

ODONATOLOGICAL ABSTRACTS

1971

- (907) BUCHHOLTZ, C., 1971. Zur Formkonstanz des Labiumschlages der Larve von *Aeschna cyanea*. In: A.W. Stokes & U. Haacker, *Praktikum der Verhaltensforschung*, pp. 43-49. Fischer, Stuttgart. — (*Inst. Tierphysiol., Philipps-Univ., Ketzertbach 63, D-355 Marburg / Lahn, GFR*). Instructions for laboratory experiments on the labium strike of *A. cyanea* for university students in a well known German edition of the laboratory course on animal behaviour. Illustrations (cinéphotographs) and references on the subject are also provided. (Cf. also OA No. 69).
- (908) BUCHHOLTZ, C., 1971. Analyse der räumlichen und zeitlichen Bewegungsmuster von *Calopteryx splendens*. In: A.W. Stokes & U. Haacker, *Praktikum der Verhaltensforschung*, pp. 70-75. Fischer, Stuttgart. — (*Inst. Tierphysiol., Philipps-Univ., Ketzertbach 63, D-355 Marburg / Lahn, GFR*). Instructions for field observations and experiments on the behaviour and territoriality of *C. splendens* for university students in a well known German edition of the laboratory course on animal behaviour. Illustrations and references on the subject are also provided.
- (909) DE VIEDMA, M.G., 1971. Spanish entomology: past and present. *Mich. Ent.* 4 (4): 97-104. — (*Dept. Ent., Coll. For., Univ. Madrid, Madrid, ES*). The history of pure entomology in Spain began during the 18th century, and, like today, emphasized systematics. Among the distinguished workers mentioned there is also the well known odonatologist, Father Longinos Navas, S.J.
- (910) DRABKIN, B.S. [Ed.], 1971. *Gidrobiologiya reki Urala*. (Hydrobiology of the Ural River). South-Ural Publ. House, Orenburg. 104 pp., 2 tab. excl. (Russian). — (*Dept. Gen. Biol., Orenburg Med. Inst., 6 Sovetskaya Str., USSR-460014 Orenburg*). On p. 81 larvae of 3 odon. spp. are mentioned.
- (911) DUSINK, A., 1971. Het Roode Veld. (The Roode Veld). *Jaarb. NJN (Distrikt 13/4)* 1971: 30-31. (Dutch). — (*Grundelweg 12, Hengelo, NL*). A list of 14 spp., collected in 1971 by the members of the Dutch Youth Federation of Nature Friends (NJJN) at the locality "Het Roode Veld" near Oldenzaal, Netherlands.
- (912) KUKALOVA-PECK, J., 1971. The structure of *Dunbaria* (Palaeodictyoptera). *Psyche* 78 (4): 306-318. — (*Dept. Geol., Carleton Univ., Ottawa, CA*). The morphology of *D. fasiipennis* Till. of the Paleozoic extinct paleopterous insect order Palaeodictyoptera from the Lower Permian of Kansas is revised. For the 1st time, thin multisegmented antennae, sclerotized prothoracic paranota, and an abdomen composed of 11 visible segments were observed. Genital structures previously interpreted as an ovipositor are described

as male claspers and posteriorly curved striated parameres, approaching in general aspects those of some Odon. The wings have additional supporting structures concentrated mostly in the basal third. 9 spec. were available and made a variability analysis of wing venation possible for the 1st time. Fossil evidence supports the assumption of a single ancestral stock for all paleopterous insects.

- (913) NOORDAM, A. & D. WAMMES, 1971. Insekten. (Insects). In: M. van Noordwijk, [Ed.], Inventarisatie rapport landgoed Heemstede, p. 27. Dutch Youth Federation of Nature Friends, Utrecht. (Dutch). — (c/o Mr. M. van Noordwijk, Taveernelaan 15, Bilthoven, NL).

A list is given of 6 odon. spp., collected by the members of the Dutch Youth Federation of Nature Friends (NJN), in the territory of the Heemstede Castle, Netherlands.

- (914) SLOT, P., 1971. Inventarisatieverslag van het Kalkterreintje over de jaren 1968, 1969 en 1970. (Report on the inventarisation of the Kalkterreintje in the years 1968, 1969 and 1970). Dutch Youth Federation of Nature Friends, Utrecht. 12 pp. (Dutch). — (*Verschurestraat 118, Hilversum, NL*).

A list is given of 8 odon. spp., collected by the members of the Dutch Youth Federation of Nature Friends (NJN) at the locality "Het Kalkterreintje" near Hilversum, Noord Holland Prov., Netherlands.

- (915) URVOY, J., 1971. Contribution à l'étude de la régénération et de la greffe d'appendice chez quelques insectes (*Blabera craniifer*, *Carausius morosus*, *Sipyloidea sipyilus*, *Agrion virgo* et *Locusta migratoria*). Année Biol. 10 (11-12): 591-621. — (*Lab. Biol. anim., Fac. Sci., Univ. Rennes, Place Pasteur, Rennes, France*).

The regeneration and the appendiceal graft have been studied in representatives of a number of orders. They exhibit different regenerative capacities. Regeneration in an insect is closely linked to the molting cycle. There is a parallel between the possibility

of regeneration in an animal and the physiologic state, which depends on the molting hormones. Regeneration also depends on an "organic gradient" characteristic of the animal. In addition there are complex local effects to be considered. Particularly, regeneration is a function of the severity of the injury, and sometimes of the shape of the lesion. Experience with transverse sections shows that there exists in each appendage a certain number of successive areas of regeneration at the extremity of the organ. For a given appendage the proximodistal morphogenetic gradient has no constant value. For example, there are zones without any possibility of regeneration (mid femur) placed between regenerating territories of the leg of *B. craniifer*; in the phasma *S. sipyilus*, the pedicel which has heteromorphous potentialities precedes the 3rd segment which has antenniform possibilities.

- (916) YONEKUBO, T., K. IYATOMI, T. TAMURA, T. SAITO & M. YAMADA, 1971. Electrophysiological observation on spectral sensitivities in the compound eyes of some insects. Botyu Kagaku Bull. Inst. Insect. Contr. 36 (2): 51-58. (Japanese, with Engl. s.). — (*Biol. Dept., Nagoya Univ., Nagoya, JA*).

An electroretinogram investigation was undertaken to observe the spectral sensitivity of compound eyes in the following insects: ♂ adults of *Ceragrion melanurum*, ♀ adults of *Sympetrum darwinianum*, rice stem borer ♂ moth (*Chilo suppressalis* Walker), and tobacco cutworm ♂ moth (*Spodoptera littoralis* Boisdu). The amplitude of electroretinogram recorded from the compound eye stimulated by monochromatic light of 12 visible wavelengths (404-726 mμ) was determined. The electroretinogram after light stimulation consisted usually of an initial positive spike-like potential and a slow direct current component. Spectral sensitivity maxima were found at about 525-548 mμ in all insects; but in *S. darwinianum* a minor peak appeared at about 610 mμ. This seemed to be

due to mass responses from receptors with sensitivity peaks at different wavelengths. The Odon. were more sensitive than tobacco cutworm and rice stem borer moth to wavelengths longer than 548 $m\mu$, but to shorter wavelengths the tobacco cutworm moth was more sensitive, and the rice stem borer moth was almost equally sensitive or slightly more so than Odon. The difference in spectral sensitivity between light and dark-adapted eyes in the tobacco cutworm moth was also investigated. In wavelengths shorter than 548 $m\mu$, the sensitivity of dark-adapted eyes was greater than that of light-adapted eyes, while in longer wavelength regions the sensitivity of light-adapted eyes was the same as or greater than that of dark-adapted eyes. But a shift of wavelength at which compound eyes produced maximum responses was not observed.

1972

- (917) CLOAREC, A., 1972. Revue générale des comportements alimentaires d'insectes prédateurs et de leur régulation. *Année Biol.* 11 (5-6): 258-290. — (*Lab. Ethol., Fac. Sci., Univ. Rennes, Av. Général Leclerc, B.P. 25 A, F-35031 Rennes Cedex*). The feeding behaviour and its regulation in some insect predators are reviewed. The preying mantis (Mantodea) hunts from an ambush, being practically immobile aside from the continual vibrations of the antennae. When a desired prey comes in sight, the mantis follows it with its eyes and turns its head by small jerky movements. When the prey is at a distance about twice the length of the unfolded grasping legs, a complex series of movements begins, culminating (when the distance to the prey is considerably greater) in the actual capture. The anatomical details of these movements are described in detail. There is a similar description for the projection of the mask in larvae of Odon., motor projection for *Nepa cinerea*, the bite of *Rhodnius prolixus*, the projection of *Ranatra linearis* (all Heteroptera). This is followed by a general

comparison between the motor processes for the seizure of prey in various insects, the effect of temperature and nycthemeral rhythm and variations in internal factors, and the participation of chemoreceptors, mechanoreceptors and proprioceptors.

- (918) FRY, C.H., 1972. The biology of African bee-eaters. *Living Bird* 11: 75-112. — (*Zool. Dept., Univ. Aberdeen, Tillydrone Ave., Aberdeen AB9 2TN, Scott., UK*). The bee-eaters (Meropidae) comprise a little-known palaeotropical family of 24 sp. The sparse literature is reviewed, and new data are presented on behavior, breeding biology and food. The 14 spp. that inhabit the savannas of Africa feed on insects caught in flight, mainly venomous Hymenoptera. They all eat honeybees, which comprise 2 to 96% of their food numerically, and average 30%. Diets are remarkably similar in the kinds of insects and the proportion of different kinds, except that the white-throated bee-eater (*M. albicollis*) often takes grounded prey, the European (*M. apiaster*) has a generalized flying-insect diet, the large green (*M. superciliosus*) specializes on dragonflies, and the carmine (*M. nubicus*) specializes on locusts. African savanna bee-eaters diverge in size — a weight factor of 4 — and plumage, although their structure and habits are rather uniform. They differ somewhat in respect to habitat, preferred breeding season and migration, but on the whole exhibit remarkably few ecological differences. (Cf. also OA No. 933).
- (919) HEMELRIJK, L., M. HUIJZER, M. VERDONK & M. van NOORDWIJK, 1972. Verslag van het tweede jaar van het libellenonderzoek op het Oppad bij Kortenhoeft, zomer 1971. (Report on the second year of the dragonfly work at the Oppad near Kortenhoeft, summer 1971). Dutch Youth Federation of Nature Friends, Utrecht. 16 pp. (Dutch). — (Obtainable from the fourth author: *Taveernelaan 15, Bilthoven, NL*). Fauna composition, population density and autecology of 21 spp. were studied by the

members of the Dutch Youth Federation of Nature Friends (NJN), at the Oppad, Noord Holland Prov., Netherlands. For the first report cf. *OA* No. 96. (Cf. also *OA* No. 1010).

105, *De Bilt, NL*).

This is a report on the inventarisation of the odon. fauna of the Wooldse Veen near Winterswijk, Gelderland Prov., Netherlands, carried out in 1972 by the members of the Dutch Youth Federation of Nature Friends, (NJN), on request of the (Netherlands) State Forestry Service. Special attention was payed to ecology and population structure.

