

ODONATOLOGICAL ABSTRACTS

1979

- (5877) KERDPIBULE, V., S. NICHARAT & S. SUCHARIT, 1979. Descriptions of odonate nymphs from Thailand. *Stheast Asian J. trop. Med. public Health* 10(4): 540-547. — (Fac. Trop. Med., Mahidol Univ. Bangkok, Thailand).

The ultimate instars of *Brachythemis contaminata*, *Crocothemis servilia* and *Pseudagrion microcephalum*, and the penultimate instars of *Copera marginipes* and *Prodasineura autumnalis* are described and figured. Notes are also provided on the immature stages of not further identified *Diplacodes* and *Ceriagrion* spp. Of particular interest is a brief review of literature on Odon.-Trematoda relationship, with reference to the trematode vectors of human diseases in SE Asia.

1982

- (5878) HEPPNER, J.B. & G. LAMAS, 1982. Acronyms for world museum collections of insects, with an emphasis on neotropical Lepidoptera. *Bull. ent. Soc. Am.* 28(3): 305-315. — (First Author: Dept Ent., Smithsonian Instn, Washington, DC 20560, USA).

Acronyms are suggested for 285 museum collections, in 71 countries; listed per country and indexed alphabetically.

- (5879) HONG, Y.-t., 1982. *Jiuquan Pendi kunchong huashi*. — [*Mesozoic fossil insects of Jiuquan Basin in Gansu Province*]. Geol. Publ. House, Beijing. 187 pp., pls excl. (Chin.). — (Tianjin Inst. Geol. & Miner. Resour., Tianjin, P.R.

China).

The Odon. are dealt with on pp. 18, 36, 47-63, 178, 181, pls 3-5, 39, and the following taxa are described, figured and keyed as new: Gomphidae: *Sinogomphus taushanense* gen. & sp. n. (Taoshan, Jilin Prov., provisionally placed in Early Cretaceous), *Cercus clavus* gen. & sp. n. (Yumen, Gansu Prov., Jurassic), *Dissurus quinquanensis* gen. & sp. n. (Yumen, Gansu Prov., Late Jurassic; larva), *D. liauyuanensis* sp. n. (Liauyuan, Liaoning Prov., Late Jurassic; larva); — Aeschniidae: *Brunnaeschnidia jiuquanensis* gen. & sp. n. (Jiuquan, Gansu Prov., Late Jurassic), *Hebeiaeschnidia fengningensis* gen. & sp. n. (Fengning, Hebei Prov., Late Jurassic); — Aeshnidae: *Liupanshaniasia sijiensis* gen. & sp. n. (Siji, Ningxia Autonomous Region, Early Cretaceous). Descriptions and figs are also presented of not further identified *Archaeogomphus* sp. (Yumen, Gansu Prov., Late Jurassic; larva) and *Brunnaeschnidia* sp. (Yumen, Gansu Prov., Late Jurassic). — (*Abstracter's Note*: *Sinogomphus* Hong, 1982 is preoccupied by *Sinogomphus* May, 1935 [*Senckenbergiana* 17: 90-94], and the preoccupied *Archaeogomphus* Lin, 1979 has been replaced by *Yixiangomphus* Lin, 1986 [*Odonatologica* 15: 449-450]).

1983

- (5880) VAN TOL, J., 1983. Council of Europe project: Protection of dragonflies and their biotopes. Preliminary list of Odonata taxa suggested for inclusion in the project. *Council of Europe Report SN-VS 83(14)*: 2-11. — (Rijks-

museum van Natuurlijke Historie, P.O. Box 9517, NL-2300 RA Leiden).

The total number of odon. spp. recorded from Europe amounts to 127; 59 of these are included in this list, along with statements on their range-category, general distribution, habitat and status.

1984

- (5881) HAND SHETTERLY, S., 1984. Nighthawks and dragonflies. They have always seemed magical to people - and sinister. *Yankee* 1984 (August): 86-91. — (Author's address not stated).

Largely a literary text, but containing also some main biological information on dragonflies.

1985

- (5882) BEIRNE, B.P., 1985. Irish entomology: the first hundred years. *Ir. Naturalist's J.* (Ent. Suppl.) 1985: 1-40. — (c/o C.E. O'Riordan, Keeper Nat. Hist., Nat. Mus. Ireland, Dublin). The history of entomology in Ireland is covered up to 1950. Among others, the work of W.F. Kirby (1844-1912) is dealt with in some detail and his (hitherto unpublished) portrait is provided.

- (5883) CONESA GARCIA, M.A., 1985. *Larvas de odonatos*. Claves para la identificación de la fauna española. Vol. 14, 39 pp. Depto Zool., Fac. Cien., Univ. Málaga. — Price and ISBN number not stated, — (Author & Publishers: Depto Zool., Fac. Cien., Univ. Málaga, ES-29080 Málaga).

Identification key for the Spanish fauna. The adults are dealt with in the work listed in OA 4618. The keys are well organized and adequately illustrated, but it is unfortunate that figures have no captions.

- (5884) [FIMIANI, P., C. D'ANTONIO & G. DE FILIPPO], 1985. Segnalazioni faunistiche italiane (N. 55-70). *Boll. Soc. ent. ital.* 117(8/10): 182-184. — (First Author: Ist. Ent. Agraria, Via Università, I-80055 Portici). Noteworthy records of 10 odon. spp. are listed

under Nos 55-64. Among these, *Sympetrum depressiusculum* is listed for the first time from southern Italy.

- (5885) LAHIRI, A.R., 1985. Insecta: Odonata [of Arunachal Pradesh, India]. *Rec. zool. Surv. India* 82(1/4): 61-67. — (Zool. Surv. India, 2nd MSO Bldg, Nizam Palace Complex, 234/4 A.J.C. Bose Rd, Calcutta-700020, India).

In addition to the records of 10 spp., *Coelicia prakritii* sp. n. is described and illustrated (holotype ♂ and 3 ♂ paratypes: Namdhapa Sanctuary, Arunachal Pradesh, India, 2-V-1981).

- (5886) LAHIRI, A.R. & C. SINHA, 1985. A new synonymy in Indian *Rhinocypha* Rambur, with a review of the species-groups *fenestrella* and *bifasciata* (Odonata: Chlorocyphidae). *Bull. zool. Surv. India* 7(1): 33-36, pl. 1. — (Zool. Surv. India, 2nd MSO Bldg, Nizam Palace Complex, 234/4 A.J.C. Bose Rd, Calcutta-700020, India).

R. bifenestrata Fraser is synonymized with *R. cuneata* Sel. and it is placed in Fraser's (1934) *fenestrella*-group.

- (5887) LEE, M.-C., 1985. One unrecorded species of the genus *Sympetrum* Newman (Odonata, Libellulidae) from Korea. *Korean Arachnol.* 1(1): 27-28. (Korean, with Engl. s.). — (Arachnol. Inst. of Korea, Dept Biol., Korea Univ., Seoul-132, Korea).

Several individuals of *S.s. speciosum* are recorded from Kwanumsa, Hallasan, Cheju-do (4-VIII-1982). The author is engaged in the inventarisation of the Korean odon. fauna.

- (5888) ROWE, R.J., 1985. *A taxonomic revision of the genus Xanthocnemis* (Odonata: Coenagrionidae) and an investigation of the larval behaviour of *Xanthocnemis zealandica*. PhD thesis, Univ. Canterbury, Christchurch, NZ, V+296 pp. — (Dept Zool. Univ. Canterbury, Christchurch-1, NZ).

The thesis is divided into sections dealing with: taxonomy of the genus, agonistic display used during site defence, aspects of the predatory activity of dragonfly larvae, use of space by X.

zealandica larvae and the value of the territorial sites occupied. Each section is headed by a brief statement placing the section in context and comprises one or more chapters. There are 4 appendices: the first describes some mathematical techniques used, the second examines predatory versatility in *Hemianax papuensis*, the third details the effect of perch diameter on foraging and predator avoidance success and the fourth contains data on site occupation. — [Verbatim abstract]: The genus *Xanthocnemis* is endemic to New Zealand and includes 4 described spp. *X. tuanuii* is confined to the Chatham Islands, *X. sobrina* in Northland forests and *X. sinclairi* is described for the first time from Whitcombe Pass in the headwaters of the Rakaia River (holotype ♂, allotype ♀, in copula: Louper Stream Valley; deposited in Auckland Inst. & Mus.; larval habitat are shallow rock-bottomed depressions, probably seepage fed). *X. zealandica* is the commonest and most widely distributed sp., occurring on the 3 main islands, in many still and some running water habitats. In the present study, larval behaviour was examined extensively in laboratory aquaria with particular emphasis on interactions with conspecifics and the use of defended, territorial sites. Field studies were used to complement laboratory work on feeding. — *X. zealandica* larvae have an extensive repertoire of agonistic displays, 25 of which are identified and described. All are associated with site defence. Larvae adopt a sedentary behaviour pattern from the earliest free living stage and many displays are well developed by instar 5. Late instar larvae select particular types of sites on stems with a preference for those of 4-7 mm diameter observed in experimental work. They often remain on a particular site for many weeks. This was consistent with what was known of their behaviour in the field. — It was found that the perches occupied probably served the larvae primarily as refuges from predators rather than as "fishing sites". Behaviour on sites was insensitive to feeding regimes, i.e. different prey type and density. The sites were effective refuges against some invertebrate predators including larval and adult *Dytiscidae*. It is considered that the "sit and wait" tactics of *X. zealandica*

larvae are mainly associated with predator avoidance. — The sedentary and cryptic behaviour of *X. zealandica* made experimental investigation of the predatory behaviour of larvae impracticable. However, the opportunity was taken to examine the varied predatory behaviour of *Hemianax papuensis* which was more amenable to study. This demonstrated unequivocally the presence of predatory versatility in odon. larvae. — (*Abstracter's Note*: In spite of the very adequate description and figs of *X. sinclairi* sp. n., due to the stipulation in Art. 8/c and Art. 9/11 of the Int. Code of Zoological Nomenclature, this name is not available and the description is invalid. For a properly published, therefore valid description cf. *OA* 5951).

