake, El Dorado County, Markleeville, Alpine County, Monitor Pass, Mono County (?), and several places in Inyo County. Some emphasis is given to records of *Tanypteryx hageni* and *Cordulegaster deserticola* Cruden, 1969 (Obviously, this taxa is a good species rather a syn. of *C. dorsalis*, for K. Tennessen reported several morphological differences between these two taxa). The paper also list all participants.] Address: Valley, S., 1165 SW

Lawrence, Albany, OR, 97321, USA. E-mail: svalley@comcast.net

**3786.** Van Buskirk, J.; Anderwald, P.; Lüpold, S.; Reinhardt, L.; Schullera, H. (2003): The lure effect, tadpole tail shape, and the target of dragonfly strikes. *Journal of Herpetology* 37(2): 420-423. (in English). ["Tadpoles of many species develop enlarged tail fins in the presence of insect predators, but the function of this response is not known. Because large tails do not improve swimming performance, we tested the hypothesis that the tail attracts predator strikes away from the more vulnerable head and body region. We first confirmed the assumption that attacks to the tail are less dangerous: Living tadpoles escaped from dragonfly larvae only 10% of the time when the strike landed on the head and body but 29.4% of the time when struck on the tail. We then constructed model tadpoles having four tail shapes: normal, predator-induced, and 50% shallower and 50% deeper than normal. The models were presented to dragonflies and the location at which the insect's labium struck the model was noted. Models having the predator-induced tail sustained 16% fewer strikes to the head and body than did models with the non-induced tail, lending credibility to the hypothesis that the tail acts as a lure. Models with an unnaturally large tail were attacked more often on the body than was the predator-induced model, which may create stabilizing selection on tail shape." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**3787.** Vick, G.S. (2003): Obituary David Allen Lewis Davies. *Odonatologica* 32(3): 295-301. (in English). [D.A.L. Davies, 18 March 1923 - 2 March 2003] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom

**3788.** Walker, J.; Smentowski, J. (2003): Tachoptery thoreyi (Hagen), Somatochlora tenebrosa (Say) and S. hineana Williamson - observations from Missouri. *Argia* 15(1): 6-11. (in English). [On the opportunity for searching Somatochlora hineana in Missouri, USA, information on Tachopteryx thoreyi, S. tenebrosa, and S. hineana are compiled from literature data and personal communications. Special emphasis is given to habitat, oviposition, and larval habitats.] Address: Walker, Jane, Washington University Tyson Research Center, P.O. Box 258, Eureka, MO 63025, USA. E-mail: walker@biology.wustl.edu

**3789.** Wang, Z.-g. (2003): A new species of the genus Sinocnemis (Odonata: Platycnemididae) from Henan Province of China. *Entomotaxonomia* 25(1): 1-3. (in Chinese with English summary). ["The paper reports a new species of the genus Sinocnemis Wilson et Zhou. Type specimens are preserved in the Henan Academy of Science, China. Sinocnemis henanese, sp. nov. Measurements (mm): Abd. apprxapp. ♂ 35 mm apprx38 mm, ♀ 32 mm apprx34 mm. Hind-wing ♂ 28 mm apprx32 mm, ♀ 30 mm apprx32.5 mm. This species is similar to Sinocnemis yangbingi Wilson et Zhou, but differs from the latter as follows: 1) Pronotum of ♂ and ♀ with two yellowish round spots; 2) no small stripe at the upper posterior corner of the mesepimeron of synthoax; 3) lateral margin of abdominal segments 3 apprx4 with long yellowish stripe; 4) terminal margin of distal segment of penis with a apophysis. Holotype: ♂, Mt. Baiyun, Song County, Henan Province, 06-VIII-

1996, coll. WANG Zhi-guo. Paratypes: 1 ♀ Jiyuan County, Henan Province, 17-V-1987, coll. XI-AO Jian-guang; 2 ♂♂, 1 ♀ Lushan County, Henan Province, 22-VI-1990, coll. WANG Zhi-guo." (Author)] Address: Wang Zhi-guo, Henan Academy of Science, Zhengzhou, Henan, 450002 China