- (920) JAHN, K., 1972. Die Libellen des unteren Saalegebietes bei Bernburg. In: Die Landschaft an der unteren Saale zwischen Rothenburg und Nienburg. Published by the Museum im Schloss Bernburg. pp. 79-81. — (*Hohe Str. 22, DDR-435 Bernburg, GDR*).
A popular article, with a table of 28 spp. collected at various localities in the District of Bernburg, German Democratic Republic. (Cf. also *OA* No. 723).

- (924) O'BRIANT, P., 1972. A study of behavioral and reproductive patterns of adult *Lestes vigilax* Hagen (Odonata: Lestidae). *J. Elisha Mitchell scient. Soc.* 88 (4): 196. — (*Dept. Biol., North Carolina Univ., Chapel Hill, N.C., USA*).

- (921) KOJIMA, K. & S. NAKAMURA, 1972. The dragonflies of Ogasawara Islands. *Gensei* 23: 5-10. (Japanese, with Engl. s.). — (First author: *Fac. Agric., Kochi Univ., Nangoku-shi, Kochi Pref., JA*; — Second author: *Taipei Japanese School, 151-12, Huto-chie, Sung Shan-qu, Taipei, Taiwan*).
Ischnura senegalensis, I. (Boninagrion) ezoin, *Hemicordulia ogasawarensis*, *Diplacodes bipunctatus* and *Pantala flavescens* were recorded during a survey of the Ogasawara Islands, The Bonins (March 26 - Apr. 7, 1970). The larval stages of *H. ogasawarensis*, *D. bipunctatus* and *I. ezoin* are described and illustrated.

A study to investigate the general behaviour and reproductive activity of an adult population of *L. vigilax* at an impoundment in Piedmont, North Carolina was conducted from July through Oct. 1971. Observations were made daily, weather permitting. These observations were made with regard to time of day, temp., and light intensity. *L. vigilax* is a late summer sp. in this locality. Larvae emerged in July and Aug., and adults flew until Oct. 1. After they emerged, the teneral damselflies flew to the woods and remained there for a maturation period of undetermined length. Studies on interaction and reproductive behaviour were made with the mature adults during the mornings while they were flying. The ♂♂ made random approaches to other ♂♂ in a primitive territorial maneuver. During these approach flights, threats and contacts were made, a threat being simply an approach while actual physical touching constituted a contact. The ♂♂ achieved tandem with the ♀♀ without courtship display. Following tandem achievement, half of the observed pairs experienced a precopulation rest period. The remaining pairs began copulation immediately. This copulation took place while the pair was perched on the vegetation bordering the lake. After copulation, oviposition followed, usually immediately. Oviposition took place on or in floating sprigs of *Elodea* near the center of

- (922) KONDUR, L.V., 1972. Pitanie zhereha (*Aspius aspius iblioides* Kessl.) v Kairak-Kumskom vodohranilishche. (The diet of *Aspius aspius iblioides* Kessl. in the Kairak-Kum Reservoir). *Izv. Akad. Nauk Tadzhik., (Biol.)* 1972 (1): 59-64. (Russian). — (*Inst. Zool. & Parasitol., Tadjik Acad. Sci., P.O.B. 70, 734025 Dushanbe, USSR*).
Unidentified odon. larvae are recorded as a food item of this fish sp.

- (923) NOORDWIJK, I. van & A. van NOORDWIJK, 1972. Libellen. (Dragonflies). In: Inventarisatie-verslagen Woold 1972, pp. 8-12. Dutch Youth Federation of Nature Friends, Utrecht. (Dutch). — (*Hessenweg*

the lake. The ♀♀, in tandem with the ♂♂ always oviposited on the surface: they never descended beneath the water. After oviposition, the pair broke tandem and returned to the shore.

- (925) PENA, L.E., 1972. Distribucion geografica de *Hypopetalia pestilens* McL. (Odonata). Geographic distribution of *Hypopetalia pestilens* McL. (Odonata). *Revta ent. Chil.* 6 [1968]: 6. (Spanish). — (*Author's address unknown*).

For many years efforts were made to locate this sp. in the Cordillera (mountain range) of Nahuelbuta. Finally these efforts succeeded in the foothills of Curico, Chile. *H. pestilens* flies in the densest part of the mountains, always following the course of water in the darkest places, thus being almost invisible. During a journey to Lago (Lake) Chapo, province of Llanquihue, in Correntoso, another specimen was captured on March 30, 1968.

- (926) SAGITOV, A.K., S. GUL'MURADOV & S. BAKAEV, 1972. K biologii obyknovennogo chegloka v basseine reki Zarafshan. [On the biology of the common hobby in the basin of the Zarafshan river]. *Trudy Samark. Univ.* 211: 8-13. (Russian). — (*Authors addresses unknown*).

In the Zarafshan Valley, Central Asia, USSR, the hobby (*Falco subbuteo*) nests at altitudes between 120-3250 m above sea level in tree stands, nr. meadows, fields and populated areas. A description is given of growth and behaviour of 2 nestlings. They ate mainly the crested lark, turtle-dove, swallow and carrion crow, but also various insects, incl. Odon.

- (927) SAHNI, D.N., 1972. Studies on the Odonata of Kumaon: III. Suborder Zygoptera. *Bull. Ent.* 12 (2) [1971]: 69-84. — (*Agric. Complex, Himachal Pradesh Univ., Palampur, Himachal Pradesh, India*). 16 spp. from different parts of Kumaon, Northwestern India, are described. ♂ and ♀ specimen measurements and distribution ranges are presented.

- (928) SHIRGUR, G.A. & H.G. KEWALRAMANI, 1972. Observations on comparative propensities for carp fry destruction by adults and last instar preimaginal stages of predatory aquatic insects. *Proc. Indian Acad. Sci. (B)* 76 (3): 85-89. — (*Taraporevala Marine Biol. Res. Stn, Bombay-2, Maharashtra, India*).

Studies on comparative propensities for carp fry (*Catla catla*, *Labes rohita*, *Cirrhina mrigala*) destruction by adults and larvae of Heteroptera, Coleoptera and Odon., were made under laboratory conditions. Coleopterans, especially *Cybister* larvae, were the most predaceous, the Odon. larvae the least.

- (929) SUGERMAN, B.B., 1972. Insects and other arthropods from Kwajalein Atoll (Marshall Islands). *Proc. Hawaii ent. Soc.* 21 (2): 271-286. — (*Author's address unknown*).

The atoll is a coral reef formation, with a surface area of 902 mile². Data are given on precipitation, temperature, wind directions, etc. The historical background is reviewed. A table lists the islets on the atoll from which insect specimens were collected. This is followed by a list of spp. showing the names of the islet or islets on which they were found, and covers 14 insect orders, incl. 4 spp. of Odon., viz. *Anax guttatus* (Burm.), *Diplacodes bipunctata* (Br.), *Pantala flavescens* (Fabr.) and *Tramea transmarina* propinqua Lief.

1973

- (930) CARNEVALI, D.C. & R. VALVASSORI, 1973. Intersegmental abdominal muscles of *Calopteryx splendens* and *Anax imperator*. *J. Submicrosc. Cytol.* 5 (3): 227-236. (With Ital. s.). — (*Ist. Zool., Univ. Milano, Milano, Italy*).

The ultrastructure of the intersegmental abdominal muscles of the larvae of the 2 spp. was examined. The latter are characterized by a different mobility of the abdomen. Differences of the endoplasmic reticulum, of the number and distribution of the dyads, and of the myofibril and myo-

filament diameter are discussed. These data are correlated with the different functions performed by the muscles. (Cf. also *OA* No. 664).

- (931) DEWEY, J.E., 1973. Accumulation of fluorides by insects near an emission source in western Montana. *Environ. Ent.* 2 (2): 179-182. — (*For. Insect Dis. Branch, Div. State Priv. For., North. Reg., US For. Serv., Missoula, Montana, USA*).
4 major insect groups, viz. pollinators (Hymenoptera, Lepidoptera), predators (Odon., Hymenoptera, Diptera), foliage feeders (Lepidoptera, Coleoptera, Homoptera) and cambial region feeders (Coleoptera) were collected near an Al. reduction plant and analyzed for fluorides. Collections were made in June, Aug. and Oct. in 1970 and in Aug. 1971. From 58.0 - 585.0 ppm fluoride was found among the pollinators; from 6.1 - 170.0 ppm among the predators; from 21.3 - 255 ppm among the foliage feeders; and from 8.5 - 52.5 ppm among the cambial region feeders. Fluoride levels among the control insects sampled ranged from 3.5 - 16.5 ppm. The relatively high fluoride levels in the 100% predatory insects indicate fluorides are either accumulated by respiration or are passed along the food chain.
- (932) GROOTHUIS, T., A. BARENDRECHT & M. van NOORDWIJK, 1973. Odonata - Libellen. (Odonata - Dragonflies). In: M. van Noordwijk, A. Noordam & A. Barendrecht [Eds.], *Vlieland zoals NJNers het zagen in 1971 & 1972*, p. 46. Dutch Youth Federation of Nature Friends, Utrecht. (Dutch). — (Obtainable from the third author: *Taveernelaan 15, Bilthoven, NL*). A list is given of 6 spp. collected by the members of the Dutch Youth Federation of Nature Friends (NJN) in 1971-1972 at the Northsea island of Vlieland, Netherlands.
- (933) KOENIG, C., 1973. Eine erfolgreiche Brut des Bienenfressers (*Merops apiaster*) in Hegau. *Anz. ornithol. Ges. Bayern* 12 (1): 52-56. (With Engl. s.). — (*Staatl. Mus. Naturk., Schloss Rosenstein, D-7 Stuttgart, GFR*).
During the summer of 1972 a pair of bee-eaters (*Meropidae*) bred successfully in the Hegau, Lake Constance, German Federal Republic. Detailed observations on nest morphology, brood development and behaviour of the birds are recorded. Food remnants consisted of representatives of a number of insect orders, incl. Odon. (Cf. also *OA* No. 918).
- (934) KUMAR, A., 1973. The life history of *Bradinopyga geminata* (Rambur) (Odonata: Libellulidae). *G.K.V.J. Sci. Res.* 5 (1-2): 50-57, 3 pls. — (*High Altitude Zool.Fld. Stat., Zool. Surv. India, "Mohinder Bhawan", Rajgarh Rd., Solan - 173212, H.P., India*).
The sp. was reared from egg to adult in the laboratory. The principal changes in external morphology in different instars and the characters helpful in distinguishing various instars are described and illustrated. In addition, the seasonal distribution of this sp. is compared to that of *Zyxomma petiolatum*. (Author).
- (935) NOORDWIJK, M. van & D. WAMMES, 1973. Insekten. (Insects). In: J. Koeman, B. Mansell, A. Noordam, M. van Noordwijk & D. Wammes, *Inventarisatie verslag Wickenburg*, p. 25. Dutch Youth Federation of Nature Friends, Utrecht. (Dutch). — (*Taveernelaan 15, Bilthoven, NL*).
List of 5 odon. spp. collected by the members of the Dutch Youth Federation of Nature Friends (NJN) in summer 1973 at Wickenburg, North of the Amsterdam-Rhine Canal, Netherlands.
- (936) PAVESI, M., 1973. Interessanti reperti di odonati in Puglia e Basilicata: I. Contributo alla conoscenza degli Odonata. *Boll. Soc. ent. ital.* 105 (9-10): 151-155. (With Engl. s.). — (*Via Beatrice d'Este 18, I-20122 Milano*).
Spp. collected during short researches in Puglia and Basilicata, Italy, are listed together with a short description of biotopes.