- (5889) SÚAREZ FONSECA, L., 1985. *Morfología del integumento de la náyade de Aeshna (Hesperaeschna) marchali Rambur, 1842 (Odonata Aeshnidae)*. Tesis de grado de Biología, Fac. Cien., Pontificia Univ. Javeriana, Bogotá. XIII+182 pp. 61 pls incl. — Xerox copies available at Hfl. 85.- + postage from the SIO Central Office, Bilthoven, The Netherlands. — Author: A.A. 26157, Bogotá, D.E., Colombia).
This is a monographic treatment of the external morphology of the larva of *Aeshna marchali*, with extensive notes on the adult, documented by 70 (good quality) figs.
- (5890) [TAGUCHI, M.], 1985. [Migrative dispersion of imaginal *Anotogaster sieboldii*]. *Insectarium, Tokyo* 22(10): 288-290. (Jap.). — (1-22-4, Minami-hashimoto, Sagamihura, Kanagawa Pref., 229, JA).
334 males and 32 females, caught at a stream in Yato, Shiroyama-machi, Kanagawa Pref. (July 24 - Oct. 7, 1984), were released, after having been marked on the wings with the individual number and with the 'phone number the possible catcher was requested to dial. 14 males were recaptured in the same habitat, and 12 males and 1 female were reported by 'phone to have been caught at remote places. 3 males were recaptured twice, and 1 male was recaptured 3 times. The recapture rate was 8.5%, which is significantly

higher than 0.3% reported earlier for *Symptetrum frequens* (cf. *OA* 4996). The migration distances ranged between 0.9 and 26.6 km (8.7-2.4 km) and the mean migrating speed was 0.72 ± 0.18 km/day. There does not seem to be any restriction as to the direction, save for the SW, where there are mountains.

1986

- (5891) ALIEV, R.A., A.R. HALILOV, N.B. TALYBOV & I.A. AHMEDOV, 1986. *Gidrobiologicheskaya harakteristika ozera Aggel'*. — [Hydrobiological characteristics of the Aggel Lake]. *Izv. Akad. Nauk azerbaydzh. SSR* (Biol.) 1986(6): 36-41. (Azarbaijan, with Russ. s.). — (Authors' addresses not stated). 6 odon. spp. were recorded from the Aggel Lake, Azarbaijan, USSR, of which *Coenagrion puella*, *Ischnura elegans* and *I. pumilio* are listed only.
- (5892) ANDER, K., 1986. [Recension]. Sahlén, G., 1985. Sveriges trollsländer (Odonata). *Ent. Tidskr.* 107(3): 69-70. (Swed.). — (Skogsfrids-gatan 19, S-582 46 Linköping). Book review of the work listed in *OA* 5062.
- (5893) BOOSTEN, G., 1986. Odonata de la collection G. Boosten. *Bull. Anns Soc. r. belge Ent.* 122: 264-267. — (Author's address not stated). List of 36 spp., with locality and collection data, from various Belgian localities.
- (5894) CONESA GARCIA, M.A., 1986. Odonatos de las Marismas del Guadalhorce (Málaga): aspectos faunísticos. *Actas 8 Jornadas A & E, Sevilla*, pp. 1107-1120. (With Engl. s.). — (Depto Zool., Fac. Cien., Univ. Málaga, ES-29080 Málaga). The odon. fauna (17 spp.) of the Marismas del Guadalhorce nr Málaga, Eastern Andalusia, Spain is analysed and its similarities with the faunas of similar habitats in Huelva and Almeria are mathematically expressed.
- (5895) GARRISON, R.W., 1986. The genus *Aphylla* in Mexico and Central America, with a description of a new species, *Aphylla angustifolia* (Odonata: Gomphidae). *Ann. ent. Soc. Am.* 79(6): 938-944. — (1030 Fondale St., Azusa, CA 91702-0821, USA). Based upon examination of types, *A. ambigua* (Sel.) is found to be a synonym of *A. protracta* (Hag.). The common sp. ranging from southern Texas to Guatemala, previously known as *A. protracta* Calv., is described as *A. angustifolia* sp. n. (holotype ♂, allotype ♀: Lago Catemaco, Veracruz, Mexico, 17-VIII-1976), and compared with *A. protracta* and *A. obscura* (Kirby). A key to the 3 regional spp. is provided.
- (5896) GOLUBKOV, S.M. & A.M. PAVLOV, 1986. Rost i energeticheskiy obmen u lichinok *Coenagrion hastulatum* Charp. (Odonata: Zygoptera). — [Growth and energy metabolism in *Coenagrion hastulatum* Charpentier larvae (Odonata: Zygoptera)]. *Gidrobiol. Zh.* 22(2): 50-55. (Russ., with Engl. s.). — (Zool. Inst., USSR Acad. Sci., Universitetskaya nab. 1, USSR-199034 Leningrad). The *C. hastulatum* larvae are studied for their growth rate, oxygen uptake rate and energy consumption of the substrate. The growth rate is determined according to changes in size of the damselfly population during the vegetation season in 2 small ponds. The value of the energy use efficiency of the assimilated food (K_2) is calculated for the growth of larvae at 20° C.
- (5897) HEDSTRÖM, L., 1986. Svenska insektsfynd-rapport 2. — Swedish insect records - report 2. *Ent. Tidskr.* 107(4): 139-147. (Swed., with Engl. s.). — (Entomologiska avdelningen, Box 561, S-751 22 Uppsala). Includes records of 5 odon. spp.
- (5898) HIEKEL, I., 1986. Zur Libellenfauna des Sergener Luchs. *Natur Landsch. Cottbus* 8: 46-50. — (Anne-Frank-Str. 26, DDR-7513 Cottbus, GDR). Annotated list of 24 spp. from the Nature Reserve Sergener Luchs nr Cottbus, GDR.
- (5899) MARTIN, T.H., 1986. *The diets of bluegill and redear sunfish in Bay's Mountain Lake*. M. Sc. thesis, East Tennessee St. Univ., Johnson City. 53 pp. — (Author's current ad-

dress unknown; — correspondence to: Dr D.M. Johnson, Dept Biol. Sci., East Tennessee St. Univ., Box 23590 A, Johnson City, TN 37614-0002, USA).

[Verbatim abstract]: The goals of this study were to identify those dragonfly larvae that might experience significant predatory mortality from the larger sunfish of Bay's Mountain Lake, Sullivan Co., Tennessee. Interest was focused on whether the fish were size-selective predators on the larval odon., and if so, whether this led to differential mortality among species. — Samples of bluegill and redear sunfish were taken monthly from Aug. 1981 to Sept. 1982. The contents of the entire intestinal tracts of 58 bluegill and 78 redear sunfish were analyzed and the contained prey items identified and enumerated. Odon. found in the diets were measured (head width) and their size frequency compared to that of odon. collected from the lake during the same time period. — Redear sunfish were found to be the major odon. predator, with the majority of odon. predation occurring during mid-July on Corduliidae (most often *Tetragoneuria cynosura*). The redear were found to be size-selective predators on odon., however within, not among species. This size-selective predation could have great consequences for the *T. cynosura* as redear were feeding on the larger larvae (possibly the univoltine complement of each cohort).

- (5900) MOORE, R.D., 1986. *Exploitation competition between small bluegill sunfish and Tetragoneuria cynosura (Odonata: Anisoptera) larvae in the littoral zone of Bays Mountain Lake*. M. Sc. thesis, East Tennessee St. Univ., Johnson City. 60 pp. — (Author's present address unknown; — correspondence to: Dr D.M. Johnson, Dept Biol. Sci., East Tennessee St. Univ., Box 23590 A, Johnson City, TN 37614-0002, USA).

[Verbatim abstract]: *T. cynosura* (Corduliidae) has a 2-year larval period and is the most abundant anisopteran sp. in Bays Mountain Lake, City of Kingsport, Tennessee, USA. Small (< 30 mm standard length) bluegill sunfish (*Lepomis macrochirus*) and the year-classes of *T. cynosura* larvae exploit si-

milar prey populations in the littoral zone. A replicated field enclosure experiment, designed to determine whether small fish and dragonfly larvae engage in exploitation competition, was conducted from 5 Sept. to 4 Oct. 1983. This study was also designed to evaluate the effect of small bluegill on intra-odonate predation. — Prey depletion, fish and larval diet modifications, and differences in larval growth in response to the presence and absence of fish indicated that exploitation competition between *T. cynosura* larvae and small *L. macrochirus* does occur. This competition was more intense between fish and first year-class larvae than between fish and second year-class larvae. The second year-class larvae were evidently in a diapause; they were consuming enough food to maintain good condition but not enough to grow and emerge too early. First year-class larvae, however, seemed to be eating as much as possible in order to grow to larger instars. Consequently, there was more pressure on the prey resources when fish and first year-class larvae were present. — An increase in intra-odonate predation in response to the presence of small bluegill sunfish was observed. Larvae were encountering (and consuming) each other more frequently when fish were present. These more frequent encounters were attributed to exploitation, a fish avoidance behavior, or a combination of the two.

- (5901) *ODONATA RECORDING SCHEME NEWSLETTER*, No. 8 [issue number not stated] (Apr., 1986). — (c/o R. Merritt, 48 Somersby Ave., Walton, Chesterfield, Derbys. S42 7LY, UK).

This is the first issue published since 1983 (cf. OA 4332). In addition to "Some recent discoveries", related to 19 spp., the newsletter is giving an outline of the forthcoming reorganisation of the recording scheme. The evidence gathered up to and incl. 1986 is to be published, and the follow-on project is briefly described.

- (5902) REHFELDT, G., 1986. Verteilung und Verhalten von Segellibellen (Odonata: Libellulidae) während der Trockenzeit in Regenwäldern Panamas. *Amazoniana* 10(1): 57-62.

