# ODONATOLOGICAL ABSTRACTS

## 1971

(432) BAIJAL, H.N. & S. MEHRA, 1971. On the wing venation of Bradinopyga geminata (Rambur) (Libellulidae: Odonata). Indian J. Ent. 33 (1): 72-76. – *(Zool. Dept., Univ. Agra, Agra, U.P., India)*.
The wing venation and articulation of B. geminata are described and illustrated.

(433) COMPTE SART, A., 1971. La filogenia en los Odonatos. (Phylogeny in the Odonata). Acta salmant., (I), 36 (Actas I° Simp. int. Zoofilog., Salamanca, 1969); 329-332. (Spanish, with Engl. s.). – *(Inst. Espan. Ent., José Gutierrez Abascal 2, Madrid-6, ES)*.
The order is considered an old complex of living and extinct groups of frequently uncertain hierarchical level, whose intrinsic and adaptive characters are mixed. This and its considerable diversification along various independent branches make a schematic phylogeny very difficult and suggest that the branches of the polyphyletic set be increased. Several larval and adult characters of phylogenetic interest as well as the odon. karyotypes are discussed and Meganisoptera are considered as the first true Odon. (Author).

(434) GRILLOT, J.-P., A. PROVANSAL, N. BAUDRY & M. RAABE, 1971. Les organes périsympatiques des Insectes Ptérygotes. Les principaux types morphologiques. C.R. Acad. Sc. Paris, Sér. D. 273: 2126-2129. – *(Équipe Neuroendocrinol., Lab. Physiol. Insectes, Fac. Sci., Univ. Paris-VI, 9 quai Saint-Bernard, F-75005 Paris)*
Different types of perisympathic organs, as encountered in 14 pterygotan orders (including Odon.), are described on the basis of their localisation and structure. An attempt is made to sketch their evolution and a proposal for their nomenclature is added. (Cf. also *OA* Nos. 439, 440, 463).

(435) HUSAINOVA, N.Z. & B.F. BELYSHEV, 1971. Pamyati Aleksandra Nikolaevicha Barteneva (1882-1946). (In memory of Alexander Nikolaevich Bartenev [1882-1946]). Biol. nauki, Alma-Ata 3: 213-225. (Russian). – *(Inst. Biol., Kazakh State Univ., Alma-Ata, USSR)*.
A detailed scientific biography of the late prof. A.N. Bartenev (born October 12, 1882, Moscow; deceased July 16, 1946), founder of modern odonatology in Russia and USSR. He published 102 technical papers, about 80 of these, including several monographs, devoted to dragonflies. His special odonatological interests were in the fields of faunistics (USSR), taxonomy, morphology, biology and geography of the holarctic fauna. A complete bibliography (1907-1940) is appended. *(Abstracter's note:* Bartenev's last, posthumously published paper [No. 103] is omitted from the list, viz.: Bartenev, A.N., 1956. Materialy po odonatologicheskoiy faune [Insecta, Odonata] Dal'nego Vostoka. Trudy dal'nevost. Fil. Akad. Nauk SSSR 3: 201-238).

(436) KALLA, N.R. & V. NATH, 1971. Cytochemical and in vivo studies on the male germ cells of dragonflies. Res. Biophys., Panjab Univ., Sci. 21 (1970): 431-457. – *(Dept. Biophys., Panjab Univ., Chandigarh, India).*
Observations are reported on the differentiation of ♂ germ cells in Paragomphus lineatus, Orthetrum pruinosum neglectum, O. sabina, O. taeniolatum, O. triangulare, Crocothemis servilia, Trithemis festiva, T. kirbyi and Pantala flavescens. The mitochondria in all forms remain granular except in P. lineatus and O.p. neglectum where they transform into frothy vacuoles and filaments respectively. During differentiation in all spp. of Libellulidae, mitochondria do not form a complex mitochondrial nebenkern of the normal type; instead they form a mitochondrial mass which ultimately forms the mitochondrial sheath of the mature sperm. In P. lineatus, however, the mitochondria form a typical nebenkern. The details of the mitochondria and their derivatives were studied in vivo and by cytochemical techniques. The lipids and protein rich Golgi bodies are granular in all the spp except in P. lineatus where they have a duplex structure. The formation of a carbohydrate rich acrosome is by direct transformation except in Trithemis spp. where it is a secretory product. Cytochemical tests were performed to detect the cytochemical composition of the Golgi bodies, acroblast and acrosome. The cytochemistry and behaviour of the nucleus, centriole and axial filament are discussed.

(437) MARLIER, G., 1971. Les étangs de la Forêt de Soignes. Naturalistes belg. 52 (4): 177-193. *(c/o M.C. Vanden Berghen [Ed.], av. Jean Dubrucq 65, B-1020 Bruxelles).*
This is a popular description of the forest lakes of the Forêt de Soignes, south of Brussels, Belgium (alt. 120-130 m above sea level). The lake l'Ermite is referred to as harbouring the majority of the odon. spp. known to occur in central Belgium. A list of spp. is not given.