Some observations on the most interesting of these are also provided. *Erythromma viridulum*, *Chalcolestes viridis*, *Brachytron pratense*, *Anaciaeschna isosceles*, *Anax parthenope* and *Selysiothemis nigra* are new for Puglia. There are 35 spp. known from this region. *E. viridulum* is new also for Basilicata. (Cf. also *OA* No. 497).

- (937) REES, G., 1973. Cysticeroids of three species of *Tatria* (Cyclophyllidae: Amabiliidae) including *T. octacantha* sp. n. from the haemocoel of the damselfly nymphs *Pyrrhosoma nymphula*, Sulz. and *Enallagma cyathigerum*, Charp. Parasitology 66 (3): 423-446. — (*Dept. Zool., Univ. Coll., Aberystwyth, Wales, UK*).

Cysticeroids of 3 spp. of *Tatria* were recovered from the larval haemocoel of the 2 zygopteran spp. from a lake in Mid-Wales, United Kingdom. This is the 1st record of *Tatria* in Britain. The cysticeroids are enclosed each in a transparent capsule of host origin permanently attached to the midgut of the host. The cysticeroids of the 3 spp. are indistinguishable superficially. Specific diagnosis depends on the armature of the scolex. *T. octacantha* differs from the other 8 species by the presence of 8 apical rostellar hooks and 48 small spines on the rostellar surface. One mature adult was found in a little grebe *Podiceps ruficollis ruficollis* (Pallas) from the same lake and is described briefly. The cysticeroids are described in general terms and the scolex of *T. octacantha* in detail including the mode of operation of the rostellum and the ultrastructure of the surface layers. A layer of fibers occurs below the superficial longitudinal muscles of the rostellum providing additional support for this mobile organ. A revised key to the 9 spp. of *Tatria* is included. (For the ultrastructure of the cysticeroid of the new sp. cf. *OA* No. 599).

- (938) REHWOLDT, R., L. LASKO, C. SHAW & E. WIRHOWSKI, 1973. The acute toxicity of some heavy metal ions towards benthic organisms. *Bull. Environ. Contam. Toxicol.*

10 (5): 291-294. — (*Marist Coll., Environ. Sci. Program, Poughkeepsie, N.Y., USA*).

The effects of heavy metals on benthic organisms of the Hudson River (Poughkeepsie region, USA), was investigated. The organisms chosen were those most common to the area, including unidentified *Zygoptera*. Results are given in tabular form in terms of analytical conc. (ppm) of metal ion in the water, TLM (50%) and ratio of added toxin to ambient river conc. Mercury ion is the most toxic ion studied and is more toxic toward benthic organisms than fish. With the exception of *Chironomus* and *Gammarus*, benthic organisms tend to be more able to withstand heavy metal inputs than fish.

- (939) WASSERMAN, G.S., 1973. Invertebrate color vision and the tuned-receptor paradigm. *Science* 180 (4083): 268-275. — (*Biol. Dept., Univ. Wisconsin, Madison, Wis. 53706, USA*).

Recordings from photoreceptors of a number of arthropods, incl. *Odon.*, indicate their sensitivity to broad spectral bands.

1974

- (940) ASAHINA, S., 1974. A revisional study of the genus *Mnais* (Odonata, Calopterygidae). I. What is *Mnais mneme* Ris? *Kontyû* 42 (4): 365-374. — (*Totsuka III-123, Shinjuku-ku, Tokyo, 160, JA*).

A forgotten and rather puzzling South Chinese species *M. mneme* is revised. It was found that it represents a distinct species including misidentified allied insects such as *M. earnshawii thoracicus* May and *M. andersoni* of some authors. The distribution now covers South China (Kwangtung and Fukien Provinces), Hainan, Laos and Central Vietnam. (Author). (For Pt. II of this series cf. *OA* No. 941).

- (941) ASAHINA, S., 1974. A revisional study of the genus *Mnais* (Odonata, Calopterygidae). II. *Mnais gregoryi* Fraser and its allies. *Tombo* 17 (1-4): 2-9. — (*Totsuka III-123, Shinjuku-ku, Tokyo, 160, JA*).

- M. gregoryi and its allied forms known from Yunnan, West China are revised. It seems possible that M. gregoryi, M. maclachlani Fraser, M. semiopaca May and M. yvonna Martin (nomen nudum) are ascribable to a single sp., or they represent geographic races of a single sp. M. incolor Martin, described from Laos, is regarded to be close to M. gregoryi. (Author). (For Pt. I of this series cf. *OA* No. 940).
- (942) ASAHINA, S., 1974. Diagnostic notes on the ultimate instar larvae of some Anax species. Tombo 17 (1-4): 10-16. (Japanese, with Engl. s., key, and "Remarks"). — (*Totsuka III-123, Shinjuku-ku, Tokyo, 160, JA*).
The exuviae of 7 Anax spp. are briefly described with illustrations of their labium, caudal appendages of both sexes and ♀ ovipositor rudiments, i.e. parthenope julius, nigrofasciatus nigrofasciatus, guttatus, panybeus, maclachlani, immaculifrons and imperator. A key is added. In the "Remarks" comments are given on the papers by S.K. Sangal & A. Kumar (1970. J. nat. Hist. 4: 305-313) and A. Kumar (1973. Odonatologica 2: 83-90).
- (943) ASAHINA, S., 1974. A specimen of "Davidius moiwanus" from Shimane Prefecture. Tombo 17 (1-4): 23. (Japanese, with Engl. s.). — (*Totsuka III-123, Shinjuku-ku, Tokyo, 160 JA*).
A problematical ♂ specimen from the Shimane Prefecture, Japan, referred to, but not subspecifically determined, in the paper listed in *OA* No. 690, is here identified as D.m. sawanoi Asahina & Inoue.
- (944) ASAHINA, [S.], 1974. (The 19th General Assembly). Tombo 17 (1-4): 28. (Japanese). — (*Totsuka III-123, Shinjuku-ku, Tokyo, 160, JA*).
A brief report on the Assembly of the Society of Odonatology, Tokyo, that has taken place on Sept. 29, 1974, at the Iwate University, Morioka. A group photograph of the 17 participants is added.
- (945) BELY SHEV, B.F., Z.D. SPURIS & K.F. SEDYH, 1974. Otrayad strekozi — Odonata. (Order dragonflies - Odonata). In: K.F. Sedyh [Ed.], Zhivotnyi mir Komi ASSR. Besponozvochnye. (Animal world of the Komi Autonomous Soviet Socialist Republic. Invertebrates). Komi ASSR Publ. House, Syktyvkar. pp. 68-72. (Russian). — (*Biol. Inst., Siberian Section USSR Acad. Sci., Ul. Frunse 11, Novosibirsk-91, USSR*).
A list is given of 35 spp. recorded from the Komi Republic, USSR. In addition to the usual locality data information is furnished, whenever available, on the larval habitats, oviposition sites, length of larval development and on the adult phenology.
- (946) BREHME, W., 1974. Die Libellen des Federseegebietes. Beih. Veröff. Landesstelle Naturschutz Landschaftspflege Baden-Württemberg 4 (Beiträge zur Insektenfauna des Naturschutzgebietes Federsee): 89-134. — (*Freudenthalstrasse 7, D-303 Walsrode, GFR*).
An account is given of the odon. fauna of the nature reserve lake Federsee, Oberschwaben, German Federal Republic. The description of odon. biotopes is followed by a seasonal characterisation (per month) of the lake and its odon. fauna. The annotated list of spp. includes also literature records from other localities in Oberschwaben. Phenology graphs and graphs of the fauna composition of different biotopes are also provided.
- (947) DABORN, G.R., 1974. Biological features of an aestival pond in western Canada. Hydrobiologia 44 (2-3): 287-299. (With Fr. s.). — (*Dept. Zool., Univ. Alberta, Edmonton-7, Alberta, CA*).
The seasonal changes in flora and fauna in an aestival pond in central Alberta, Canada, were studied through a complete annual cycle during which an exceptional decrease in water volume occurred in response to lower than normal rainfall. Substantial changes took place between successive summers in the species composition of the phytoplankton, Rotifera, Oligochaeta,

- Copepoda and Zygoptera. Some of the incoming spp., particularly also 3 spp. of *Lestes* are often associated with more temporary habitats of the region. The instability of spp. composition and productivity of the community is discussed in terms of the trophic position of aestival lakes and ponds.
- (948) DEGRANGE, C. & M.-D. SEASSAU, 1974. Sur l'interprétation du labium des Odonates. C.R. Acad. Sc. Paris (D) 278: 3335-3338. — (*Lab. Zool., Univ. Grenoble, Domaine Universitaire, F-38 Saint-Martin-d'Hères, France*).
The larval labium can be homologized with that of the adult Odon. In the adults, however, it is more primitive than in the larval stage.
- (949) DRENTH, D., 1974. Susceptibility of different species of insects to an extract of the venom gland of the wasp *Microbracon hebetor* (Say). *Toxicon* 12 (2): 189-192. — (*Pharmacol. Lab., Univ. Amsterdam, Polderweg 104, Amsterdam, NL*).
A venom-gland extract from *M. hebetor* (Hymenoptera: Braconidae) was injected into representatives of 9 orders, incl. Odon. High susceptibility to this paralyzing venom was restricted to Lepidoptera. Odon. remained unaffected, while a few spp. of Heteroptera, Diptera and Hymenoptera could also be paralyzed, but only if high doses were injected.
- (950) EBERT, G., 1974. Aus der Entomologischen Arbeitsgruppe des Naturwissenschaftlichen Vereins Karlsruhe. Beitr. naturk. Forsch. SWDtl. 33: 253-254. — (*Landessamml. Naturk., Erbprinzenstr. 13, D-75 Karlsruhe, GFR*).
This is a report on the 1972 and 1973 activities of the Entomological Section of the Karlsruhe Natural History Society, with a reference to a lecture held by Dr. G. Jurzitza on Sept. 28, 1973 at the Second International Symposium of Odonatology. (Cf. OA Nos. 512, 530, 531).
- (951) EDA, S., 1974. Submerged oviposition of *Lestes sponsa* in tandem. Tombo 17 (1-4): 1. — (*Dept. Oral Pathol., Matsumoto Dental Coll., 1780 Gobara, Hirooka, Shioziri, Nagano, 399-07, JA*).
Front-piece photograph, taken near Matsukawa, Nagano, Japan (Sept. 28, 1974).
- (952) EDA, S. & K. NARUSE, 1974. *Sympetrum parvulum* from Ichikawa, Chiba Pref. Tombo 17 (1-4): 20. (Japanese, with Engl. s.). — (*Dept. Oral Pathol., Matsumoto Dental Coll., 1780 Gobara, Hirooka, Shioziri, Nagano, 399-07, JA*).
The record of this sp. increases the number of species, recorded from this prefecture to 73.
- (953) EDMAN, J.D. & J.S. HAEGER, 1974. Dragonflies attracted to and selectively feeding on concentrations of mosquitoes. Fla Ent. 57 (4): 408. — (*Fla Med. Ent. Lab., Box 520, Vero Beach, Fla 32960, USA*).
While releasing marked mosquitoes on a heavily forested 100-acre island in the St. Johns River marsh, west of Vero Beach, Florida, USA, in August 1971, the authors observed a rapid accumulation of *Anax junius* and witnessed selective feeding on this man-made concentration of prey. A cage containing 800,000 2-3 day old *Aedes taeniorhynchus* (Wied.) was placed in a cleared area in the middle of the field, and smaller cages containing a total of some 300,000 newly-emerged mosquitoes were spaced around it. The observations are described in detail and additional evidence on the subjects, provided by earlier workers, is brought on record and considered in the discussion.
- (954) EZENWA, A.O., 1974. Ecology of Simuliidae, Mermithidae, and Microsporidia in Newfoundland freshwater. Can. J. Zool. 52 (5): 557-565. (With Fr. s.). — (*Res. Unit Vector Pathol., Mem. Univ. Newfoundland, Saint John's, Newfoundland, CA*).
Aeshna interrupta is mentioned as predator

of the larvae of the black fly, *Simulium venustum* (Diptera).