- (With Engl. s.) — (Zool. Inst., Techn. Univ., Pockelsstr. 10a, D-3300 Braunschweig, FRG). The distribution and flight behaviour of libellulids were studied in clearings of lowland tropical moist forest, on Barro Colorado Is., Panama (Jan.-Feb., 1986). The numbers of individuals and spp. increase with clearing area. Maximum flight activity up to the canopy occurs at noon, with the increased light intensity. In the afternoon, only short flights, close to the ground, were observed. There are 2 groups of differently coloured libellulids, discerned by peculiar height, kind and density of their perching sites. These are discussed in terms of strategies to avoid potential predators.
- (5903) SEKI, T., M. MITSUDO, S. FUJISHITA, M. ITO, N. MATSUOKA & K. TSUKIDA, 1986. Analysis of visual pigment chromophores in a compound eye of the dragonflies. *Zool. Sci.* 3(6): 985. [Abstract only]. — (First Author: Dept Health Sci., Osaka Kyoiku Univ., Osaka, JA).
[Verbatim; style and grammar improved]: Retinoid composition was analysed quantitatively by using high performance liquid chromatography. Dark adapted eyes of living insects were homogenized with NH_2OH in CH_3OK to form oximes of retinal isomers. — Save for a few Zygopteran families, all spp. of the 3 suborders contained retinal and 3-hydroxyretinal (3-OHR) in the compound eye, while in the former the amounts of retinal were undetectable. In almost all families the amount of 3-OHR was comparable, or higher than that of retinal, but in one Gomphidae genus the 3-OHR was lower. All larvae examined contained 3-OHR predominantly. — In Zygoptera, both retinals were distributed equally in an eye, but in the other 2 suborders, 3-OHR was present predominantly or exclusively in the ventral part of the compound eye. Retinal was found in the dorsal and in the ventral regions. — 3-OHR cannot be considered a phylogenetic marker in insects, as suggested by Vogt, but the biological significance of the presence of a particular retinal in some taxa is still unknown.
- (5904) SPENCE, J.R., 1986. Relative impacts of mortality factors in field populations of the waterstrider *Gerris buenoi* Kirkaldy (Heteroptera: Gerridae). *Oecologia* 70(1): 68-76. — (Dept Ent., Univ. Alberta, Edmonton, Alberta T6G 2E3, CA).
Impacts of predators, food levels and cannibalism on population growth of *G. buenoi* were studied in 2 experiments using field enclosures. Presence of invertebrate predators decreased egg-adult survivorship 2-3 fold and decreased the range of juvenile development times. *Aeschna* larvae were among the 5 main predators noted.
- (5905) TAKAMURA, K. & M. YASUNO, 1986. Effects of pesticide application on chironomid larvae and ostracods in rice fields. *Appl. Ent. Zool.* 21(3): 370-376. — (Div. Environ. Biol., Natn. Inst. Environ. Stud., Yatabe, Tsukuba, Ibaraki 305, JA).
Benthic macroinvertebrates were surveyed in rice fields in which 3 pesticide applications were adopted (no pesticide, herbicide only, herbicide + insecticide + fungicide). The Odon. were most abundant in the field where no pesticide was applied. They represent the major predators in the flood-water (*Sympetrum frequens*, *Orthetrum albistylum speciosum*, *Pantala flavescens*, *Cercion sieboldi*). They were also abundant in the herbicide area, though their density was less than 50/m² (as compared to 100/m² in the untreated field), but they have scarcely occurred in the insecticide-treated habitats.
- (5906) YOUNG, J.O. & S.M. SPELLING, 1986. The incidence of predation on lake-dwelling leeches. *Freshw. Biol.* 16(4): 465-477. — (Dept Zool., Univ. Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK).
Under laboratory conditions, odon. larvae (8 Zygopt. & Anisopt. spp. tested) were eaten readily by *Erpobdella octoculata*, *Glossiphona complanata* and *Helobdella stagnalis*, but serological technique showed that very few lake-collected predators had been feeding on leeches. It is concluded that predation pressure on lake-dwelling leeches is light, and is more severe from fish than from invertebrates, less on stony

shore than in vegetation. *Pyrrhosoma* and *Sympetrum* had some difficulty in feeding on the largest leeches and did not eat the largest *E. octoculta*.

1987

- (5907) (Anonymous), 1987. (*The dragonflies, butterflies & moths of the Kennet & Avon Canal in Berkshire*. Kennet & Avon Canal Restoration Consortium. 11+10 pp. (folded). This leaflet is one of a series on the wildlife of the Kennet and Avon Canal, Berkshire, UK. It is directed at the general visitor of the Canal, therefore the British vernacular nomenclature is used only. The odon. are treated on 6 pp., incl. 11 col. phot., some of which were contributed by the well known British insect photographer, Stephen Dalton.
- (5908) *ADVANCES IN ODONATOLOGY*, Vol. 3 (155 pp., frontispiece incl.), July, 1987. Edited by J. Legrand; published by the Societas Internationalis Odonatologica (S.I.O.), Bilthoven. Price: Hfl. 125.— (single copies), Hfl. 100.— (Standing Orders). — (Orders to the SIO Central Office, P.O. Box 256, NL-3720 AG Bilthoven). The present volume contains the Proceedings of the Eighth Int. Symp. Odonatol., Paris (1985). The Symposium was dedicated to the memory of the late Dr M.A. Lieftinck (1904-1985), whose portrait appears on the frontispiece. — Contents: *Cannings, R.A. & S.G.* *Cannings*: The Odonata of some saline lakes in British Columbia, Canada: ecological distribution and zoogeography (pp. 7-21); — *Castella, E.*: Larval Odonata distribution as a describer of fluvial ecosystems: the Rhône and Aix rivers, France (23-40); — *Conrad, K.F. & T.B. Herman*: Territorial and reproductive behaviour of *Calopteryx aquabilis* Say (Odonata: Calopterygidae) in Nova Scotia, Canada (41-50); — *Gambles, R.M.*: Hagen's tubercle, a largely overlooked but potentially useful character in gomphid taxonomy (Anisoptera: Gomphidae) (51-60); — *Legris, M. & J.-G. Pilon*: Étude morphologique des stades larvaires d'*Argia moesta* (Hagen) (Zygoptera: Coenagrionidae) (61-90); — *Legris, M., J.G. Pilon & M. Masseur*: Variation intra-stade et croissance postembryonnaire chez *Argia moesta* (Hagen) (Zygoptera: Coenagrionidae) (91-102); — *May, M.*: Body temperature regulation and responses to temperature by male *Tetragoneuria cynosura* (Anisoptera: Corduliidae) (103-119); — *Pritchard, G. & M.A. Leggott*: Temperature, incubation rates and origins of dragonflies (121-126); — *Reygrobellet, J.L. & E. Castella*: Some observations on the utilization of groundwater habitats by Odonata larvae in an astatic pool of the Rhône alluvial plain (France) (127-134); — *Schmidt, E.*: Generic reclassification of some westpalae-arctic Odonata taxa in view of their nearctic affinities (Anisoptera: Gomphidae, Libellulidae) (135-145); — *Van Tol, J.*: The Odonata of Sulawesi (Celebes), Indonesia: an introduction (147-155).
- (5909) ALIEV, R.A., S.I. MEMEDOVA & Z.YU. ABDURAHMANOVA, 1987. Makrozoobentos solonovatyh ozer Apsheronского полуострова. — [Macrobenthos of the saline lakes in the Apsheronskoe Peninsula]. *Izv. Akad. Nauk azerbaydzh. SSR* (Biol.) 1987 (1): 49-55. (Russ., with Azarbaijan s.). — (Authors' address stated only as Kaspian Biol. Stn, Zool., Acad. Sci. Azarbaijan SSR). Hydrological data and lists of recorded spp. are presented of 5 lakes. Only 2 odon. spp. are mentioned, viz. *Coenagrion mercuriale* from Kyzyl-Nour, and *Orthetrum brunneum* from Beyuk-shor, Azarbaijan, USSR.
- (5910) ANDERSSON, H., C.-C. COULIANOS, B. EHNSTRÖM, O. HAMMARSTEDT, L. IMBY, L. Å. JANZON, Å. LINDELÖW & H.W. WALDEN, 1987. Hotade evertbrater i Sverige. — Threatened invertebrates in Sweden. *Ent. Tidskr.* 108(3): 65-75. (Swed., with Engl.s.). — (First Author: Dept Zool., Univ. Lund, Helgonavägen 3, S-223 62 Lund). The odon. listed are *Lestes virens*, *Sympetma fusca*, *Nehalennia speciosa*, *Ophiogomphus serpentinus*, and *Epithea bimaculata*. The data were provided by K. Ander and G. Sahlén.
- (5911) ARAI, Y., 1987. How "wasteful" is oviposition

- by Red Dragonflies? *Insectarium, Tokyo* 24: 130-131. (Jap., with Engl. title). — (1233-2, Oaza Suez, Yorii-machi, Osato-gun, Saitama Pref., 369-12, JA).
[Abstract not available].
- (5912) ASAHINA, S., 1987. A list of the Odonata recorded from Thailand. Part XVI. Cordulidae-Macromia. *Kontyu* 55(2): 354-372. — (Takadanobaba 4-4-24, Shinjuku, Tokyo, 160, JA).
The known Thai records, synonymy, detailed descriptions and illustrations are provided of 10 spp., 4 of which were not listed from Thailand earlier. 2 more spp. are known from female specimens only; these are described and figured, but could not be named.
- (5913) BAKER, R.D., 1987. Dispersal of larval Zygoptera: a field test for spacing behaviour. *Bull. N. Amer. benthol. Soc.* 4 (1): 70. [Abstract only]. — (Dept Zool., Erindale Coll., Univ. Toronto, Mississauga, Ont., L5L 1C6, CA).
[Verbatim text]: Damselfly populations may be regulated by spacing behaviour of larvae. Under laboratory conditions large, dominant individuals remain near profitable hunting sites and exclude small, subordinate conspecifics to areas of little food. However, although this exclusion from food could explain the density-dependent growth of larvae seen in the field, there is no evidence that such behaviour is important or even occurs under field conditions. Dispersal of zygopteran larvae to artificial substrates in a pond in southern Ontario was analysed to test for spacing behaviour. If larvae do exclude conspecifics from food patches one would predict that animals that retreat from interactions (disperse) should be small and behaviourally subordinate compared to those that do not. Also, the proportion of the population that disperses should be positively correlated with the degree of food limitation since when food patches are rare both food limitation and dispersal rates should be high. There was little evidence of higher dispersal rates in small larvae and there was no positive correlation between food limitation and dispersal rate. Results may reflect a lack of
- discrete persistent patches of prey and/or a low frequency of aggressive interactions. These findings point to the difficulties in extrapolating results of simple laboratory experiments to field situations.
- (5914) BOEHMS, C., 1987. The influence of temperature upon embryonic diapause in *Symptetrum vicinum* (Hagen) (Odonata: Libellulidae). *Bull. N. Amer. benthol. Soc.* 4(1): 95. [Abstract only]. — (Austin Peay St. Univ., Clarksville, Tennessee 37040, USA).
[Verbatim text]: Laboratory and field studies were combined to describe the influence of constant temperatures and a series of time-temperature regimes upon embryonic development in *S. vicinum*, a north temperature zone anisopteran. Eggs collected in the field and the laboratory were observed from oviposition to eclosion to elucidate the developmental behavior at constant temperatures of 2°, 6°, 10°, 14°, 18°, 22°, 26°, and 30° C. and when exposed to a variety of time-temperature regimes. — Eight morphological stages were established. The thermal coefficients of specific stages revealed three physiological periods designated as pre-diapause development, diapause development, and post-diapause development. When eggs were cultured at constant temperatures most rapid development occurred at 18° C. However, developmental behavior indicated that the physiological processes responsible for the rate of diapause could be removed temporarily from the actual morphological stages assigned to this physiological period. Initial temporary exposures to 6° and 10° C. resulted in accelerating the rate of diapause when development was concluded at a higher temperature.
- (5915) BOHANAN, R.E., 1987. The efficacy of tube-building as an anti-predator behavior. *Bull. N. Amer. benthol. Soc.* 4(1): 95. [Abstract only]. — (Dept Zool., Univ. Wisconsin, Madison, Wisconsin 53706, USA).
[Verbatim text]: The construction of tubes has been observed in numerous larval chironomids. Previously, it had been suggested that the function of tubes was for respiration or feeding. Recent field and laboratory experi-

ments suggest that tubes may also be effective foils against invertebrate predation. Field experiments indicate that the effects of predation by larvae of *Ischnura verticalis* on an assemblage of chironomid larvae can be attributed to prey behavior. Analyses of *Ischnura* diet found a larger preference for free living chironomids compared to tube-building chironomids. This aspect of the predator's behavior is apparently largely determined by prey behavior. Laboratory experiments found significantly higher feeding rate coefficients of *Ischnura* on a free living chironomid (*Pentaneura inconspicua*) than that for a tube-building chironomid (*Paratanytarsus inopertus*). Analysis of encounter frequency of *Ischnura* and these two chironomid species indicate that the mechanism involved is avoidance rather than escape behavior.