**3790.** Watson, E.J.; Carlton, C.E. (2003): Spring succession of necrophilous insects on wildlife carcasses in Louisiana. *Journal of Medical Entomology* 40(3): 338-347. (in English). ["Seven fresh animal carcasses were monitored throughout decomposition in a mixed flat-wood forest in East Baton Rouge Parish, LA from 1 April to 1 July 1999. Succession patterns of necrophilous insects were documented for the following: one Louisiana black bear (threatened species), two white-tailed deer, two alligators, and two swine as the experimental reference. Our results suggest variation in the species composition of necrophilous insects among animal carcass types. A total of 93 arthropod species, from 46 families and three classes, were manually collected from the seven carcasses. Only 19 insect species were collected on all four animal types and were represented by eight families: Coleoptera: Histeridae, Nitidulidae, Silphidae, Staphylinidae; Diptera: Calliphoridae, Muscidae, Piophilidae, Sepsidae. Eleven of the 46 families were not collected at either alligator site but were observed at bear, deer, and swine carrion: Coleoptera: Cleridae, Dermestidae, Geotrupidae, Scarabaeidae; Diptera: Micropezidae, Sarcophagidae, Syrphidae; Hymenoptera: Apidae; Lepidoptera: Nymphalidae; and Odonata: Libellulidae. Residency and succession patterns of necrophilous insects are presented for each animal type with particular emphasis on selected fly (Calliphoridae, Muscidae, Piophilidae, Stratiomyidae) and beetle species (Cleridae, Dermestidae, Histeridae, Nitidulidae, Silphidae, Staphylinidae)." (Authors)] Address: Carlton, C.E., Department of Entomology, Louisiana State University, Baton Rouge, LA, USA. E-Mail: ewatson@agctr.lsu.edu

**3791.** Weihrauch, F.; Schorr, M. (2003): Bibliographie der odonatologischen Literatur Bayerns 1996-2002 (Odonata). *Libellula Supplement* 4: 133-142. (in German, with English summary). ["A list of 107 references is given, covering relevant odonatological literature from this period of time for the state of Bavaria, Germany. Not considered in this list were articles concerning fossil dragonflies and unpublished diploma theses and reports." (Authors)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-Mail: florian.Weihrauch@t-online.de

**3792.** Weihrauch, F. (2003): Emergenzstudien an Cordulegaster b. boltonii von einem niederbayerischen Waldbach (Odonata: Cordulegastridae). *Libellula Supplement* 4: 3-18. (in German, with English summary). ["Between 1996 and 2003 the emergence was studied at the Schallerbach, a forest rivulet near Siegenburg (48°45'N, 11°44'E) in Lower Bavaria, Germany. The period of emergence lasted from 24 May to 13 June. Exuviae hung preferably on twigs of spruce trees and on the bark of pine trees, to a height of 6 m above water level and 4.2 m from the shore. The mean distances of from the water were 112 cm (s.d. ±105 cm) horizontally and 198 cm (s.d. ±114 cm) vertically (n=76). Additional behavioural observations included oviposition, male "dunking" and precopulatory action." (Author)] Address:

Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-Mail: Florian.Weihrauch@t-online.de

**3793.** Weihrauch, F.; Burbach, K.; Hölken, U.; Netz, H.J.; Stettmer, C. (2003): Neue Nachweise von *Orthetrum albistylum* aus Bayern (Odonata: Libellulidae). *Libellula Supplement* 4: 59-70. (in German, with English summary). ["Within Central Europe, the range of *Orthetrum albistylum* (Selys) hitherto was confined to the southern parts, reaching Germany only in the extreme southwest, in the Upper Rhine Valley and at Lake Constance. Besides, there existed only five other German records of the species taken in Bavaria as single, obviously migrating individuals. In the years 1999-2002 we were able to take a number of new records of the species, including successful reproduction, at three localities in Bavaria. Obviously *O. albistylum* was able to establish at least temporary bridgeheads of possibly northern Italian origin in this region north of the Alps. Possible migration routes and an extension of range of the species in Central Europe are discussed."] (Authors)] Address: Weihrauch, F., Hengelerstraße 9, D-80637 München, Germany. E-Mail: Florian.Weihrauch@t-online.de