- (955) FRANTSEVICH, L.I. & P.A. MOKRUSHOV, 1974. Response of high-rate movement detecting neurons to movement of single targets in dragonfly nymphs. *Neirofiziologiya* 6 (1): 68-74. (Russian, with Engl. s.). — (*Lab. Insect Physiol., Inst. Zool., Ukrainian Acad. Sci., 15 Lenin Str., USSR-252030 Kiev*).

High-rate movement detecting neurons of *Aeshna cyanea* discharge at a rate of 150-250 pulses/s to the movement of single targets in a large receptive field. The response depends directly on the target size. Dark targets are preferred. Expansion of the dark edge (approaching of the black disc) excites the neurons stronger than contraction of the dark edge (removing of the white disc against a contrasting background). The response to uniform movement of high-frequency volleys separated by pauses. Neurons habituate to repeated movements along the same trajectory, recovering with the time constant of about 30 s after the cessation of stimulation. The role of lateral inhibition and local habituation in detecting certain optical signs is discussed.

- (956) FRANTSEVICH, L.I. & P.A. MOKRUSHOV, 1974. Responses of high-rate movement detecting neurons to movement of complex patterns in dragonfly nymphs. *Neirofiziologiya* 6 (1): 75-80. (Russian, with Engl. s.). — (*Lab. Insect Physiol., Inst. Zool., Ukrainian Acad. Sci., 15 Lenin Str., USSR-252030 Kiev*).

High-rate movement detecting neurons discharge at a rate of 150-250 pulses/s to the appearance and movement of a single black target in new loci of a large receptive field. The movement of a complex pattern produces only a feeble initial response. Repeated movements of the pattern cause habituation and do not influence the background discharge. However, they inhibit the response to movement of a single target at a distance of 15-30 degs aside from the

habituated zone. The signs of optic stimuli strongly exciting the neurons coincide with those of causing avoidance and retreat reactions in the nymphs. The receptive fields of such type are common in arthropods and vertebrates.

- (957) GAUFIN, A.R., R. CLUBB & R. NEWELL, 1974. Studies on the tolerance of aquatic insects to low oxygen concentrations. *Great Basin Nat.* 34 (1): 45-59. — (*Univ. Utah, Salt Lake City, Utah, USA*).

Acute, short-term (96-h) tests were conducted to determine the relative sensitivity to low O₂ concentrations in 20 spp. of aquatic insects. The longer-term effects of low O₂ levels on the survival, molting, growth, and emergence of 21 spp. were studied. This paper encompasses work conducted at the University of Montana Biological Station from 1968-1970 and at the University of Utah (USA) from 1966-1972. An evaluation of the average minimum dissolved-oxygen requirements of the different groups of aquatic insects tested indicates that mayflies are the most sensitive, stoneflies are next, and the caddisflies, freshwater shrimp, true flies, and Odon. follow, in that order. While 2 spp. of mayfly could tolerate as low a dissolved-oxygen concentration as 3.3 mg/l for 10 days, a level of 4.6 mg/l was required for 50% survival at 30 days. 50% of the true flies and Odon. tested were able to survive at levels ranging from 2.2-2.8 mg/l for periods ranging from 20-92 days.

- (958) GIGINYAK, YU. G. & E.B. PAVEL'EVA, 1974. *Vesovaya i energeticheskaya harakteristika lichinok strekoz ozera Naroch'.* (The weight and energy characteristics of the Naroch' Lake dragonfly larvae). *Vest. Beloruss. Univ., (II)* 1974 (1): 37-40. (Russian). — (*Dept. Invert. Zool., Byelorussian Univ., USSR-220080 Minsk*).

The dependence of larval weight on size and caloric contents was studied during one year in a lake of Minsk Province. The dependence of the wet weight in mg(W) of one specimen on its body length in mm (l)

was determined preliminarily: $W = 0.102$ ± 2.58 in summer and $W = 0.102 \pm 2.68$ in winter. Only the genus of the larva was identified. In a table the mean dry weight of one larva, the % body water, the caloric content of 1 mg dry matter, the % ashes and organic matter, the caloric content of 1 mg organic matter and the energy equivalent of one larva were presented for each of 9 genera studied. The caloric contents showed a minimum between September and February and a maximum between May and June. Ashes and organic matter constituted 5.12 and 94.88% respectively of the total dry matter, with caloric contents of 4.43 and 4.67 cal/mg respectively. The mean water content of the body was 82.5% (Cf. also OA No. 533).

- (959) GLÖER, P., G. IHSEN, O. OSTERMANN, H. STOBBE & W. WERNICKE, 1974. Teufelsmoor. Ergebnisse des internationalen DJN-Lagers in Worpswede vom 27.7.-10.8.1974. Red Area Book & Verlag Deutscher Jugendbund für Naturbeobachtung (DJN). 78 pp, 1 map excl. — (Address fourth author: *Ahrensburger Platz 4, D-2 Hamburg-67, GFR*; Publishers' address: *Verlag DJN, Mechthildenstrasse 36, D-8 München-19, GFR*).

A general characterization is given of 10 biologically interesting areas of the Teufelsmoor nr. Bremen, German Federal Republic, with lists of selected groups of flora and fauna, incl. Odon. The damage caused by the anthropogenic influences is discussed and protective measures are suggested.

- (960) GREEN, J., 1974. Territorial behaviour in some Nigerian dragonflies. *Zool. J. Linn. Soc.* 55: 225-233. — (*Zool. Dept., Westfield Coll., Hampstead, London NW3 1ST, UK*). The observations were carried out at a small pool (3.25 m²) in the grounds of the Ife University, Nigeria, on ♂♂ of the following 7 spp.: *Pseudagrion melanicterum*, *P. kersteni*, *Orthetrum microstigma*, *Palpo-leura lucia lucia*, *P.l. portia*, *Trithemis arteriosa* and *Crocothemis* sp. Each of these

had its characteristic time of arrival at the pool; those arriving early stayed late, and those arriving late left early.

The territories held by the ♂♂ can be divided into two categories: "perch and patrol" and "continuous short term aerial". With the perchers and patrollers it is possible to distinguish a patrol area and a somewhat larger defended area. Forms with red bodies (*Trithemis*, *Crocothemis*) defended larger areas than the blue bodied *Orthetrum microstigma*. This last species showed variation in the size of territory with the number of ♂♂ present. No feeding activities were seen in the territories, which appeared to be held only for reproductive purposes. Although there was much intraspecific interaction over the pool there was little or no interspecific interaction, and the territories of different spp. overlapped considerably in space and time. (Author).

- (961) GREEN, J., S.A. CORBET & E. BETNEY, 1974. Ecological studies on crater lakes in West Cameroon. Debundsha Lake. *J. Zool., Lond.* 173: 199-223. — (*Zool. Dept., Westfield Coll., Hampstead, London NW3 1ST, UK*).

In April 1972 three odon. spp. were recorded at the lake, viz. *Enallagma buchholzi*, *Orthetrum* sp. and *Urothemis* sp. Figures are given of the adult ♂ (thorax and abdomen, head, wings, appendages) and ultimate instar larva (head, general dorsal view, anterior wing venation, caudal lamella, labium) of *E. buchholzi*, and of the ultimate instar larva (general dorsal view, labium) of *Urothemis* sp. This is the first description of the larval stage of *E. buchholzi*. The adults are smaller than the type series from Fernando Po. — The lake is characterized by one of the lowest conductivities recorded in Africa. The general impression of the fauna is one of sparseness (15 insect spp.), with an unusual high proportion of larval Odon. (30 individuals). The preponderance of larval Odon. in low conductivity tropical waters has also been noted in the Mato Grosso, Brazil (cf. J. Green, 1970. *Proc. Br. ecol. Soc.* 39:4-5), but it is difficult to explain.

- (962) HART, C.W., Jr. & S.L.H. FULLER [Eds.], 1974. Pollution ecology of freshwater invertebrates. Academic press, London - New York. XIV + 389 pp. — (Address author odon. section: *Dr. S. Roback, Dept. Limnol., Acad. Nat. Sci. Philadelphia, 19th & The Parkway, Philadelphia, Pa. 19103, USA*).

The book is a multilevel treatment of pollution ecology of freshwater invertebrates, giving (1) basic outlines of the normal ecology of certain invertebrate groups, (2) discussion on the present state of knowledge concerning the pollution ecology of these groups, (3) systematic interpretations and (4) extensive references to ancillary background literature. Odon. are dealt with on pp. 321-327. Of particular interest is a table showing ranges of chemical analysis of waters in which 65 North American spp. were collected. It is apparent, from the table, that Odon. are not, as a whole, a sensitive group. Except for pH and high BOD they have a few-to-moderate number of spp. tolerant of the extremes of the chemical parameters listed (pH, alkalinity, Cl, DO, total hardness, Ca, Mg, NO₃, SO₄, BOD, turbidity). With regard to the number of spp. found under the extremes of water quality, the Zygoptera and Anisoptera are fairly even, although the populations of the former are, in most cases, considerably larger. Above pH 8.5 only 1 zygopteran was found. Of the 15 spp. found above the alkalinity 210 ppm, 10 were Zygoptera. In the case of chloride greater than 100 ppm 8 Zygoptera and 7 Anisoptera were observed; in brackish situations with a dissolved oxygen less than 4 ppm, a 1:1 relationship exists between the 2 suborders. In hard waters the anisopteran larvae predominated 6:3, and where sulphate was greater than 400 ppm 3:1. Where BOD was greater than 5.9 ppm the Anisoptera to Zygoptera ratio was 9:6, and only *Ischnura verticalis* was found at BOD higher than 10 ppm. The Zygoptera (e.g. *Ischnura*) are successful in consistently maintaining good population sizes under chemical extremes. *Ischnura* was found in 6 of the 10 categories listed,

with *Argia* and *Enallagma*, 4 times each. This is specially true under conditions of high organic loading, when *Ischnura* and other Zygoptera often dominate the insect populations present. The Anisoptera are more diverse in their tolerances, with no genus being found in more than 3 categories.