- (5916) CLAUSEN, W., 1987. Libellenbeobachtungen aus dem nördlichen Ostwestfalen. *Natur & Heimat, Münster* 47(1): 17-30. — (Op-penwehe 459, D-4995 Stemwede-3, FRG).
A very detailed account on 34 spp., collected/observed during 1976-1985 at 5 localities in the Minden-Lübbecke district, eastern Westfalia, FRG.

- (5917) COHN, S.L., 1987. The effects of larval density, prey presence, and light on larval behavior in the damselfly, *Ischnura verticalis*. *Bull. N. Amer. benthol. Soc.* 4(1): 95. [Abstract only]. — (Sch. Biol. Sci., Univ. Kentucky, Lexington, KY 40506, USA).
[Verbatim text]: The effects and interactions of prey presence, intraspecific competition, and light vs. dark on the behavior of *I. verticalis* (Say) larvae were investigated in the lab with a 3-way factorial design. Feeding behavior, aggression, and general movements of 2 instars at 2 larval densities (1 or 3) larvae were recorded in all combinations. F-1 larvae (the penultimate instar) moved more when prey were absent, regardless of light conditions. Small larvae (F-2) moved more in the absence of prey as well. However, they also were more active in the dark and in the absence of large larvae. No effect on encounter rate, due to these factors was observed. These results will

be compared to a parallel study were fish predator presence was the third factor instead of light. It appears that prey presence is the overriding factor in the larval behaviors recorded, unless a fish predator is present. Small larvae may consider larger ones as potential predators and this may account for their fewer movements overall. A video tape, compiled from the various experimental conditions, will illustrate several larval behaviors, such as larval encounters and foraging movements.

- (5918) COLTON, T.F., 1987. Extending functional response models to include a second prey type: an experimental test. *Ecology* 68(4): 900-912. — (Dept Zool., Duke Univ., Durham, N.C. 27706, USA).
Functional response models based on Holling's disc equation allow the use of one-predator/one-prey experiments to predict the feeding rates of a predator when more than one prey type is available. Single-prey trials at six densities of each prey were used to measure the functional responses of 10th-instar naiads of the damselfly *Enallagma aspersum* to a copepod, *Diaptomus spatulocrenatus*, and a cladoceran, *Simocephalus serrulatus*. Rogers' random predator equation, a modification of Holling's type-2 functional response equation, described the data well. The predictions of a one-predator/two-prey model based on the random predator equation were tested by performing all 36 pairwise combinations of densities of the two prey species in a factorial design. The model predicts that naiads should show a preference for *Simocephalus* over *Diaptomus*, and that *Diaptomus* should experience a greater reduction in predation in the presence of *Simocephalus* than should *Simocephalus* in the presence of *Diaptomus*. The two-prey trials show that the reverse is true; the model fails to predict these results adequately. — Preference varied slightly with the density of *Diaptomus*, but not with the density of *Simocephalus*, total prey density, or the ratio of the two prey types. The "attack rate" and "handling time" parameters that describe predation on *Diaptomus* both increased significantly with increasing density of *Simocephalus*, and the "handling time" parameter for

predation on *Simocephalus* decreased significantly with density of *Diaptomus*. There was no evidence of switching behavior in this system. — Clearly, the outcome of this three-species interaction cannot be predicted by studying only the component two-species interactions. A modified random predator model, which incorporates changes in the "attack rate" and "handling time" parameters with alternate prey density, provided a better fit to the two-prey data. The factorial design, which requires experiments involving all three species, permits the use of other, less mechanistic, models as well. — (Author).

- (5919) CORNELIUS, D.M. & T.M. BURTON, 1987. Studies of *Ophiogomphus colubrinus* in the Ford River in Michigan. *Bull. N. Amer. benthol. Soc.* 4(1): 96. [Abstract only]. — (Depts Zool. and Fish. & Wildl., Michigan St. Univ., East Lansing, MI 48824, USA).
[Verbatim text]: *O. colubrinus* was sampled in the Ford River, a fourth-order stream in Michigan's Upper Peninsula, during 1983 and 1984. Kick screen sampling of one m² areas resulted in standing crop estimates which varied from 280 mg m⁻² in December to more than 2500 mg m⁻² of insect biomass in September and October. Typical July-August values were in the 1200-2000 mg m⁻² range in both 1983 and 1984. Adults emerged from the stream during June (6/7 to 6/26). Size class analysis suggested that this species has a two year or longer development period. The number of individuals collected was positively correlated with the 16 to 64 mm diameter sediments and negatively correlated with sediments less than 8 mm in diameter. Conversely, length of individuals was negatively correlated with sediment sizes greater than 16 mm and positively correlated with sediments less than 16 mm in diameter. General life history traits for this species in the Ford River will be discussed.
- (5920) DUFFY, W.G., 1987. Population ecology of the damselfly *Lestes disjunctus disjunctus* (Zygoptera: Odonata) in the St. Marys River, Michigan. *Bull. N. Amer. benthol. Soc.* 4(1): 70. [Abstract only] — (Natn. Wetlands Res. Cent., U.S. Fish & Wildlife Serv., Slidell, LA 70458, USA).
[Verbatim text]: A demographic investigation of a natural population of *L. d. disjunctus* inhabiting the St. Marys River, Michigan was conducted during 1982 and 1983. Studies investigating life history, distribution, demographics, and production are reported here. The 1982 cohort oviposited an estimated 3,202,000 eggs in the 4.03 ha study area. Mortality in the egg stage was estimated to be 77.2%. Egg mortality factors were: habitat loss through anthropogenic sources (18.9%), overwintering (16.7%), hatching difficulty (6.0%), and unexplained sources (35.6%). Relative mortality among 10 nymphal instars varied and was greatest in the final instar (71.4%). Relative mortality through all nymphal stages was 94.7%. An estimated 35,800 adults emerged from the study area yielding a survival rate from the egg to adult stage of 1.2%. Lower potential fecundity in 1983 (45.2 eggs/♀) than in 1982 (73.5 eggs/♀) combined with increased mortality in 1983 to produce a negative population rate of increase (λ) value of -0.6. Larvae were restricted in distribution to 2 habitat types, shallow nearshore areas and stands of the emergent aquatic macrophyte *Sparganium eurycarpum*. Cohort production was greater in the *S. eurycarpum* habitat than in the nearshore habitat. Weighted mean cohort production for the 2 habitats combined was 135 mg dry wt · m⁻² · yr⁻¹.
- (5921) DUNN, R., 1987. Annual dragonfly (Odonata) report - 1986. *Quart. J. Derbyshire ent. Soc.* 1987(87): 5-6. — (4 Peakland View, Darley Dale, Matlock, Derbyshire, DE4 2GF, UK). Comments on the 1986 Derbyshire (U.K.) records of 9 spp.
- (5922) EVANS, R., 1987. Singing in the acid rain: *Leucorrhinia* dominates benthos of acidified, fishless lakes. *Bull. N. Amer. benthol. Soc.* 4(1): 96. [Abstract only]. — (Dept Natural Resour., Cornell Univ., Ithaca, NY, USA).
[Verbatim text]: The general importance of fish predation in structuring invertebrate assemblages and empirical evidence from Scandinavia suggest that acid tolerant odonates,

and *Leucorrhinia* in particular, may become very abundant in acidified, fishless lakes. However, no quantitative information has been available about odonates in acidified lakes of North America. As part of the Lake Acidification Mitigation Project a survey was conducted to determine (1) population and biomass densities of odonates, and (2) macroinvertebrate assemblage structure in two, acidified, fishless, Adirondack lakes. Benthic samples were taken in both lakes throughout the ice-free seasons. On each sampling date, 6 replicates were taken at each of 4 depths: 5, 1.5, 3 and 4.5 m. Each sample was collected from 48 m² of benthic area with a sweep net. In the deeper lake replicated sweep net samples were also taken at 6, 7.5, 9 and 10.5 m depths. Ekman grab samples were taken as well on one date in each lake. Littoral benthic samples from both lakes were dominated by odonates, especially *Leucorrhinia*. At depths less than 6 m, *Leucorrhinia* generally accounted for about 50% of the total number of macroinvertebrates sampled. Peak *Leucorrhinia* densities exceeded 40 indiv./m². *Leucorrhinia* biomass (dry wt.) was typically about 1 to 3 g/m². In the deeper lake, *Enallagma* (Zygoptera), *Sialis*, and *Gyrinus* larvae increasingly dominated samples below 4.5 m. Temporal changes in depth distributions suggest some taxa seasonally migrate. I postulate that: (1) the distribution and abundance of *Leucorrhinia* is strongly determined by fish predation, and therefore (2) that *Leucorrhinia* may be useful as positive evidence for absence of fish in acidified lakes, and (3) fish growth rate in limed lakes may be very high initially because of high biomass of odonates, but will eventually decline.