**3794.** Werking-Radtke, J. (2003): Eingriffsregelung - Wirkungen von Kompensationsmaßnahmen. *LÖBF-Mitteilungen* 2/2003: 62-69. (in German). [Against the background of the German legal rules (§19 BNatSchG) to compensate impacts caused by the construction of a road, so called "compensation area-pools" were declared to focus compensation measures from several impacts on one - greater - area instead to have several small and isolated areas. The paper critically assesses the efforts of one of these "pools" in the county of Steinfurt, Nordrhein-Westfalen, Germany. 18 odonate species could be recorded; the species spectrum coincides with the typical regional odonate fauna. Therefore, it is concluded that water body-based measures have been successful. Nonetheless, a sustainable effort of the measures will not be given due to fast growing, expansive scrubs which will shade the bankside of the water bodies. This will cause the loss of several typical odonate species.] Address: Werking-Radtke, Jutta, Dezerinat: Biomonitoring und Erfolgskontrolle, LÖBF NRW, Castroper Str. 312-314, D-45665 Recklinghausen, Germany. E-mail: jutta.werking-radtke@loebf.nrw.de

**3795.** Willigalla, C.; Menke, M.; Kronshage, A. (2003): Naturschutzbedeutung von Regenrückhaltebecken. Dargestellt am Beispiel der Libellen in Münster/Westfalen. *Naturschutz und Landschaftsplanung* 35(3): 83-89. (in German, with English summary). [Nordrhein-Westfalen, Germany; "In the city of Münster rain storage ponds have been constructed since 1980 to temporarily store peak flow discharge and large amounts of surface effluents. A dragonfly inventory of all rain storage ponds identified 27 species (61 % of a total of 44 species occurring in the city area of Münster), with 22 classified as (potentially) permanent settlers and five species as guests. Beside species frequently occurring at all types of water habitats of the city area a number of specialised species could be found. The earlier comprise *Cercion lindenii*, *Erythromma najas*, *Ischnura pumilio*, and *Aeshna grandis*, more specialised species are *Lestes dryas*, *Somatochlora metallica*, and *Orthetrum brunneum*. The colonisation depends on the one hand on light conditions and vegetation structure of the ponds, on the other side on the spatial relationship to

other important dragonfly biotopes in Münster. The study shows that rain storage ponds in urban areas significantly contribute to the protection of mainly ubiquitous species but also support some more specialised species, at least as 'side-habitats' as referred to in the concept of metapopulations. Finally, the study proposes management and development measures for the establishment of rain storage ponds." (Authors)] Address: Willigalla, C., c/o Willigalla Ökologische Gutachten, Franz-List-Str. 103, D-14624 Dallgow, Germany. E-mail: christoph@willigalla.de

**3796.** Willigalla, C. (2003): New data on dragonflies (Odonata) of the Masurian lakelands. *Wiad. entomol.* 22(1): 50. (in Polish). [NE Poland; data resulting from a survey of four localities in June 2001 are briefly documented.] Address: Willigalla, C., c/o Willigalla Ökologische Gutachten, Franz-List-Str. 103, D-14624 Dallgow, Germany. E-mail: christoph@willigalla.de