- (963) HOWSE, P.E., 1974. Design and function in the insect brain. In: L.B. Browne [Ed.], *Experimental analysis of insect behaviour*. Springer, Berlin-Heidelberg-New York, pp. 180-194). — (*Dept. Biol., Univ. Southampton, Southampton, SO9 5NH, UK*).

A study of brains of insects, differing widely in the richness of their behavioural repertoires, shows that the mushroom body volume is related to behavioural complexity, while that of the central body is not. Lesion and stimulation experiments on the mushroom bodies support the hypothesis that these are concerned with selection and sequential organization of behaviour. The central complex is a highly ordered system comprising many repetitively branching neurons, and does not have direct connections with other neuropile areas. The results of lesion experiments are consistent with the hypothesis that the central complex is involved in setting levels of behavioural responsiveness. — Insects which have good vision, but which show little evidence of a well developed visual memory, like Odon. (and syrphids and mantids), have very small mushroom bodies (which indicates that a large proportion of the calyx tissue in Hymenoptera is concerned with visual memory operative in foraging). Very small mushroom bodies in Odon. (also Diptera and Hemiptera) are often coupled with large and highly differentiated optic and antennal lobes. The calyces, therefore, can not form a blank screen on which a detailed picture of the outside world can be projected, but it is likely that they are organized to respond to specific patterns of stimulation which will unlock certain behaviour patterns. (Cf. also *OA* No. 1001).

- (964) IGNATOWICZ, S., 1974. New data on the occurrence of Acarina on insects in Poland. Bull. Ent. Pol. 44 (4): 705-713. (Polish, with Engl. s.). – (*Dept. Zool., Inst. Biol., UMK, ul. Gagarina 9, PO-87-100 Toruń*). An unidentified *Arrhenurus* sp. is recorded from the adults of *Cordulia aenea* and *Sympetrum flaveolum*. Data on the intensity of infestation are also mentioned. The other hosts listed represent the orders Coleoptera, Diptera, Lepidoptera, Heteroptera and Homoptera. (Cf. also *OA* No. 781).
- (965) JENSEN, H., 1974. The anatomy of the salivary system of the adult *Sympetrum danae* Sulzer (Odonata: Anisoptera). Norw. J. Zool. 22 (3): 145-170. – (*Inst. Anat., Univ. Bergen, NO-5000 Bergen*). The salivary system of *S. danae* is described. Both supraoesophageal and suboesophageal salivary glands are found in the sp. Their histology is identical. The glands contain 2 types of cells, one of which is assumed to be protein secreting, the other is of uncertain function. The ultrastructure of binucleated cells which border the lumen of the salivary reservoir is identical to that seen in typical transport cells. The tracheae supplying the salivary glands originate from air sacs in the thorax, while the salivary reservoir is supplied by a branch from the labial trachea. (Author).
- (966) JOHNSON, C., 1974. Taxonomic keys and distributional patterns for nearctic species of *Calopteryx* damselflies. Fla Ent. 57 (3): 231-248. – (*Dept. Zool., Univ. Florida, Gainesville, Florida 32611, USA*). The paper gives taxonomic keys for 5 nearctic spp. and completes a 3-title series on distributions of the United States *Calopterygidae*. The accompanying text clarifies intraspecific variability, 9 morphs, areas of sympatry for similar spp., and reviews the taxonomic uncertainty of *C. amata* and *C. angustipennis*. Distributions, for USA and Canada together, appear for each sp. by appropriate state or province subunits, and focus attention on related ecological questions. Flight season data reveal little or no seasonal differences between spp. A review of early southwestern records for *C. maculata* appears, and existing literature notes provide a tentative identification of the early type-locality of *C. angustipennis* representing the single sp. reported for Georgia, USA. (Author).
- (967) JOOST, W., 1974. Bericht über das II. Symposium des AK "Aquatische Insektengruppen" in Gottau vom 24. bis 26. Mai 1974. Ent. Nachr., Dresden 18 (9): 139-142. – (For odonatol. matters: *Mr. W. Zimmermann, Museum der Natur, Parkallee 15, DDR-58 Gotha, GDR*). This is a report on the 2nd Symposium of the Aquatic Insects Workers of the German Democratic Republic. (The first Symposium was limited to the odon. workers only; cf. *OA* No. 765). Among the papers presented 2 were devoted to Odon., but have so far not yet been published. The following conclusions were taken with regard to Odon.: (1) Because of technical difficulties no central card index will be set up; – (2) A bibliography will be compiled of papers related to the local odon. fauna; – (3) Mr. W. Zimmermann will prepare a list of odon. collections in the GDR; – (4) Six odonatologists were appointed to work out the local fauna of a number of families. – A group photograph of the participants is added. The next Symposium will take place in June, 1975.
- (968) JURZITZA, G., 1974. Rasterelektronenmikroskopische Untersuchungen des Zangengriffes und der lamina mesostigmalis einiger Coenagrionidae (Odonata, Zygoptera). Forma et Functio 7: 377-392. (With Engl. and Fr. s's.). – (*Bot. Inst. 1, Univ. Karlsruhe, Kaiserstrasse 12, D. 75 Karlsruhe, GFR*). Scanning electron microscope studies of the per collum connection and of the lamina mesostigmalis were carried out on 2 preserved copulae of *Ischnura fluviatilis* and 1 tandem of *Oxyagrion rufulum*. In both spp. the lower appendages are located on the

dorsum of the prothorax, with their tips in small cavities. The upper appendages are pressed against the rear side of the prothorax margin. In *I. fluviatilis*, they have contact to part of the mesostigmal laminae, in *O. rufulum* a double hook at the ends of the upper appendages catches hold of the lateral ends of these plates. Studies on the connection between pro- and ptero-thorax in several Coenagrionidae ♂♂ gave evidence that the mesostigmal plates are part of the articulation between them and limit the upward motility of the former. In *I. fluviatilis*, bristles are located at some of those parts of the ♀ prothorax and the mesostigmal plates which come into contact with the ♂ appendages during mating. In the upper appendages of the ♂ the contact zone bears short chitinous cones, and the bristles are inserted in holes. (Author).

- (969) KAJAK, Z. & K. DUSOGE, 1974. Experimentally increased fish stock in the pond type lake Warniak. IX. Numbers and biomass of bottom fauna. *Ekol. Pol.* 21 (35) [1973]: 563-573. (With Pol. s.). — (*Inst. Ecol. PAN, Dziekanów Leśny k. Warszawy, PO-05-150 Lomianki*).

An increase of the fish stock by introducing carp and bream resulted in a decrease of benthic biomass in successive years and, therefore, in worse food conditions for benthophagous fish. The Chironomidae (Dipt.) larvae dominated, but among the predatory forms in the biomass of the benthic fauna Odon. play a considerable role. Neither a list of spp. nor quantitative data for Odon. are stated. (Cf. also *OA* No. 987).

- (970) KAWAGUCHI, S., 1974. Two males of *Anax guttatus* captured again in Shizuoka City. *Tombo* 17 (1-4): 23. (Japanese, with Engl. translation of the title). — (2-10, *Otemachi, Shizuoka-shi, 420, JA*).

2 ♂ were captured at Kujira-ike, Shizuoka, Japan, on July 26, 1974. (Cf. also *OA* No. 741).

- (971) KNOPF, K.W., 1974. A new marking technique for studying the mating behavior of

Odonata. *Fla. Ent.* 57 (2): 149-150. — (*Dept. Ent. & Nematol., Univ. Florida, Gainesville, Florida 32611, USA*).

A new marking technique useful for studying mating behaviour and isolating and releasing mechanisms of Odon. was developed and tested. Fluorescent pigments mixed with vaseline are applied so that some of the paste is transferred during mating. Application is to the ♂ caudal appendages or their points of contact on the ♀. An UV light is then used to check field collected individuals for transferred pigment.

- (972) KRAUSCH, H.-D. & W. SCHEFFLER, 1974. Die Moore des Naturschutzgebietes Stechlin und seiner Umgebung. *Naturschutzarb. Berlin Brandenburg* 10 (2): 55-58, fig. 7 excl. — (Address second author: *Abt. Limnologie, Zentralinst. f. Mikrobiol. u. exp. Therapie, Forschungszentrum f. Molekularbiol. u. Medizin, Akad. Wiss. DDR, DDR-1431 Neuglobsow, GDR*).

A brief general characterization of abiotic and biotic conditions prevailing in the lakes of the moorland nature reserve of Stechlin, German Democratic Republic, is given. The importance of the conservation of *Nehalennia speciosa*, *Aeshna subarctica* and *Leucorrhinia albifrons* is stressed. (*Abstracter's note*: For a detailed account of the odon. fauna of the area cf. W. Scheffler, 1970, *Limnologica* 7: 339-369, and *OA* No. 754).

- (973) KRYLOVA, V.N., 1974. Strekozy (Odonata) Mongol'skoy Narodnoy Respubliki. [Dragonflies (Odonata) of the Mongolian People Republic]. *Biol. resursy i prirodoosloviya MNR* 4 (2): 14-22. (Russian). — (*Inst. Biol., Acad. Sci. Kirghiz SSR, Ul. 22nd-Party-Congress 265, USSR-720040 Frunze Kirghiz SSR*).

An annotated list is given of 32 spp. and ssp. so far known from the Mongolian territory. 4 of these are new to the Mongolian fauna.

- (974) KURATA, M., 1974. Odonata fauna of the Saigawa River and its neighbours III.

Dragonflies in the northern part of Japan Alps, Kita Azumigun, Nagano Prefecture (supplement). *New Entomol.* 23 (1): 7-12. (Japanese, with Engl. s.). – (*Iiyama-daini Middle School, Iiyama, Nagano 389-22, JA*).

Enallagma deserti circulatorum, *Platycnemis echigoana* and *Somatochlora clavata* are added to the list of 69 spp. known previously from this region.

- (975) LAUGHLIN, S.B., 1974. Neural integration in the first optic neuropile of dragonflies. II. Receptor signal interactions in the lamina. *J. comp. Physiol.* 92 (4): 357-375. – (*Dept. Neurobiol., Res. Sch. Biol. Sci., Australian Natn. Univ., P.O.B. 475, Canberra City, A.C.T. 2601, AU*).

(1) Positive potentials with the waveform of a smoothed retinula receptor potential are recorded from dragonfly lamina. All potentials of this type are called lamina positive potentials, unless their origin is certain. To establish their origin and to see how information is processed in the lamina their sensitivity characteristics are examined in detail and compared with retinula cell somata. (2) By comparing response noise at low intensities (discrete potentials), polarised light sensitivity, angular sensitivity, spectral sensitivity and intensity response functions it becomes clear that not all lamina positive potentials originate from retinula cell axons. The potentials are divided into two groups, axon responses and lamina depolarisations. (3) Axon responses have sensitivities and characteristics that resemble closely retinula cell somata. In some cases recordings are correlated with a definite resting potential. It is concluded that axon responses probably originate intracellularly from retinula axons in the lamina. Some axon responses show small light induced action potentials. (4) Lamina depolarisations show the properties of a summed response from several retinula cell somata, i.e. high signal: noise ratio at low intensities, no polarised light sensitivity, broad or distorted spectral sensitivities. On the basis

of this evidence, together with their broader angular sensitivity functions and unique intensity/response functions it is proposed that lamina depolarisations are extracellular in origin. (5) Previous studies also suggest an extracellular origin for the lamina depolarisation. It is concluded that this extracellular signal may act as a negative feedback within the lamina. (6) No pre-synaptic summation of retinula axon signals can be found in dragonfly lamina. Voltage amplification and improved signal: noise ratio result from a summation of inputs upon second order neurons. The unique individual properties of retinula cells are maintained in the lamina and they may function as inputs to other systems. (Author). (For pts. I and III cf. *OA* Nos 636 and 976).