- (5923) FRANKOVIĆ, M. & R. JUREČIĆ, 1987. Karyotype morphology and structure in species *Libellula fulva* Mull. (Odonata, Libellulidae). *Abstr. 3rd Congr. Yugoslav Geneticists, Ljubljana*, p. 41. (Bilingual: Engl. & Croatian). — (Second Author: Dept Anim. Physiol., Fac. Nat. Sci., Univ. Zagreb, Rooseveltov trg 6, YU-41000 Zagreb, Croatia).
The male chromosome numbers encountered are 2n=25, n=13, occasionally also 2n=27, n=14. Sex determination is of the XO/XX mode, and *m*-chromosomes occur in all cells. The karyotype is briefly described and *m*-chromosome variation is discussed.
- (5924) FRASERIA. Newsletter of the S.I.O. National Office in India, Pondicherry, No. 12 (June 1, 1987). — (c/o Dr B.K. Tyagi, Vector Control Res. Cent., I.C.M.R., Medical Complex, Indira Nagar, Pondicherry-605006, India).
Tyagi, B.K.: Ninth International Symposium of Odonatology — Second and final circular (pp. 49-50); — *Prasad, M.*: A note on the Odonata from South India (50); — *Tyagi, B.K.*: Editorial notes (50); — Dr Mathavan promoted (51); — New publications on sale during the Ninth International Symposium, Madurai (51); — *Tyagi, A.*: Women in entomology — a useful newsletter for India odonatologists (51).
- (5925) GAUTHIER, A., 1987. *Macromia legrandi* n. sp., odonate nouveau du Togo (Corduliidae). *Annls Limnol.* 23(1): 61-63. (With Engl. s.) — (Lab. Ent., Univ. Paul Sabatier, 118 rte de Narbonne, F-31062 Toulouse).
M. legrandi sp. n. is described and figured (holotype ♂: Cascades de Kpimé, IV-1986). The ♂ paratype is in the MNHN, Paris.
- (5926) GEENE, R., 1987. Libellen in Zeeland. — [Dragonflies in the Zeeland Province]. *Stridula* 11(1): 4-10. (Dutch). — (Roomtuintjes 91, NL-1093 SV Amsterdam).
Annotated list, with distribution maps, of 24 spp. from the Zeeland prov., The Netherlands.
- (5927) GEIGER, W., 1987. Atlas de papillons et de libellules. *Prot. Nature, Basel* 87(4): 10. — (Inst. Zool., Univ. Neuchâtel, CH-2000 Neuchâtel).
Announcement and brief description of the Swiss dragonfly distribution atlas, by A. Maibach & C. Meyer, to appear shortly at the Centre suisse de cartographie de la faune, Neuchâtel.
- (5928) HARP, G.L., 1987. Protracted oviposition by *Hetaerina titia* (Drury) (Zygoptera: Caloptery-

gidae). *Bull. N. Amer. benthol. Soc.* 4(1): 95. [Abstract only]. — (Dept Biol. Sci., Arkansas St. Univ., State University, AR 72467, USA).

[Verbatim text]: Time of submergence during oviposition by females of 3 Hetaerina spp. has been reported to vary from 1-106 min. Some species oviposit in living plant materials, while others utilize dead vegetation. Degree of guarding by attending males varies among spp. On 1 Sept. 1985 3 submerged female *H. titia* were observed ovipositing into an inclined rotting log, in an area of moderate current. Oviposition occurred to a maximum depth of 15 cm, and the longest period observed was 120 min. Attending males, normally quite wary, were noticeably unaffected by human presence.

- (592^o) HERSHEY, A.E. & S.I. DODSON, 1987. Predator avoidance by *Cricotopus*: cyclomorphosis and the importance of being big and hairy. *Ecology* 68(4): 913-920. — (Dept Biol., 321 Life Sci. Bldg, Univ. Minnesota-Duluth, Duluth, Minnesota 55812, USA). In laboratory experiments the importance of body size and long abdominal hairs in determining susceptibility of 2 aquatic midges, *Cricotopus sylvestris* and *C. bicinctus* (Diptera: Chironomidae), to predation by *Hydra* and *Ischnura verticalis* was tested. The chironomids co-occur on dense macrophytes in the Yahara River, Dane Co., Wisconsin, USA, and differ structurally in that *C. sylvestris* has long hairs and *C. bicinctus* has short hairs. Also monitored was *Hydra* density and *C. sylvestris* hair length for 2 yr. — Large *C. bicinctus* were less susceptible to predation by both *Hydra* and small *Ischnura*, but prey size had no effect on susceptibility to large *Ischnura*. Long hairs offered no protection from *Ischnura*, but did protect *C. sylvestris* from *Hydra*, relative to short-haired *C. bicinctus* or *C. sylvestris* with experimentally shortened hairs. Hair length is negatively allometric relative to body size in ontogeny; hair absolute length remains constant as the larvae increase in size. Hair length was also cyclomorphic; successive generations of *C. sylvestris* showed a seasonal pattern of hair length.

Hydra density also varied seasonally. When *Hydra* density was high on *C. sylvestris* were longest; when *Hydra* density was low, hairs were shortest. The observed cyclomorphic and allometric patterns of hair length were both beneficial characteristics in presence of *Hydra*, and the benefits were additive.

- (5930) HERZOG, H.-U., 1987. The plasma composition of larval *Aeshna cyanea* Müller. I. The effect of the nutritional state on osmotic pressure and ion concentrations. *Comp. Biochem. Physiol.* (A) 87(1): 39-45. — (Inst. Cytol., Univ. Bonn, Ulrich-Haberland-Str. 61a, D-5300 Bonn-1, FRG). The plasma osmotic pressure (OP), Na^+ , K^+ and Cl^- concentrations of larval *A. cyanea* were investigated at different nutritional states. A single ad lib. feed of larvae, starved for 10 days, causes a sharp rise in OP after 1 day due to an accumulation of food material in the plasma followed by a slow decline until a steady state is reached after 30 days. The change in OP is assumed to control the percutaneous water entry. A similar change occurs in the Na^+ and Cl^- concentrations. These ions account for 35% of the OP rise and decline until 10 days but for 90% between 10 and 30 days of starvation. The reduction in Na^+ and Cl^- concentrations and possibly in hemolymph volume is interpreted as a means of osmoregulatory adaptation to the demand of energy saving during long-term starvation. The Cl^- concentration changes by 64% per 100% in Na^+ concentration. The nutritional states investigated have no effect on the K^+ concentration.
- (5931) HERZOG, H.-U. & N. LIAPPIS, 1987. The plasma composition of larval *Aeshna cyanea* Müller. II. The effect of the nutritional state on the free amino acids. *Comp. Biochem. Physiol.* (A) 87(1): 47-52. — (Inst. Cytol., Univ. Bonn, Ulrich-Haberland Str. 61a, D-5300 Bonn-1, FRG). Using an automatic amino acid analyser the plasma free amino acids (FAA) of larval *A. cyanea* were investigated 1, 10 and 30 days after a heavy meal. Glutamine, proline, glycine, alanine, valine, and tyrosine represent

- the main FAA. One day after feeding the total FAA concentration increases to 42.6 mmol/l and 11.4% of the plasma osmotic pressure and again decreases to 9.8 mmol and 3.1% after 10 days with quantitatively different contribution of the individual FAA. The considerable contribution of the FAA to the osmotic pressure after feeding probably plays a role in percutaneous water gain for the excretion of nitrogenous waste products. Long-term starvation (10-30 days) has only a minor influence on the FAA levels. Aspartic and glutamic acid are kept at very low levels (20 and 45 $\mu\text{mol/l}$) independent of the nutritional state probably to prevent interference with muscular excitability. At equal total FAA concentrations the proline level is clearly higher after 30 than after 10 days of starvation, both falling to zero at 3 mmol/l total FAA. A possible role of proline as an energy substrate is discussed.
- (5932) JOHNSON, D.M., 1987. Dragonfly cohort-splitting: hypotheses tested and suggested. *Bull. N. Amer. enthol. Soc.* 4(1): 71. [Abstract only]. — (Dept Biol. Sci., East Tennessee St. Univ., Johnson City, TN 37614, USA).
[Verbatim text]: *Tetragoneuria cynosura* in Bays Mountain Lake exhibit cohort-splitting — most individuals are semivoltine, but size-frequency data suggest that some are univoltine. Larvae of known size were analysed under natural conditions to corroborate inferences made from size-frequency data. Comparison of initial and final head-widths support the following conclusions: small larvae (HW < 2.5 mm) in Apr-Jun 1986 and Jul-Aug 1986 exhibited relatively fast growth through 2-4 instars resulting in no apparent relationship between initial and final sizes; medium-sized larvae (2.5 < HW < 3.5) in Sep-Oct 1985 & 1986 grew through 0-2 instars, with those that grew following Dyar's Law, final HW = 1.25 (initial HW); larger larvae that reached the penultimate instar by September entered the final instar by mid-October with greater relative size-increase by the smaller among them, so that the slope of final HW vs. initial HW (slope = 0.54 in 1985 & 1986) was considerably less than expected by Dyar's Law; no growth in head-width occurred from Nov 1985 to Mar 1986, and winter survival was very good by all sizes. These results suggest a race to reach some "critical size" during the summer. Winners may enter the penultimate instar at relatively small sizes; but they do some catching up as they enter the final instar. The proportion of a cohort achieving univoltine life histories may be reduced by: delayed oviposition or hatching; exploitation competition among larvae; interference among larvae within or between cohorts; predation on larger larvae in a cohort by large odonates or fish.
- (5933) KARAMAN, B.S., 1987. Les odonates du Lac de Prespa (Macédoine, Yougoslavie) I partie: la composition qualitative et l'analyse zoogéographique de la faune. *God. Zh. prir. mat. Fak. Skopje (Biol.)* 37/38: 97-110. (With Macedon. s.) — (Inst. Zool., Fac. Sci. Nat., Univ. Skopje, P.O. Box 162, YU-91000 Skopje).
The fauna (34 spp.) of the Prespa Lake, Macedonia, Yugoslavia is listed and analysed. *Leucorrhinia pectoralis* is new to Macedonia.
- (5934) KARAMAN, B.S., 1987. Le sex-ratio chez une espèce de zygoptère, *Coenagrion puella* (L.) (Odonata, Coenagrionidae). *God. Zh. prir. mat. Fak. Skopje (Biol.)* 37/38: 163-173. (With Macedon. s.) — (Inst. Zool., Fac. Sci. Nat., Univ. Skopje, P.O. Box 162, YU-91000 Skopje).
In a series of 248 exuviae collected in Skopje, Yugoslavia during 1977, 52.02% were males. At the same locality, in 1979, 1451 exuviae were gathered, of which 52.17% were females. The predominance percentage is in both cases statistically non-significant.
- (5935) KARCEV, V.M. & P.M. FILIMONOV, 1987. Kannibalizm u nasekomyh. — Cannibalism in the insects. *Priroda, Moscow* 1987(3): 97-99. (Russ.). — (Katedra Ent., Fac. Biol., Lomonossov St. Univ., Moscow, USSR).
The population-biological aspects of cannibalism in Odon. are discussed in some detail, and a case in an *Aeshna* sp. is photographically evidenced — (*Abstracter's Note*: The sp. could