**3797.** Wilson, K.D.P.; Reels, G.T. (2003): Odonata of Guangxizhuang Autonomous Region, China, part I: Zygoptera. *Odonatologica* 32(3): 237-279. (in English). [Taxonomic and faunistic information is provided on the Zygoptera of Guangxi Zhuang Autonomous Region, China. *Megalestes haul* sp. n. (holotype: ♂, Shiwandashan), *M. tuska* sp.n. (holotype: ♂, Dayaoshan), *Rhipidolestes laui* sp.n. (holotype: ♂, Cenwanglaoshan), *Calicnemia haksik* sp.n. (holotype: ♂, Cenwanglaoshan), *Coelicia galbina* sp.n. (holotype: ♂, Longrui), and *Drepanosticta magna* sp.n. (holotype: ♂, Cenwanglaoshan) are described. *Sinolestes truncata* Needham is synonymised with *Sinolestes edita* Needham. The hitherto unknown ♂ of *Indocypha katharina* (Needham) and ♀ of *Schmidtiphaea vietnamensis* (van Tol & Rozendaal) are described. *Devadatta ducatrix* Liefstinck, *Euphaea guerini* Rambur, *Euphaea superba* Selys, *Schmidtiphaea vietnamensis* van Tol & Rozendaal, *Indocnemis ambigua* (Asahina), *Calicnemia miles* (Laidlaw), and an undescribed species of *Drepanosticta* are recorded from China for the first time. The status of Guangxi as an important centre of odonate biodiversity is discussed."] (Authors)] Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@netvigator.com

**3798.** Wong, A.; Smith, M. L.; Forbes, M. R. (2003): Differentiation between subpopulations of a polychromatic damselfly with respect to morph frequencies, but not neutral genetic markers. *Molecular Ecology* 12(12): 3505-3513. (in English). [*Nehalennia irene* "has two distinct female colour morphs. Individuals of one morph have male-like colouration and pattern (androchromes), whereas gynochromes are different from males and androchromes in these respects. In several damselflies, such female-limited polychromatism is attributable to a single genetic locus. We developed six polymorphic genetic markers, which were codominant, to test for genetic differentiation in *N. irene*, collected from two sites located 8 km from one another in eastern Ontario, Canada. Based on three censuses spanning a 10 year period (1992-2001), morph ratios differed consistently and significantly between these two sites. However, subpopulations at these sites were not genetically differentiated with respect to the putatively neutral markers. Our results suggest that site differences in morph ratios of female *N. irene* cannot be explained by genetic drift, but are consistent with spatially variable selection operating on different morphs, perhaps mediated by male

density. Alternatively, morph type may be a plastic trait and cues for induction may differ between sites." (Authors)] Address: Wong, A., Dept of Molecular Biology and Genetics, Biotechnology Building, Cornell University, Ithaca, NY 14853 USA. E-mail: aw246(@)cornell.edu

**3799.** Yates, N. (2003): Worldwide Dragonfly Association 3rd International Symposium of Odonatology. *Austrolestes* 7: 2-3. (in English). [This is a compact report on the WDA symposium held in January 2003 in Beechworth, Australia.] Address: not stated

**3800.** Zavodska, R.; Sauman, I.; Sehnal, F. (2003): Distribution of PER protein, pigment-dispersing hormone, prothoracicotrophic hormone, and eclosion hormone in the cephalic nervous system of insects. *Journal of Biological Rhythms* 18(2): 106-122. (in English). ["Investigations performed on adult insects revealed that putative components of the central pacemaker, the protein Period (PER) and the pigment-dispersing hormone (PDH), are immunocytochemically detectable in discrete sets of brain neurons throughout the class of Insecta, represented by a bristletail, mayfly, damselfly, 2 locust species, stonefly, 2 bug species, goldsmith beetle, caddisfly, honeybee, and 2 blowfly species. The PER-positive cells are localized in the frontal protocerebrum and in most species also in the optic lobes, which are their only location in damselfly and goldsmith beetle. Additional PER-positive cells occur in a few species either in the deuto- and tritocerebrum or in the suboesophageal ganglion. The PER staining was always confined to the cytoplasm. The PDH immunoreactivity consistently occurs in a cluster of perikarya located fronto-ventrally at the proximal edge of the medulla. The mayfly and both locust species possess additional PDH neurons in 2 posterior cell clusters at the proximal edge of the medulla, and mayfly, waterstrider, and 1 of the blowfly species in the central brain. PDH-positive fibers form a fanlike arrangement over the frontal side of the medulla. Two or just 1 bundle of PDH-positive fibers run from the optic lobe to the protocerebrum, with collaterals passing over to the contralateral optic lobe. Antisera to the prothoracicotrophic (PTTH) and the eclosion (EH) hormones, which in some insects regulate the molting and ecdysis rhythms, respectively, typically react with a few neurons in the frontal protocerebrum. However, the PTTH-positive neurons of the mayfly and the damselfly and the EH-positive neurons of the caddisfly are located in the suboesophageal ganglion. No PTTH-like antigen was detected in locusts, and no EH-like antigens were detected in the damselfly, stonefly, locusts, and the honeybee. There are no signs of colocalization of the PER-, PDH-, PTTH-, and EH-like antigens in identical neurons." (Authors)] Address: Sehnal, F., Institute of Entomology, Czech Academy of Sciences, Branisovska 31, 370 05, Ceske Budejovice, Czech Republic. E-Mail: sehnal@entu.cas.cz