- (976) LAUGHLIN, S.B., 1974. Neural integration in the first optic neuropile of dragonflies. III. The transfer of angular information. *J. comp. Physiol.* 92 (4): 377-396. – (*Dept. Neurobiol., Res. Sch. Biol. Sci., Australian Natn. Univ., P.O.B. 475, Canberra City, A.C.T. 2601, AU*).

(1) The transfer of angular sensitivity from photoreceptors (retinula cells) to second order neurons (large monopolar cells – LMC's) is investigated by means of intracellular recordings from the retina and lamina of *Hemicordulia tau*. Angular sensitivity is measured by using a single point light source in two different ways. In the first, the constant intensity test flash method, responses to test flashes delivered at different angles of incidence are compared with the axial intensity/response function of the unit. In the second, the off-axis intensity/response function method, complete LMC intensity/response functions are derived at a number of angular inclinations to axis (defined as the point of maximum sensitivity within the unit's visual field). (2) The constant intensity test flash method shows that dragonfly retinula cells have a high angular sensitivity when compared to other insects. The horizontal and vertical acceptance

angles are $1.46^\circ \pm 0.44$ and $1.31^\circ \pm 0.23$ respectively. Application of this same method to LMC's demonstrates that they retain retinal acuity for their angular sensitivity functions appear to be the same as those of retinula cells. (3) The off-axis intensity/response functions show that the shape of the triphasic LMC response waveform depends upon the angular inclination of the stimulus to axis. The relative amplitudes of "on" transient and plateau vary independently with angle. The slope of the plateau response/log intensity curve decreases as the stimulus moves off axis but the "on" transient curve's slope remains relatively constant. (4) Constant intensity test flash methods cannot measure LMC angular sensitivity because the slope of the response/log intensity curves depend upon stimulus inclination. The off-axis intensity/response function method shows that lateral inhibition narrows the LMC visual fields and angular sensitivity is increased during the transfer of visual information. (5) Examination of the LMC response waveform and the intensity/response characteristics shows that two types of inhibition shape the response to square wave stimuli. Intracartridge inhibition acts at the level of the first synapses to attenuate the response to maintained stimuli. Intracartridge inhibition acts with a time delay to depolarise the LMC membrane and increase angular sensitivity. (6) It is concluded that LMC's integrate retinal input by acting as high sensitivity detectors of contrast differences within the spatial domain. Their role as an input to the visual system is discussed in relationship to visual behaviour and its experimental analysis. (Author). For pts. I and II cf. *OA* Nos. 636 and 975).

responsible for the autotomy, the Z instar larvae of some French representatives of the families Platycnemididae, Coenagrionidae, Lestidae and Calopterygidae have been experimentally studied. The experiments have shown that the breakage and release of a pedal comb is solely a mechanical phenomenon caused by the abdominal movements of the larva. No autotomy was ever observed in anesthetized insects. The microanatomy and histology of the comb breakage and the innervation of the distal portion of the abdomen are described. During the release of a comb, the irruption of water in the tracheal system is prevented by the obturator muscles, which realize a genuine clamp of the trachea, while the hemostasis is realized by the proximal diaphragm, the fibers of which might be weakly contractile.

- (977) LEGRAND, J., 1974. Étude comparative de l'autotomie chez les larves de zygoptères (Odon.). *Ann. Soc. ent. Fr.*, (N.S.), 10 (3): 635-646. (With Engl. s.). — (*Lab. Ent. gén. et app., Mus. natl. Hist. nat., 45 rue de Buffon, F-75005 Paris*).

In order to determine the factors

- (978) MASON, C.F. & R.J. BRYANT, 1974. The structure and diversity of the animal communities in a broadland reedswamp. *J. Zool. Lond.* 172: 289-302. — (*Sch. Biol. Sci., Univ. East Anglia, Norwich, UK*).

The fauna of a Phragmites reedswamp at Alderfen Broad, Norfolk, UK, is described in terms of structure and diversity. 3 transects were laid parallel to the water's edge at 1, 10 and 25 m from the reedswamp/open water interface. 20 samples were taken randomly along each transect in July. *Coenagrion puella* and *Ischnura elegans* are the only odon. spp. recorded.

- (979) MIDTTUN, B., 1974. The anatomy of the male internal organs of reproduction of *Somatochlora arctica* (Zetterstedt) (Odonata: Corduliidae) with remarks on the development, structure and behaviour of the spermatzoa. *Nor. J. Zool.* 22 (2): 105-124. — (*Dag Hammerskjöldsv. 75, NO-5033 Fyllingsdalen*).

The 2 testes are unifollicular, elongated cylindrical structures lying alongside the alimentary canal. Each testis consists of numerous cysts, each having a vas deferens, arranged round a central duct. Spermatzoa in the final stage of transformation are not

present in juveniles. There are 2 vesiculae seminales which open to the exterior through a common ductus ejaculatorius. Sometimes a common pre-exit chamber is interposed between the vesiculae seminales and the ductus ejaculatorius. The glandular epithelium of the vas deferens and vesicula seminalis is ciliated. Elongated, rod-like spermatozoa leaving the testis, shorten and become conical or tadpole-shaped on entering the vas deferens and elongate again in the vesicula seminalis. On the basis of histological changes an approximate method of age determination was arrived at.

- (980) MILLER, P.L., 1974. Rhythmic activities and the insect nervous system. In: L.B. Browne [Ed.], *Experimental analysis of insect behaviour*. Springer, Berlin-Heidelberg-New York, pp. 114-138). — (*Dept. Zool., Univ. Oxford, Oxford, UK*).

The paper is an attempt to draw together some common features of several insect rhythmical systems. Among the oscillatory systems the flight start in Odon. is discussed in some detail. They can start fresh flight with an upstroke or a downstroke. Some libellulids, when on the look-out for prey, perch on a branch with the wings in an extremely depressed position (e.g. *Trithemis* spp.), maintained by tonic contractions in depressor muscles against wing hinge elastic forces. The continuous muscular activity required may serve a thermogenic function and thus allow rapid take-off in pursuit of prey in the members of this family which, unlike larger gomphids and aeshnids, make little use of thermogenic shivering. The same spp. may also bask and roost with the wings more or less horizontal. Fresh flight can therefore be initiated from more than one point in the cycle. Among the coordinating systems the larval ventilation is mentioned.

- (981) MILOŠEVIĆ, B., 1974. The directory of entomological taxonomists of Yugoslavia. *Ent. Inf.*, Zagreb 2 (1): 1-8. (Croatian, with Engl. s.). — (*c/o Yugoslav Ent. Soc., P.O.B. 360, YU-41001 Zagreb*).

The directory is giving the names, addresses and specialisms of those members of the Yugoslav Entomological Society who declared to be willing to carry out identifications upon request. The only odonatologist listed is Dr. Ž. Adamović (Institut za medicinska istraživanja, P.O.B. 721, Yu-11001 Beograd); he is willing to identify any odon. material from the Yugoslav territory.

- (982) MIYAZAKI, T., 1974. Four noteworthy Odonata from Hokkaido. *Tombo* 17 (1-4): 24-25. (Japanese, with Engl. s.). — (*1-128, Seki-machi, Nerima-ku, Tokyo, 177, JA*). During an odonatol. survey of Hokkaido, Japan (July 23-Aug. 6, 1973), 43 spp. were recorded, incl. *Erythromma najas baicalensis*, *Coenagrion terue*, *Aeshna subarctica* and *Somatochlora graeseri graeseri*. The latter is known from the Asian Continent, Sakhalin and the South Kuriles, but is here for the first time recorded from the Hokkaido area. This is all the more interesting since *S.g. aureola* is a well known member of the Hokkaido fauna.

- (983) MORGE, G., 1974. Das Naturhistorische Museum des Stiftes Admont unter dem Aspekt seiner wissenschaftlich wertvollsten Kollektionen (Würdigung anlässlich des 900 jährigen Bestehens der Benediktiner-Abtei Admont, Österreich). *Beitr. Ent.* 24 (Suppl.): 1-431, 30 col. pls. Price: M 45.—. (With Engl. and Russian lists of Contents). — (*Walther-Rathenau-Str. 3, DDR-13 Eberswalde-Finow I, GDR*).

This volume, published for the 900th anniversary of the Abbey of Admont, Austria, consists of 6 chapters (papers), dealing with the famous Nat. Hist. Mus. of the monastery, its founder Father Gabriel Strobl (born: Nov. 3, 1846, Unzmarkt, Austria; deceased: March 15, 1925, Admont, not Oct. 23, 1910 as occasionally stated), and with Strobl's dipterological collections. The autobiography of the dipterologist J.W. Meigen is added. Father Strobl was a famous dipterologist, but published also on Odon. The Admont

entomological collections are in Austria second only to those of the Nat. Hist. Mus. of Vienna and include a large odon. material brought together by Strobl and referable to 62 European and 119 "exotic" spp. Extensive biography, several portraits and bibliography of and on Father Strobl are provided. The colour plates are reproductions of Strobl's Diptera illustrations.

- (984) NAITO, S., 1974. *Hemicordulia mindana* discovered in Miyazaki Prefecture, Kyushu. Tombo 17 (1-4): 17-20. (Japanese, with Engl. s.). — (45 *Higashiyama, Minami-Sakaecho, Toyohashi, Aichi Pref., 440, JA*). The sp. was described from Mindanao in the Philippines, and later recorded from Taiwan, Guam Island and the Ryukyus. This is the first record for Kyushu, where it was observed, collected and studied during 1973-1974. Notes on habitat, territorial flight and mating are also provided.

- (985) NARAOKA, H., 1974. On *Cercion plagiolum* and *Sympetrum striolatum* imitoides from Aomori Prefecture. Tombo 17 (1-4): 26-27. (Japanese, with Engl. translation of the title). — (2 *Murakami apart., 252 Hiraoka-Shinjo, Aomori, Aomori Pref., 030, JA*).

Notes on field observations, with a localities map of Aomori Prefecture, Japan.

- (986) OKAZAWA, T., 1974. Studies on the aquatic insects in the stream Hoshioki near Sapporo. J. Fac. Sci. Hokkaido Univ., VI, 19 (2): 474-488. — (*Zool. Inst., Fac. Sci., Hokkaido Univ., Sapporo, 060, JA*).

The faunal makeup, distribution and life cycles of insect assemblages in the Hoshioki Stream, Hokkaido, Japan, were studied by monthly sampling at 3 stations from July 1971 through June 1972. In total 82 spp. of 7 orders were recorded. Ephemeroptera, Plecoptera, Trichoptera and Diptera represent 95% of the individuals collected. The only odon. sp. recorded is *Epiophlebia superstes*.