- not be identified from the xerox copy available).
- (5936) KLEHM, G., 1987. Maskierte "Räuber" mit 30.000 Augen. In: E. Andres et al., [Eds], *Schützt die Insekten!*, pp. 29-30, Deutscher Bund für Vogelschutz, Blieskastel. — (Author: c/o DBV, Deutscher Naturschutzverband, Saar-Pfalz-Kreis, Hasental 18, D-6653 Blieskastel, FRG).
Under the Nature Conservation Act of the State of Saarland, FRG, all dragonfly spp. are protected there. The article gives 10 further suggestions for the conservation of odon. habitats.
- (5937) KORYSZKO, J., 1987. Some Staffordshire dragonfly records. *Bull. amat. Ent. Soc.* 46: 108. — (3 Dudley Place, Meir, Stoke-on Trent, Staffs., ST3 7AY, UK).
Aeshna mixta, *Leucorrhinia dubia*, *Libellula depressa* and *Sympetrum danae*, from Staffordshire, UK.
- (5938) LEGRAND, J., 1987. Deux nouveaux Pseudagrion forestiers afrotropicaux (Odonata, Zygoptera, Coenagrionidae). *Revue fr. Ent.* (N.S. 9(2): 77-82. (With Engl. s.) — (Lab. Ent., Mus. natn. Hist. nat., 45 rue de Buffon, F-75005 Paris).
P. grilloti sp. n. (holotype ♂: Dimonika, Congo, 15-IV-1975) and *P. simonae* sp. n. (holotype ♂: Makaba, Congo, 22-I-1977) are described, figured and compared with the related *P. makabusiensis* Pinhey and *P. melanicterum* Sel.
- (5939) LIEFTINCK, M.A., 1987. New and little known Platycnemididae and Coenagrionidae from New Guinea and the Solomon Islands (Odonata). *Tijdschr. Ent.* 119(9): 263-291. — (Reprints available from J. Van Tol, Rijksmuseum van Natuurlijke Historie, P.O. Box 9517, NL-2300 RA Leiden).
This is the final, posthumously published odonatol. work by the late Dr M.A. Lieftinck. It is based on an almost completed manuscript, though the introductory text and the concluding remarks are lacking. — The following new taxa are described and figured (the holotype data are stated here only): Platycnemididae: *Rhyacocnemis prothoracica* sp. n. (NW New Guinea: Morobe Distr., stream at Guraker, Wau Rd, alt. 500 m; 25-X-1972), *Salomocnemis gerdae* gen. n., sp. n. (Solomon Isls: Guadalcanal Is., Komugelea, alt. 1200 ft; 22-IX-1965), *Lieftinckia malaitae* sp. n. (Solomon Isls: Malaita Is., Ngwaiu, alt. 1500 ft; 10-X-1967), *L. isabellae* sp. n. (Solomon Isls: Santa Isabel is., Maring Distr., Ta Matahi; 2-VII-1960), *L. ramosa* sp. n. (Solomon Isls: San Jorge Is, off Santa Isabel; 26-IX-1965); Coenagrionidae: *Teinobasis simulans* sp. n. (Solomon Isls: New Georgia Is., Bareki R.; 30-VIII-1965), *T. obtusilingua* sp. n. (Solomon Isls: San Cristoval Is., Huni R.; 14-VIII-1965), *T. chinopleura* sp. n. (Solomon Isls: Florida Isls, Ngela group, Sandfly Is., Takavali, 22-XII-1965), and *T. imitans* sp. n. (Solomon Isls: Guadalcanal Is, Honiara, alt. 150 m; 2-V-1964). In addition, 8 other members of these genera are described and figured, not including 2 unnamed *Lieftinckia* spp. — The manuscript was prepared for publication by Mr J. Van Tol, who has also added a brief introductory note.
- (5940) LINDENIA. Notiziario dell'Ufficio Nazionale Italiano della Società Odonatologica Internazionale, Roma, No. 8 (July 1, 1987). — (c/o Prof. Dr C. Utzeri, Dipt. Biol. Anim. & Uomo, Univ. Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma).
In addition to the general SIO news items, there are notes on Dr P.L. Miller's (Oxford) working visit to Rome, the Italian odon. mapping scheme, with extinction threatened spp. in Italy, and on the Odon. of the minor islands adjacent to Sardinia. An obituary for the late Prof. H. Kaiser, and bibliographic additions to the Ital. odon. fauna conclude the issue.
- (5941) LÜTHI A., 1987. Contribution à un inventaire des libellules du canton de Genève. *Bull. romand Ent.* (5): 17-38. — (48, chemin des Ceps, CH-1217 Meyrin).
Locality date are given and the abundance is stated for the 28 spp. known from canton Geneva, Switzerland. Cantonal distribution

maps and phenology graphs are appended. The more interesting spp. are *Gomphus pulchellus*, *Anax parthenope* and *Crocothemis erythraea*.

- (5942) MAIBACH, A., 1987. Entretien des cours d'eau: les effets sur les libellules et autres invertébrés. *Prot. Nature, Basel* 87(4): 8-9. — (Mus. zool., Place Riponne 6, C.P. 448, CH-1000 Lausanne-17).
Suggestions for management of streams (embanked canals) in Switzerland, with emphasis on odon. conservation.
- (5943) MARTIN, T.H., 1987. Fish predation on the Odonata of Bays Mountain Lake. *Bull. N. Amer. benthol. Soc.* 4(1): 96. [Abstract only]. — (Address given only as: North Carolina St. Univ., Raleigh, NC, USA).
[Verbatim text]: Bays Mountain Lake has a large and diverse community of odon. which have been the subject of much research in recent years. Several mechanisms have been examined as the underlying cause of the organization of this odon. larvae assemblage. This paper reports on a year-long diet study conducted to identify potentially important fish predators. Redear sunfish, bluegill, and large mouth bass were collected monthly and the contents of their entire intestinal tract (redeer sunfish and bluegill) or their stomach (large mouth bass) were examined to identify major diet items. Redear sunfish were found to be the major fish predator on odon. larvae, with relatively small *Tetragoneuria cynosura* during July being the most numerous larval odon. found in the diet. Bluegill consumed relatively large numbers of zygopterans and libellulids during the cooler months, and large mouth bass contained very few odon. larvae. Large mouth bass did contain a number of adult odon. during the summer and could be an important predator of ovipositing adults. Redear sunfish were found to be size selective, predators on odon., not between spp. as suggested by Morin (1984), but rather within *T. cynosura* — the numerically dominant anisopteran in Bays Mountain Lake. This size-selective predation could have an important impact on coexistence of other spp. with *T. cynosura* and with *T. cynosura*'s life-history in Bays Mountain Lake.
- (5944) MAY, M.L. & J.M. BAIRD, 1987. The behavioral ecology of feeding by adult Odonata. *Bull. N. Amer. benthol. Soc.* 4(1): 70 Abstract only. — (Dept Ent. & Econ. Zool., Rutgers Univ., New Brunswick, NJ 08903, USA).
This is an indicative rather than informative abstract: Preliminary quantitative observations of assimilation efficiency, gut clearance rates, feeding rates and feeding success, feeding site constancy and intraspecific aggression at feeding sites for male and female *Pachydiplax longipennis* indicate that feeding rates are similar to those observed in the few other spp. studied heretofore, but they are adjusted to prey density and probably affected by physical characteristics of the environment. At least some individuals of both sexes repeatedly return to and defend the same feeding perch, sometimes over several days.
- (5945) McPEEK, M.A., 1987. Invertebrate predation and density-dependent interactions affect the species composition and abundance of larval damselfly assemblages (Odonata: Coenagrionidae) in fishless lakes. *Bull. N. Amer. benthol. Soc.* 4(1): 71. [Abstract only] — (Kellogg Biol. Stn, Michigan St. Univ., Hickory Corners, MI 49060, USA).
[Verbatim text]: Larvae of lentic damselfly species characteristically inhabit either lakes containing fish or fishless lakes. In this study I examined whether predation by large dragonfly (*Anax junius*) and density-dependent interactions among damselfly larvae influence *Enallagma* species composition and abundance in a fishless lake. In one experiment, equal numbers of *E. boreale*, the dominant species in the fishless lake, and *E. vesperum*, an abundant species in lakes containing fish, were placed in cages with either one penultimate-instar *Anax* larva or no *Anax* larva. The presence of *Anax* reduced the survivorship of both species, but *E. vesperum* was more strongly affected than *E. boreale*. The mean size of both species was also smaller in the *Anax* treatment at the end of the experiment. In another experiment, I manipulated the

density of *E. boreale* in cages from near 0 to twice natural, while holding the numbers of *E. hageni*, another abundant species in lakes containing fish, constant and low in all cages. Both species had constant per capita death rates in all treatments. Individuals of both species also were larger in the near 0 treatment than in any other density treatment. These experiments indicate that predation by *Anax* in fishless lakes is an important mechanism affecting the exclusion of some damselfly species, and that both *Anax* predation and density-dependent interactions contribute to the regulation of *Enallagma* populations. Moreover, both processes influence the size distributions of *Enallagma* populations.

- (5945) MIYAKAWA, K., 1987. Position of germ rudiment and rotation of embryo in eggs of some dragonflies (Odonata). In: H. Ando & Cz. Jura, [Eds], Recent advances in insect embryology in Japan and Poland, pp. 125-149., Arthropod Embryol. Soc. Jpn, Tsokuba. — (Imafuku 1024, Kawagoe, Saitama 356, JA).
- Changes of the dorso-ventral axis of embryos of 7 spp. during development are described, on the base of the dorso-ventral axis of the egg when deposited, corresponding to the axis of the mother. In Zygoptera, Anisozygoptera, and aeshnid Anisoptera, so far studied, the germ rudiment is formed on the dorsal side of the egg. The embryos rotate through 180° in Zygoptera, 90° in Anisozygoptera, and 0° in an aeshnid anisopteran. In exophytic eggs of libellulid Anisoptera, the embryos exhibit a gravity-dependent rotation to take a venter-up position at about revolution stage. Time and cause of the rotation are divergent according to taxa, even in individuals of the same species. Four possible causes of the rotation are suggested. (1) Bilaterally asymmetric fusion of amnion and serosa probably brings about a rotation during revolution. (2) Zygopteran embryos, after revolution, rotate to fit themselves to the dorso-ventrally asymmetric egg space through change of their form with growth or occasional muscular movements. (3) Libellulid gravity-dependent rotation is caused only by difference of weight between the embryo and the yolk. (4) Irregular rotations seen in grown embryos are attributed to occasional activities of muscles in the trunk region.
- (5947) *ODONATA RECORDING SCHEME NEWSLETTER*, No. 9, issue number not stated (May, 1987). — (c/o P.T. Harding, Biol. Records Cent., Monks Wood Exper. Stn, Abbots Ripton, Huntingdon, Cambs. PE17 2LS, UK).
- The new regional organization of the recording scheme is outlined, plans for an Atlas of the distribution of Odonata in the British isles are presented, and those for an Inventory of key Odonata sites are briefly described. Also provided are the addresses of the National Organizer (R. Merritt, 38 New Road, Holymoorside, Chesterfield, Derbys., S42 7EN) and of the Regional Organizers for Ireland (C. Ronayne), Scotland (Mrs E.M. Smith), Wales (S. Coker), Mid & North England (L. Thickett), SW England (Dr A.D. Fox) and SE England (Mr & Mrs A.R. Welstead).
- (5948) PIERCE, C.L., 1987. Dragonfly behavioral responses to fish predators. *Bull. N. Amer. benthol. Soc.* 4(1): 70. [Abstract only]. — (Dept Zool., Univ. Maryland, College Park, MD 20742, USA).
- [Verbatim text]: Behavioral responses to predators are receiving attention in studies of predator-prey dynamics. Dragonfly larvae commonly co-occur with fish and their relatively large size and long development time suggest that antipredator behaviors may be important in reducing fish predation. Antipredator behavior in 3 libellulid spp. using replicated laboratory experiments examining microhabitat use, foraging success and vulnerability to predation was investigated. *Tetragoneuria cynosura* and *Ladona deplanata* were usually on the bottom underneath cover. However, during night trials with no fish present, more larvae occupied exposed positions on the bottom. *Sympetrum nemicinctum* were usually on the bottom in exposed positions except during day trials with fish present when most of the larvae were underneath cover. Use of exposed microhabitats tended to be lower both in the presence of fish and during daytime, indicating that microhabitat use may

represent both fixed and reactive responses to predation risk. Fish strongly depressed foraging in late instar *Tetragoneuria*, and foraging in last instar *Ladona* was reduced both by fish and during daytime. Foraging in *Sympetrum* and middle instar *Tetragoneuria* and *Ladona* was unaffected by either fish or diel period. *Sympetrum* and middle instar *Ladona* were much more vulnerable to fish predation than late instar *Ladona* or *Tetragoneuria*. Vulnerability was positively correlated with exposure, indicating that microhabitat shifts are an effective deterrent to predation. These results suggest that both fixed and reactive behavioral patterns of dragonfly larvae may function to reduce their vulnerability to fish predation. Reduction of foraging success may be a cost of risk-sensitive behavior.