**3801.** Zawal, A. (2003): Dragonflies (Odonata) of nature reserve "Dolina Pieciu Jezior" ("Valley of Five Lakes") (Drawskie Lake District). *Parki nar. Rez. przyr.* 22: 101-106. (in Polish with english summary). [The odonate fauna of the nature reserve "Valley of Five Lakes" (Poland) was investigated in 1999 and 2000. The list of 29 species (basing on a collection of 1264 specimens) includes species as *Coenagrion lunulatum*, *Brachytron*

*pratense*, *Aeshna viridis*, *Somatochlora flavomaculata*, and *Epitheca bimaculata*. *Calopteryx splendens*, *Lestes virens*, and *Libellula fulva* are probably not autochthonous. Dominant species are *Coenagrion hastulatum* (due to the dystrophic character of many water bodies), *C. puella*, *Ischnura elegans*, and *Erythromma najas*. *Erythromma viridulum* recently reach edin the region the north-eastern boundaries of its range.] Address: Zawal, A., Uniwersytet Szczecinski, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**3802.** Zawal, A. (2003): Dragonflies (Odonata) of two small water bodies from Szczecin Landscape Park "Puszcza Bukowa". *Parki Narodowe i Rezerваты Przyrody* 22(3): 441-448. (in Polish, with english summary). [Poland; in 1999 and 2000, 28 odonate species, in most cases eurythopic species, were collected. *Platycnemis pennipes* and *Anaciaeschna isocela* were found only as adults. *Coenagrion puella*, *Erythromma najas*, and *Ischnura elegans* totalled to over 70% of the collected specimens. The dystrophic lake Weglinek was characterised by a high number of species, but without any dominant species.] Address: Zawal, A., Uniwersytet Szczecinski, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**3803.** Zawal, A.; Janicki, D. (2003): Pasożytowanie larw wodopójek z rodzaju *Arrenurus* na imagines wążek pochodzących z okolic Barlinka. In: *Zoologia na progu XXI wieku. Streszczenia referatów i plakatów ogólnopolskiej konferencji.* - [Zoologie an der Schwelle des XXI Jahrhunderts. Zusammenfassungen der Vorträge und Poster der allpolnischen Tagung]. Polskie Towarzystwo Zoologiczne, Uniwersytet Mikołaja Kopernika w Toruniu, Toruń: 257-258. (in Polish). [*Arrenurus* water mites as parasites of imagines of different odonate species in the environ of Barlinek, Poland - 557 odonate specimens from 24 species were collected. A total of 2218 specimens of water mites are reported. The infection rate is outlined for the following species as follows: *Enallagma cyathigerum* (56,5%), *Coenagrion puella* (53,6%), *Ischnura elegans* (46,9), and *Coenagrion pulchellum* (41,9%). Only two anisopteran species were infected: *ordulia aenea* (14,3%) and *Sympetrum sanguineum* (4%). In most cases, females were parasitised more intensively than males. Separated according the odonate topography, the mites preferred the following regions: Metathorax: 910, mesothorax: 464, abdominal segment 1: 371, abdominal segment 2: 200, abdominal segment 3: 63.] Address: Zawal, A., Uniwersytet Szczecinski, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

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