- (987) PIECZYŃSKI, E., 1974. Experimentally increased fish stock in the pond type lake Warniak. XII. Numbers and biomass of the fauna associated with the macrophytes. Ekol. Pol. 21 (38) [1973]: 595-610. (With Pol. s.). — (*Inst. Ecol., PAN, Dziekanów Leśny k. Warszawy, PO-05-150 Lomianki*). 2 yrs observations show that the numbers and biomass of fauna associated with Elodea and Stratiotes are smaller in the stocked (with an increased fish stock) than in the control (with a usual fish stock) part of the lake. The phenomenon seems to be due to grazing by fish. There is a significant quantitative difference in the fauna associated with Elodea and that with Stratiotes. The Odon. contributed respectively 11% and 3.8% to the biomass in Elodea and 2.5% and 0.7% to that in Stratiotes, in the 2 yrs. They are considered a dominant order in Elodea, but not so in Stratiotes. The food resources for fish in the vegetative zone are estimated, but as far as the Odon. are concerned no evidence is produced as to whether or not their numbers are influenced by the density of the fish population. (Cf. also OA No. 969).

- (988) RICHARD, G., 1974. Sequential analysis and regulation of insect reproductive behaviour. In: L.B. Browne [Ed.], *Experimental analysis of insect behaviour*. Springer, Berlin-Heidelberg-New York, pp. 7-20). — (*Lab. d'Éthol., Complexe Sci. Universitaires, Rennes-Beaulieu, France*).

The subject is reviewed under the main headings "Succession of the main behavioural phases" and "The effects of the performance of one piece of behaviour on subsequent behaviour". A diagram of the succession of phases of sexual behaviour superimposed on physiological events is also given. Odon. are only briefly referred to with regard to sexual maturation and courtship. V.I. Pajunen is the only odonatologist listed in the references. (*Abstracter's note*: In the past, the author has published several research papers on odon. behaviour).

- (989) SAWCHYN, W.W. & C. GILLOT, 1974. The life histories of three species of *Lestes* (Odonata: Zygoptera) in Saskatchewan. *Can. Ent.* 106 (12): 1283-1293. — (*Saskatchewan Res. Council, 30 Campus Drive, Saskatoon, Saskatchewan, S&N OX1, CA*). In Saskatchewan, Canada, *Lestes unguiculatus* Hagen, *L. disjunctus* disjunctus Walk., and *L. dryas* Kirby overwinter as eggs in a late stage of embryonic development. The embryos enter diapause in Sept. and, in this condition, can survive exposure to temperatures as low as -20°C . Under field conditions adequate snow cover is necessary to prevent egg mortality due to desiccation or exposure to air temperatures lower than -20°C . Post-diapause development can take place at 0°C but does not occur until the eggs are wetted as the pond fills with runoff water in the spring. Hatching in *L. disjunctus* and *L. unguiculatus* is highly synchronous and occurs when the water temperature is about 10°C . Larval development is completed in about 60 days. Sexual maturation required 16 to 18 days. Oviposition immediately follows copulation while the pair is still in tandem. Eggs are laid only in green stems of *Scirpus* L., between 5 and 60 cm above the water surface. The stems selected are those either growing in small groups or bordering larger stands. The significance of the observation is discussed in terms of the species' ability to survive the climatic extremes of central Canada. (Authors).
- (990) SLÁMA, K., M. ROMANŮK & F. ŠORN, 1974. Insect hormones and bioanalogs. Springer, Wien-New York. X + 478 pp. — (*Inst. Ent., Czechosl. Acad. Sci., Viničná, 7 Prague, Czechoslovakia*). The book is a summary of the present knowledge on the subject. The 3 main sections are entitled "Brief survey of the neuroendocrine systems in insects", "The chemistry and physiology of juvenoids", and "Chemistry and physiology of ecdysoids". Odon. are but sparsely referred to. In the chapter on the nature of the juvenoid effects on differentiation (p. 235) the case of *Aeshna* sp. is described as an illustration of the lack of any direct stimulation of mitotic divisions by juvenoids in the absence of active prothoracic glands or ecdysone in the larval or pupal tissue. In the experiment described (published earlier elsewhere) there was one wave of mitoses stimulated by ecdysone; juvenoids did not stimulate mitoses, but affected the determination of differentiation. In tissues where mitoses were independent of ecdysone, they could only occur in the absence of juvenile hormone activity.
- (991) STOBBE, H., 1974. Camarque. [sic!]. *Naturk. Mitt. DJN Hamburg* 35 (1974), 6 pp. — (*Ahrensburger Platz 4, D-2 Hamburg-67, GFR*). A brief report on 2 collecting trips to Camarque, France (May 14-25, 1970 and June 1-7, 1974) with an annotated list of 40 odon. spp.
- (992) STÖCKEL, G., 1974. Zur Verbreitung von *Sympetrum pedemontanum* Allioni und *Orthetrum brunneum* Fonsc. (Odonata) in der DDR. *Ent. Nachr., Dresden* 18 (7): 97-104. (With Engl. s.). — (*DDR-1431 Bergsdorf über Gransee, GDR*). A review is given of the records up to 1973 of the 2 spp. in the territory of the German Democratic Republic and factors that may influence their distribution are discussed.
- (993) TAKETO, A., 1974. Notes on three dragonfly species in Ishikawa Prefecture. *Tombo* 17 (1-4): 25. (Japanese, with Engl. s.). — (*Dept. Biochem., Medical Sch., Kanazawa Univ., Kanazawa, 920, JA*). The spp. discussed are *Sympetrum striolatum* imitoides, *Aeshnophlebia anisoptera*, and *Lanthus fujiacus*.
- (994) THORP, V.J. & P.S. LAKE, 1974. Toxicity bioassays of cadmium on selected freshwater invertebrates and the interaction of cadmium and zinc on the freshwater shrimp, *Paratya tasmaniensis* Riek. *Aust. J. Mar. Freshwater Res.* 25 (1): 97-104. — (*Dept. Zool., Univ. Adelaide, Adelaide, S.*

Australia, 5000, AU).

In acute toxicity bioassays with cadmium sulfate at 15°C in soft water (total hardness 10 mg/l as calcium carbonate), the concentrations fatal to 50% of the test animals were determined for 5 freshwater invertebrates spp. The 96 h median lethal concentration (LC 50) of Cd was 0.04 mg/l for the amphipod *Austrochiltonia subtenuis* Sayce, 0.06 mg/l for the shrimp *Paratya tasmaniensis* Riek, 0.84 mg/l for the ephemeropteran nymph *Atalophlebia australis* Walker, 250 mg/l for the odon. larva *Ischnura heterosticta* (Burm.) and well over 2000 mg/l for a trichopteran larva of the Leptoceridae. The bioassays on *Paratya* indicated that there may be seasonal differences in sensitivity to Cd. The 96 h LC 50 for Xn for *Paratya* was 1.21 mg/l. Zn and Cd appeared to interact less than additively at concentrations below 1 toxic unit. Above this concentration, their interaction was strictly additive.

- (995) UBUKATA, H. & M. IGA, 1974. Description of the larva of *Hemicordulia ogasawarensis* Oguma (Corduliidae). Tombo 17 (1-4): 21-22. — (*Zool. Inst., Fac. Sci., Hokkaido Univ., Sapporo, 060, JA*). Exuviae of this sp., endemic to the Bonin (Ogasawara) Islands, are described and illustrated. A comparison is also made with *Cordulia aenea amurensis* Sel. and *Somatochlora uchidai* Först. From the latter 2 spp. the larva differs in the following characters (some of which may represent a generic feature): (1) dark brown body colour, (2) antefrons without setae, (3) lack of the row of fine setae on the front margin of median lobe of mentum and (4) a wide gap at the centre of the row of mental setae.
- (996) VERON, J.E.N., 1974. The role of physiological colour change in the thermoregulation of *Austrolestes annulosus* (Selys) (Odonata). Aust. J. Zool. 22 (4): 457-469. — (*Dept. Marine Biol., Sch. Biol. Sci., James Cook Univ. North Queensland, P.O.B. 999, Townsville, Queensland 4811, AU*). Observations of the early morning be-

haviour of *A. annulosus* and *Ischnura heterosticta*, two spp. which normally undergo daily physiological colour changes, show that both orient themselves perpendicularly to the direction of incident sunlight when perching and when in flight, as long as they remain in 'dark' colour phase. Accurately controlled experiments on eight *A. annulosus* show that mean gain in thoracic temperature attributed to dark-phase coloration is 0.23°C after exposure to a radiation source similar in intensity and spectral composition to sunlight. However, a thoracic temperature gain of up to 15°C may result from orientation to the sun on cloudless, windless mornings; under these conditions an oriented insect is able to forage for food c. 2 h earlier than a similar insect perched in the shade. Field experiments on *A. annulosus* reveal that receptors other than eyes are used to detect the direction of incident sunlight and that only dark-phase insects are able to do so rapidly enough to remain oriented in flight. It is suggested that dark-phase chromatophores, which have an underlying network of nerve axons insulated by large air sacs, are receptors of incident radiation, and that the temperature increase of dark chromatophores exposed to sunlight is sufficiently rapid to allow the insects to remain oriented in flight. (Author).

- (997) YOSHINO, Y., 1974. Odonata from Nii-jima, in the Izu Islands. Tombo 17 (1-4): 27. (Japanese, with Engl. s.). — (2-10-5, *Gohongi, Meguro-ku, Tokyo, 153, JA*). *Polycanthagyna melanictera*, *Orthetrum albystilum speciosum*, *Pantala flavescens* and *Pseudothemis zonata* are brought on record. All of them are new to the fauna of the Nii-jima Island, Japan.

1975

- (998) HAMMOND, C.O., 1975. [A living female of the rare dragonfly *Leucorrhinia dubia*]. Proc. Brit. ent. nat. Hist. Soc. 7 (3): 91-92. — (*c/o Brit. Ent. and Nat. Hist. Soc., The Alpine Club, 74 South Audley Str., London W1, UK*).

The record is communicated of a specimen taken in SW Surrey, UK, on June 12, 1974.

lobes (like also Syrphidae, Diptera). It may be that their visual memory resides in the optic lobes. (Cf. also OA No. 963).

- (999) HAMMOND, C.O., 1975. [A male of the very rare Scottish damselfly *Coenagrion hastulatum*]. *Proc. Brit. ent. nat. Hist. Soc.* 7 (4): 113-114. – (c/o *Brit. Ent. and Nat. Hist. Soc., The Alpine Club, 74 South Audley Str., London, W1, UK*).

The record is communicated of *C. hastulatum* and *Enallagma cyathigerum*, taken nr. Pitlochry, Perthshire, Scotland, on June 23, 1974.

- (1000) HARPER, P.P., J.-G. PILON & J.-M. PERRON, 1975. Insectes aquatiques du nord du Québec (Éphéméroptères, Odonates, Plécoptères et Trichoptères). *Annls Soc. ent. Québec* 20 (1): 33-43. (With Engl. s.). – (*Dépt. Sci. Biol., Univ. Montréal, C.P. 6128, Montréal-101, CA*).