- (5949) POLLARD, J.B., 1987. Anisopteran odonate communities in a series of south-central Ontario lakes exhibiting a pH gradient. *Bull. N. Amer. benthol. Soc.* 4(1): 72. [Abstract only]. — (Watershed Ecosystem Program, Trent Univ., Peterborough, Ont., K9J 7BB, CA).

[Verbatim text]: Anisopteran assemblages were documented in 19 small (< 35 ha) lakes across a pH gradient (range 4.9-8.1) in order to assess the effect of low environmental pH on community structure and composition.

Number of taxa present was not significantly correlated to lake pH. Two measures of diversity (Keefe and Bergersen's T.U. and McIntosh's H') suggest an increase in diversity with decreasing ambient pH. Several taxa, notably *Helocordulia uhleri*, *Dromogomphus spinosus* and *Neurocordulia yamaskanensis* appear to be excluded from lakes below species specific thresholds (approximate pH 5.8) Five species: *Aeshna canadensis*, *A. interrupta*, *A. eremita*, *Libellula julia* and *Dorocordulia libera* were restricted in distribution to lakes with a pH of less than 6.2. These results support the contention that rather than an outright loss of species, there are species shifts in the communities due to acidification effects. Factor analysis of 16 chemical and physical lake parameters produced 5 derived variables: dystrophy, pH/conductivity, silica, shoreline

development and percent silt as substrate. Spearman rank correlations between standardized species densities and factor 1 (dystrophy) scores generated highly significant ($p \leq 0.01$) positive correlations with 7 of the 29 species used in the analysis, as well as negative correlations with an additional 3 species. No significant rank correlations ($p \leq 0.01$) were observed for the remaining factors versus standardized species densities.

- (5950) ROBINSON, J.V. & G.A. WELLBORN, 1987. Mutual predation in assembled communities of odonate species. *Ecology* 68(4): 921-927. — (Dept Biol., Univ. Texas at Arlington, Arlington, Texas 76019, USA).

Larval individuals from 6 anisopteran spp. were added to artificial ponds so that each pond contained an equal number and size distribution of each sp. Half of these ponds were exposed to an additional anisopteran, *Anax junius*. Interodonate predation in *Anax*-free ponds was size dependent, with the smallest species, *Perithemis tenera*, experiencing the highest mortality. Predation in ponds containing *Anax* was not size dependent but was species dependent. *Plathemis lydia* individuals were not significantly affected by *Anax* probably due to the tendency of *Plathemis* to dig deeply into the sediment. *P. tenera* was shown to have a different allometric relationship between head width and body volume than the other 5 odon. spp. It is postulated that this is correlated with its small size and is an adaptation to increase the range of prey available to it.

- (5951) ROWE, R.J., 1987. *The dragonflies of New Zealand*. Auckland Univ. Press, Auckland, NZ. 260 pp., 134 textfigs, 16 col. pls excl. ISBN 1-86940-003-1. — Price ca US\$ 25.-. Also available from the SIO Central Office, Bilthoven, Holland. — (Author: Dept Zool., Univ. Canterbury, Christchurch-1, NZ).

A very attractive treatment of the New Zealand odon. fauna (17 spp.), with detailed information on ecology, behaviour, biogeography and distribution, with detailed descriptions of the taxa, the keys to the adults and larvae, and with high quality col. portraits of all spp. —

The book is organized in the following main chapters: "Preface", "Checklist of New Zealand Odonata", "Introduction", "The study of dragonflies in New Zealand" (incl. "Dragonflies and the Maori"), "Dragonflies and their New Zealand representatives" (by Professor P.S. Corbet), "History of the New Zealand dragonflies", "Sensory perception in dragonflies", "The species" (the treatment of *Antipodochlora braueri* was contributed by Dr W.J. Winstanley), "Studying, collecting and preserving dragonflies", "Breeding and rearing dragonflies", "Glossary", "Key to the larvae", "Key to the adults", "Terminalia", "Bibliography", and "Index". Particularly valuable are the synonymies, given for each sp., and the very extensive annotations, presented in footnotes. — *Xanthocnemis sinclairi* sp. n. was described and named earlier in the author's PhD dissertation (cf. OA 5888), but due to the nature of that "publication" the name was not available then. Here the sp. is redescribed, and it is the present description that meets the publication requirements stipulated by the Code.

- (5952) SHERK, T., 1987. Emergence of Odonata from Findley Lake and the subalpine ponds in the coniferous forest of the Cascade Mountains. *Bull. N. Amer. benthol. Soc.* 4(1): 97. [Abstract only]. — (P.O. Box 331, Branford, Connecticut 06405, USA).
 [Verbatim text]: *Aeshna palmata*, *Somatochlora albicincta*, and other insects were collected in floating and shore emergence traps at a 27.5 m deep oligotrophic lake with an area of 11.8 ha a 4.5 m deep shaded pond with an area of 0.8 ha, and a 2.0 m deep oligotrophic pond with an area of 0.6 ha. *Enallagma boreale* (Zygoptera: Coenagrionidae) was also present in the 2.0 m deep pond. Approximately 3% of the *Aeshna* larvae were *A. umbrosa*. There were no fish. After the lake thawed in early June, the Odonata emerged in late July and early August. The Odon. emerged in early Sept. in 1974 when the lake did not thaw until July 31. The 1986 mg dry weight of insects that emerged per square meter per year from the entire lake included 2.1 mg (0.15%) *A. palmata* and 3.8 mg (0.27%) *S. albicincta*. The 2047 mg dry weight of insects that emerged per square

meter per year along the shore included 189 mg (9.2%) *A. palmata* and 331 mg (16.1%) *S. albicincta*. Only 94 mg *A. palmata* and 39 mg *S. albicincta* emerged per square meter per year along the shore when the lake did not thaw until July 31. The 279 mg dry weight of insects that emerged per square meter per year from the entire 2.0 m deep pond included 2.8 mg (1.0%) *A. palmata*, 4.4 mg (1.6%) *S. albicincta*, and 2.7 mg (1.0%) *E. boreale*. *A. palmata* and *S. albicincta* only emerged from the shore, but *E. boreale* also emerged from the aquatic vegetation within the pond. The 251 mg dry weight of insects that emerged per square meter per year along the shore from the 2.0 m deep pond included 61.4 mg (24.5%) *A. palmata*, 95.3 mg (38.0%) *S. albicincta*, and 1.4 mg (0.5%) *E. boreale*.

- (5953) SIOJA. [Information Bulletin of the SIO National Office in Japan], Osaka, 1987, No. 1 (July 5). (Jap.). — (c/o K. Inoue, 5-9, Fuminosato 4-chome, Abeno-ku, Osaka, 545, JA). In addition to various "business communications", the issue contains a brief note on Professor N.W. Moore's visit to Japan (May 13-27, 1987), in his quality of Chairman of the Odonata Specialist Group, Species Survival Commission, IUCN. Dr S. Asahina accompanied him throughout his stay in Japan, and Mr K. Inoue guided him during his stay in Osaka and Kyoto. He has visited the Tombo Natural Park, and has spoken at the Tombo Kingdom Congress. Dr Moore's visit was considered important for the further development of odon. conservation in Japan. — (*Abstracter's Note*: Contrary to the senseless, contraproductive and scientifically absurd policy in most European countries, where politicians and opportunistic professional "conservationists" simply promulgated a legislation that is putting under the legal ban most or all dragonfly collecting, making therewith virtually impossible any sound monitoring to the development of the local status of "critical" spp., and which is taking care neither of conservation of odon. habitats, nor of the large-scale destruction caused by "economic activities", the Japanese very rightly went their own way. While many hundreds of local collectors, orga-

nized in various specialized societies and clubs, continue providing information on distribution and status of all taxa, they have also organized a Dragonfly Sanctuary (= "Tombo Natural Park") in Nakamura, and are performing a tremendous work by a continuous flow of publications, pamphlets, public talks, and various other activities, directed at the general public with the objective of bringing to its attention the importance of conservation of the country's "dragonfly heritage". The Nakamura "Tombo Museum" is also serving this purpose. While in every department store in Japan there is a department for entomological equipment, and in the countryside and city parks all kinds of insect collectors are, traditionally, literally "swarming", this apparently has absolutely no impact on the population density and species richness of the Japanese fauna. Also the number of popular dragonfly books published in Japan largely exceeds that of this kind of literature appearing in the rest of the world put together! In short, insect and dragonfly conservationists could learn immensely from the Japanese approach. — It is sad to notice, therefore, that even the IUCN departed recently from their formerly serious and critical treatment of dragonfly conservation problems. As far as the Odon. are concerned, the Species Survival Commission apparently serves merely as a facultative consultation body, the IUCN Monitoring Centre in Britain is publishing their "red lists" without any consultation with the group, not even informing them on the taxa put on it. In the 1986 "Red List" (cf. *OA* 5736) they have listed even some undescribed and unnamed taxa, i.e. the "species", of which virtually nothing is known, not even whether or not they represent taxonomic entities entitled to a taxonomic name. In this way the credibility of the IUCN as a conservation authority has been seriously damaged and any research on these taxa will be made difficult or legally impossible. In the same category fall the IUCN endeavours to treat insects the same way as vertebrates, putting some of them ad hoc on the Appendix of the Berne Convention. Even before the ban on these had been legalized, collectors ceased to provide new locality data, and the price of

insects on the insect fairs is rocketing. It goes without saying that by the application of such measures the IUCN will be unable to prevent collecting and trade of specimens, while it will effectively prevent the publication of current distribution and status data. The arguing about the possibility of getting licences and collecting permits upon application is testifying further to the unrealistic reasoning of the "responsible authorities". Most collectors are amateurs and they will be neither willing nor in the position to undertake the trouble of getting legal permits, but will rather continue their work "illegally", refraining from publication. One also has a very strong impression that the listing of taxa on various "legal lists" is greatly arbitrary. The persons deciding on this are often neither qualified specialists, nor do they care to get acquainted with the relevant literature. — Instead of producing ever longer lists of unexplored taxa for their ad hoc "red lists", the IUCN and the national conservationists should rather centre their efforts towards the reintroduction of animal taxonomy and ecology into the university curricula, where (at least in some European universities) these basic areas of biological knowledge and research were recently largely or entirely replaced, through political dictate and "economic" reasoning, by such virtually non-biological disciplines as e.g. molecular biology and biochemistry. The IUCN could also render an indispensable service to the invertebrate conservation idea by using its authority with the national governments for advocating more and adequate funding for natural history museums and for taxonomic field work in little explored geographic regions. If the international (or national) conservation policy is to remain the matter of an autocratic dictate by few, to many, one has to fear that the damage done will become irreparable. At least as far as insects and dragonflies are concerned, the Japanese way, described above, is immensely more acceptable and effective).

- (5954) SIVA-JOTHY, M.T., 1987. The structure and function of the female sperm-storage organs in libellulid dragonflies. *J. Insect Physiol.* 33(8): 559-567. — (Sch. Agric., Nagoya Univ.,

Chikusa, Nagoya, 464, JA).

Demonstrations of the mechanism of sperm displacement as a means of sperm competition have been restricted to the order Odonata. From those studies it appears that male and female genital structure plays an important part in sperm competition. A survey is presented here of the female genitalia of several libellulid spp. Histology, fine structure and anatomy are described. There is considerable intergeneric variation in the morphology of the organs of sperm storage, but uniformity in the histology, musculature and sensory structures which have been examined. Possible reasons for the variation are discussed.

- (5955) SUSANKE, G.R. & G.L. HARP, 1987. Selected biological aspects of *Gomphus ozarkensis* Westfall (Odonata: Gomphidae). *Bull. N. Amer. benthol. Soc.* 4(1): 96. — [Abstract only]. — (Dept Biol. Sci., Arkansas St. Univ., State University, AR 72467, USA).
[Verbatim text]: *G. ozarkensis* Westfall was studied by direct observation and mark-recapture along the South Fork of Spring River in eastern Fulton County, Arkansas. Biological aspects reported here include emergence patterns, maturation period, flying season and population estimates. One hundred twenty-five teneral, immature adult and reproductive adult dragonflies were captured and marked. *G. ozarkensis* is a spring species, emerging early in the year and having a short synchronous emergence period and an early emergence peak. The maturation period approximates 18 days for males and 25 days for females. The reproductive period was 30 days, from 23 May to 22 June. The longest observed life span of an individual was 28 days. Population estimates were determined from resighting records using the Fisher-Ford method. The survival rate was calculated to be 0.633, and the composite mean age of marked individuals was 3.5 days. The majority of the population (64.8%) was composed of males.
- (5956) TAGUCHI, M. & M. WATANABE, 1987. Ecological studies of dragonflies in paddy fields surrounded by hills. IV. Spatial distribution of *Sympetrum eroticum eroticum* Selys in relation to the seasonal fluctuations of shaded area. *Bull. Fac. Educ. Mie Univ.* (Nat. Biol., Fac. Educ., Mie Univ., 1515 Kamihama, Tsu.shi, Mie, 514, JA).
[Abstract not available].
- (5957) VAN TOL, J., 1987. The Odonata of Sulawesi and adjacent islands. Parts 1 and 2. 1. A new species of *Celebophlebia* Lieftinck from Sangihe Island, with some notes on the taxonomic status of the genus; — 2. The genus *Diplacina* Brauer on Sulawesi. *Zool. Meded.* 61(13): 155-176. — (Rijksmus. Nat. Hist., P.O. Box 9517 NL-2300 RA Leiden).
Celebophlebia carolinae sp. n. (holotype ♂: Sangihe Is., Manganitu, 10-V-1985) is described in this hitherto monotypic genus. The *Diplacina* fauna of Celebes (= "Sulawesi") is reviewed, and the relationships and distribution of the 4 known regional taxa are discussed. Of these, the following are described as new: *D. militaris dumongae* ssp. n. (holotype ♂: N. Celebes, Minahassa, Pandu Manado, 1-VIII-1940), *D. sanguinolenta* sp. n. (holotype ♂, same locality, 28-VI-1940), and *D. torrenticola* sp. n. (holotype ♂: S. Celebes, Maros waterfalls, Bantimurung, 8-XI-1948).
- (5958) WAAGE, J.K., 1987. Choice and utilization of oviposition sites by female *Calopteryx maculata* (Odonata: Calopterygidae). *Behav. Ecol. Sociobiol.* 20(6): 439-446. — (Progr. Ecol. & Evol. Biol., Brown Univ., Providence, RI 02912, USA).
Females initially choose the larger of a pair of adjacent oviposition sites, about 70% of the time, or whichever of 2 equal sized sites had other ovipositing females on it (about 88% of the time). These criteria for initial choice between a pair of sites also interact. Incoming females generally (57-74% of the time) joined others on the small site rather than ovipositing alone at the adjacent, bigger site. When pairs of large and small sites were replicated across 8 locations, there were nonsignificant trends towards greater utilization (eggs laid) of the larger of a pair of oviposition sites within locations. The lack of agreement between initial choice and utilization shows that other factors besides size are important in the choice and use

of oviposition sites. These include disturbance by males, the presence of other females and choice criteria that can only be assessed during oviposition. When all sites at the 8 locations were equal in size, there was considerable day to day and location to location variation in eggs laid. Viewed over periods of several days, some sites are obviously less attractive than others in terms of cumulative numbers of eggs laid at them. When the amount of vegetation was varied among locations, those with the bigger oviposition sites were used more often, sometimes significantly so, but there were also significant reversals (small sites used more often). Thus, there is no simple effect of size on the utilization of oviposition sites by *C. maculata* females, despite a clear tendency for females to make initial choices based on this criterion. The considerable among and within location variation in number of eggs laid may reflect additional choice criteria or the interaction of size, the presence of other females, disturbance, and location.

- (5959) WATANABE, M. & Y. ADACHI, 1987. Number and size of eggs in the three emerald damselflies, *Lestes sponsa*, *L. temporalis* and *L. japonicus* (Odonata: Lestidae). *Zool. Sci.* 4(3): 575-578. — (First Author: Dept Biol., Fac. Educ., Mie Univ., 1515 Kamihama, Tsushi, Mie, 514, JA).

The number of mature eggs in the field-captured females was rather constant during their reproductive periods, viz. ca 200, 100 and 100 in *L. sponsa*, *L. temporalis* and *L. japonicus*, resp. Egg maturation seems to occur continuously when a particular developmental stage has been reached by the adult female. *L. temporalis* eggs are more than twice the size of those of the other 2 spp. and their size decreases with age. The fecundity seems to be highest in *L. sponsa*.

- (5960) WILDERMUTH, H., 1987. Die Libellenfauna des Stelzensee-Gebietes (Prättigau). *Jber. naturf. Ges. Graubünden* (N.F.) 103: 153-163. — (Mythenweg 20, CH-8620 Wetzikon).

A brief account is given of the odon. fauna (12 spp.) of 7 wetland habitats in the Prättigau,

Grisons, Switzerland (alt. 1620-2000 m). The localities studied represent a variety of hydrologically and botanically well defined biotopes, harbouring a characteristic alpine odon. fauna. Reference is made to the general distribution of the spp. concerned in the Grisons, the threats to, and the conservational aspects of the alpine odon. habitats are stated and briefly discussed. The drainage of the high altitude wetlands, the impact of grazing cattle, and landscape reforestation are considered major threats to the alpine odon. breeding sites.

- (5961) WILDERMUTH, H. & A. KREBS, 1987. Die Libellen der Region Winterthur. *Mitt. naturw. Ges. Winterthur* 38: 89-107. — (First Author: Mythenweg 20, CH-8620 Wetzikon).

45 spp. are recorded from 80 localities in the Winterthur district, canton Zürich, Switzerland. A chapter is devoted to the aquatic habitat conservation in the area, with special reference to the odon. fauna.

- (5962) WISSINGER, S.A., 1987. Predation between anisopteran and zygopteran odonata larvae and its effect on the remainder of the prey community in experimental ponds. *Bull. N. amer. benthol. Soc.* 4(1): 71. [Abstract only]. — (Allegheny Coll., Meadville, PA, USA).

[Verbatim text]: The impact of dragonfly predation on the benthic community of artificial ponds was inferred from benthos samples collected near the end of experiments designed to quantify competition and predation among the larvae of *Libellula lydia* and *L. luctuosa* (Odonata: Anisoptera). The densities of most benthic taxa did not vary among the experimental treatments even when dragonfly growth rates were density dependent. However, *L. lydia* and *L. luctuosa* did have a significant negative effect on the abundance of zygopteran larvae. This was especially true in the predation treatment which contained the largest instars of the experimental species. The results suggest that the effects of anisopteran and zygopteran larvae are compensatory. An increase in the abundance of anisoptera should reduce the impact of zygopteran predation on non-odonate prey. Such an interaction may

explain why the abundance of other taxa such as mayflies and chironomid midges appeared unaffected by the *L. lydia* and *L. luctuosa* manipulations.

- (5963) WOIN, P. & P. LARSSON, 1987. Phthalate esters reduce predation efficiency of dragonfly larvae, Odonata; *Aeshna*. *Bull. environ. Contam. Toxicol.* 38(2): 220-225. — (First Author: Dept Ecol., Univ. Lund, Ecology Bldg, S-223 62 Lund).
Phthalate esters are among the most produced chemical groups and are mainly used as plasticizers. Of these, DEPH (di(2-ethylhexy) phthalate) seems to exhibit properties typical

of organic micropollutants (a high octanol/water partitioning ratio, the ability to accumulate in organisms, persistent to a certain degree, and a low acute toxicity). An aquatic laboratory system was constructed to study the predation efficiency of *Aeshna* larvae, exposed to sediment-bound DEPH. These caught significantly fewer prey than those not exposed to the phthalate. The physiological reasons for this effect are unknown. The phthalates may also induce behavioural changes that are not easily observed in aquatic systems, but are nevertheless serious for the ecological fitness.