Examination of aquatic insects from Northern Quebec, Canada (from 50°N) in the collections of the Université de Montréal, and the Université Laval, both Canada, revealed 34 odon. spp., listed here with the usual locality data.

- (1001) HOWSE, P.E., 1975. Brain structure and behavior in insects. *Ann. Rev. Ent.* 20: 359-379. – (*Dept. Biol., Univ. Southampton, Southampton SO9 5NH, UK*).

This is a review paper on the subject, with sparse references to Odon. in the appropriate places. The case of dragonflies is referred to as an illustration of the fact that one of the hallmarks of insect behaviour is an association of very inflexible behaviour patterns with a propensity for learning which is often startling. Thus, Odon. attempt to fly upside down if illuminated from below, but are capable of recognizing and defending a territory with a complexity of visual features. – Contrary to Hymenoptera, Dictyoptera, Isoptera, Lepidoptera and Orthoptera, all other orders, incl. Odon., have but poorly developed mushroom bodies. In this respect Odon. are interesting in having small mushroom bodies compensated by very large optic

- (1002) JELÍNEK, J., 1975. The present state and prospects of entomofaunistics in Czechoslovakia. *Acta ent. bohemoslov.* 72 (1): 1-6. – (*Dept. Ent., Natn. Mus., Kunratice 1, CZ-14800 Praha-4*).

An attempt is made to evaluate the present state of entomofaunistics in Czechoslovakia. It is based on an analysis of 450 faunistic papers, published in 11 periodicals from 1955 through 1973. These include 111 (24.6%) titles on Diptera, 108 (24.0%) on Coleoptera and 5 (1.3%) on Odon. The latter order is on the 11th place among the insects studied faunistically in Czechoslovakia. The amateur entomologists have published on 5 orders (their participation ranging from 46.3% in Coleoptera to 13.3% in Orthoptera), but all odon. papers are by professionals. It is argued that the present faunistic research in Czechoslovakia is too random, too spontaneous and is in need of more directed projects and coordination. The Faunistic Commission of the Czechoslovak Ent. Soc. has therefore suggested the foundation of a national centre for faunistics, unification of methods of recording and data processing, faunistic mapping, and the assembling of all interested workers into the Faunistic Section of the Czechoslovak Ent. Soc. (*Abstracter's note*: The actual number of papers on the Czechoslovak odon. fauna, published in 1955-1973, of course greatly exceeds the number of those contained in the analyzed sample of 11 periodicals).

- (1003) KIAUTA, B., 1975. Cytotaxonomy of dragonflies, with special reference to the Nepalese fauna. Lectures delivered at the Tribhuvan University, Kathmandu. Vol. 2. Nepal Research Center, Kathmandu, XIV + 78 pp., 3 pls incl. Price: RsN 30.– – (Author's address: *Inst. Genet., Univ. Utrecht, Padualaan 8, Utrecht, NL*; – Publisher's address: *Nepal Research Center, Thyssen House, c/o G.B. Kalikote, P.O.B.*

180, Kathmandu, Nepal).

The booklet gives a rounded off general outline of the odon. cytogenetic and cytotaxonomic features. It was prepared for the participants in the Seminar on Insect Cytotaxonomy, held at the Kathmandu University by the members of the Third Khumbu Himal Expedition of the Netherlands Centre for Alpine Biological Research (1974) and for those Nepalese students wishing to specialize in the field of invertebrate chromosome cytology. The introductory chapter, giving some hints for odonatological work under the Nepalese conditions, is followed by the following headings: "Taxonomic organization of the order and representativeness of the cytologically investigated taxa", "Outline of the research on the chromosome cytology of Odonata", "A note on the cytological techniques used in odonate cytotaxonomy", "General features of the odonate spermatogenic cycle", "General cytogenetic features of dragonflies", "General cytotaxonomic features of dragonflies", and "Review of the main cytotaxonomic data of Nepalese species". The latter includes a synopsis of the main karyotypic features of 42 spp. studied from the Nepalese territory and a more detailed discussion on the cytology of some particularly interesting taxa. The cytology of all spp. listed is illustrated by micrographs of polar views of primary spermatocyte metaphases. The "Bibliography of the chromosome cytology of Odonata" includes over 100 titles and is considered to be complete up to December 1974. In the "Bibliography of the odonate fauna of the Himalayan region" there appear over 60 titles of papers published after the publication of the first odon. volume in the Fauna of British India (1933). The text illustrations show the Geological history, genealogy and classification of the super-order Odonatopteroidea, The genealogy and classification of the living odon. families, The trends in the evolution of sex determining mechanisms in Odon., The distribution of the chromosome numbers in the order, and The trends in the evolution

of the odon. chromosome numbers. The "Appendix" includes a chapter on "Methods for preparation of dragonfly chromosomes for cytotaxonomic purposes", giving descriptions of the preparation of solutions and microscopic slides. The second chapter in this section is devoted to a review of the existing "Odonatological organizations, periodicals and services". (Author). (*Abstracter's note*: For the first vol. in this series cf. *OA* No. 705. — Only a limited number of copies are available from the author. The Nepalese residents can receive both volumes free of charge from the Publisher. Orders from abroad are to be sent to the Netherlands Centre for Alpine Biological Research, c/o Inst. Genet., Univ. Utrecht, Padualaan 8, Utrecht, NL).

- (1004) LINSKENS, H.F., 1975. E. Schmidt. Ökosystem See. *Vakbl. Biol.* 55 (4): 63. (Dutch). — (*Lab. Bot., Univ. Nijmegen, Driehuizerweg 200, Nijmegen, NL*).
Book review of the volume listed in *OA* No. 616, but without reference to Odon.

- (1005) NATURALISTS' DIRECTORY (INTERNATIONAL) THE, 1975. Compiled by W.H. Baetzner, Published by PCI Publications, South Orange. 42nd edition. 260 pp. Price: US \$ 7.95 for USA, Canada and Mexico, US \$ 9.95 for other countries. — (Publishers' address: *The Naturalists' Directory, P.O.B. 583, South Orange, New Jersey 07079, USA*).

The Directory gives names, addresses and specialisms of professional and amateur natural history workers and collectors from more than 60 countries, incl. numerous odonatologists and dragonfly collectors. Since the names of those amateur collectors who do not publish in the field of their specialty are difficult to trace, the book will be useful to anybody interested in addresses of collectors and sellers of odon. material, particularly of those resident in less frequently visited regions and countries.

- (1006) NOVÁK, B., 1975. Zum achzigsten Geburtstag von Dipl.-Ing. Jakub Palásek. Acta ent. bohemoslov. 72 (1): 62-63. — (*Lehrstuhl Zool. & Anthropol., Naturwiss. Fak., Palacký Univ., Olomouc, Czechoslovakia*). Biography and portrait of J. Palásek (born: July 25, 1894, Ivanovice na Hané, Moravia, Czechoslovakia), entomologist on the Staff of the Zoology and Anthropology Department of the Palacký University, Olomouc, Czechoslovakia. His extensive private entomological collections include also local odon. material.
- (1007) OLIGER, A.I., 1975. On fauna of dragon flies larvae (Odonatoptera) from the water bodies of Donetsk region. Vest. Zool., Kiev 1975 (1): 82-84. (Russian, with Engl. translation of the title). — (*Dept. Zool., Donetsk Univ., 46 Shchors Str., 340055 Donetsk, USSR*).
The distribution is tabulated of 25 spp. collected during 1970-1971 at 24 ecologically different localities in the Donetsk Region, USSR. In all, 2185 specimens were collected.
- (1008) PICKARD, R.S. & P.J. MILL, 1975. Ventilatory muscle activity in restrained and free-swimming dragonfly larvae (Odonata: Anisoptera). J. comp. Physiol. 96: 37-52. — (*Dept. Zool., Univ. College, Cardiff, Wales, UK*).
Late instar larvae of *Anax imperator*, *Aeshna cyanea* and *Libellula quadrimaculata* were used for this investigation. The roles of certain abdominal muscles in ventilatory behaviour are discussed and illustrated with records of muscular activity obtained mainly from free-swimming animals. The following muscles are shown to be active during normal ventilation (V_n): respiratory and anterior dorso-ventrals (RDV and ADV), longitudinal tergal (LT), diaphragm, sub-intestinal and adductors of the anal appendages (VADP). The posterior dorso-ventral, lateral primary longitudinal sterno-pleural, and dorso-ventral oblique muscles were found to be inactive during V_n . The RDV, ADV, LT and VADP are also active during ventilatory movements other than V_n . RDV activity is shown to be more variable in the free-swimming animal than recordings from dissected and restrained preparations previously suggested. Activity in the ADV during V_n shows a reciprocal relationship with that in the RDV. Postulated control elements in larval ventilation are found to parallel many described in other ventilatory systems and motor rhythms generally (Authors).
- (1009) SAWCHYN, W.W. & C. GILLOTT, 1975. The biology of two related species of coenagrionid dragonflies (Odonata: Zygoptera) in Western Canada. Can. Ent. 107 (2): 119-128. — (*Saskatchewan Res. Council, 30 Campus Drive, Saskatoon, Saskatchewan, S4N 0X1, CA*).
The biology of *Coenagrion angulatum* Walker and *C. resolutum* Hagen in Saskatchewan, Canada, has been studied. In these spp. embryonic development begins as soon as the eggs are laid and is completed in the field within 3 weeks. Larval development is rapid and larvae in the final instar were first collected before the middle of Sept. Development ceases during the first 2 weeks of Oct. when the water temperature is about 2°C. By this time the majority of larvae are in the last three instars. Larvae overwinter frozen in the ice 15 to 20 cm below the pond surface. They are able to survive temperatures as low as -5°C to -6°C though these extremes are not normally experienced in the field because of snow cover. Although the study pond filled with runoff water by mid-April no change in the larval population structure occurred until mid-May. Emergence, which is highly synchronous, begins in the last week of May. However, it is governed by the prevailing air and water temperature, and occurs only when the mean daily water temperature exceeds 12°C and the mean maximum air temperature reaches 20° to 21°C. Most insects emerge within 10 days of the first appearance of the adults. Sexual maturation takes about 1 week. Oviposition occurs while the pair are in tandem. Pre-

ferred oviposition sites are the submerged portions of stalks of floating plants such as *Utricularia*, *Ranunculus* and *Potamogeton*. The observations are discussed in terms of the species' ability to survive the climatic extremes of central Canada (Authors).

- (1010) VERDONK, M. 1975. Libellenonderzoek Ankeveen 1973. (Dragonfly studies at Ankeveen in 1973). *Anax* 7 (1): 1-15. (Dutch). – (*Vernulstlaan 8, Bussum, NL*). This is the final report on odonatological work carried out, from 1967 through 1973,

in the Ankeveen area, Noord-Holland Prov., the Netherlands, by the Dutch Youth Federation of Nature Friends (N.J.N.). Populations were studied with the capture-mark-recapture method. The results are analysed and the 24 spp. recorded in the area are discussed in detail. (Cf. also *OA* Nos. 96, 919). (*Abstracter's note*: "Anax" is the periodical of the Dutch Youth Federation of Nature Friends, N.J.N.. It can be ordered from the Editor, Mr. J. Veuger, Nic. Beetsstraat 10, Utrecht, NL).