(438) MATSUI, I., 1971. (Distributional tables of the Japanese dragonflies). (Original Japanese title: Nippon San Tombo Bumpu Hyo). Published by the Naka-Nippon Tombo Group, Nagoya. XII + 239 pp. 7 folded tabs. (Japanese). – *(Aza Ichiba 73, Moriyama-ku, Nagoya, JA).*
This is an utmost valuable bibliographic review of the geographic distribution of Odon. in the Japanese islands. It has been compiled with the assistance of some of the leading Japanese odonatologists: M. Aita, S. Asahina, H. Ikeda, S. Ishida, W. Miyata, T. Okumura and R. Tanaka. All literature records published up to the end of 1970 are considered. The Preface is followed by a chapter on the technical organization of the book and by an alphabetic list of the consulted Japanese periodicals. The bulk of the book is divided into 3 parts: Zygoptera, Anisozygoptera – Anisoptera (excl. Libellulidae) and Libellulidae. The spp. are listed according to the usual classification. For each sp. the following data are presented: consecutive number within family, Japanese common name, taxonomic name, prefectures of occurrence with exact bibliographic references (year, author, title, journal, volume, pages) in chronological sequence within a prefecture. To each of the 3 portions a tabular review of the distribution per prefecture is added. At the end of the book a list of synonyms is appended. *(Abstracter's note:* The book can be purchased from the author. Price: 1500 yen).

(439) RAABE, M., 1971. Neurosécrétion dans la chaine nerveuse ventrale des insectes et organes neurohémaux métamériques. Arch. Zool. exp. gén. 112 (4): 679-694, pls. 1-2. – *(Équipe Neuroendocrinol., Lab. Physiol. Insectes, Fac. Sci., Univ. Paris-VI, 9 quai Saint-Bernard, F-75005 Paris).*
Several distinct cell types are present in the various ganglia of the ventral nerve cord of all hitherto investigated insects. Their distribution and staining properties vary considerably. Nevertheless, a thoracic (generally A) type and a strictly abdominal type (A or B) occur frequently. A third kind, the C type, is present in all ganglia. Segmentally arranged neurohemal organs, called perisym-

pathic organs, store C type secretory material from the ventral nerve cord. They are generally located in the abdomen, though sometimes found in the thorax and head. The paper deals with the situation in various orders; only a brief reference is made to Odon. (Aeshna, Sympetrum, Orthetrum), since at the time of writing a special paper on the situation in this order has been in preparation (cf. *OA* No. 440 and also Nos. 434, 440, 463).

(440) RAABE, M., N. BAUDRY, J.-P. GRILLOT & A. PROVANSAL, 1971. Les organes périsympathiques des Insectes Ptérygotes. Distribution. Caractères généraux. C.R. Acad. Sc. Paris, Sér. D, 273: 2324-2327, 3 pls. – (*Equipe Neuroendocrinol., Lab. Physiol. Insectes, Fac. Sci., Univ. Paris-VI, 9 quai Saint-Bernard, F-75005 Paris*).
Perisympathic organs have been encountered in 68 genera belonging to 14 families of 14 pterygotan orders, including Aeshna, Anax, Sympetrum and Brachythemis. Apart from numerous common characteristics, they manifest a rather extensive morphological diversity as well as certain structural differences, especially in the stocked secretions and in the presence of neurosecretory cells. A review of their morphology is given in a tabular form and their role in the control of various physiological phenomena is pointed out. A photograph of the perisympathic organ in the abdomen of adult Sympetrum is added. (Cf. also *OA* Nos. 434, 439, 463).

(441) SHARELL, R., 1971. New Zealand insects and their story. Collins, Auckland – London. 268 pp. – (Publisher's address: *Collins Bros. & Co. Ltd., P.O. Box 1, Auckland, NZ*).
This is a popular book dealing mainly with biology and ecology, giving in an appendix also a brief review of the insect orders. Two chapters are concerned with the New Zealand Odon. (pp. 142-143, 225-227). A good general bibliography of New Zealand entomology is added. The beautifully illustrated work will be useful particularly to undergraduate students.

(442) STEINWEGER, M., 1971. Die Libellen des Teichgutes Hausdülmen und seiner Umgebung. Natur Heimat 31 (1): 22-25. – (*Dernekamp 29, D-4408 Dülmen GFR*).
A list is presented of 34 spp. collected during 1969 and 1970 in artificial fishponds of Hausdülmen (surface 165 ha), districts of Recklinghausen and Coesfeld, Westfalia, German Federal Republic. Notes on field observations are added. The material is in the collections of the Landesmuseum für Naturkunde, Münster, GFR..

## 1972

(443) ALI KHAN, B., 1972. The copulatory complex of some species of Ictinogomphus (= - Indictinogomphus Fraser) (Odonata: Gomphidae) and its taxonomic importance. Orient. Insects 6 (1): 75-82. – (*Zool. Dept., Agra Coll., Agra-2, India*).
The structure of the copulatory complex of Ictinogomphus is described, and the Indian spp. of the genus are keyed on the basis of it.

(444) ASAHINA, S., 1972. A new dragonfly subspecies Urothemis signata yiei from Taiwan (Odonata, Libellulidae). Natn. Taiwan Univ. Phytopathol. Entomol. 1972 (2): 30-31;– (*Totsuka III-123, Shinjuku-ku, Tokyo, 160, JA*).
U. signata yiei spp. n. from eastern Taiwan is described and illustrated. ♂ holotype, ♀ allotype, and 2 ♂ paratypes are in coll. Asahina and in coll. Tokyo University of Agriculture, Japan, This is the easternmost race of the Southasiatic U. signata (Rambur), which has the nominate ssp. in continental South Asia, ssp. insignata in Malaysia, ssp. bisignata in Java and Philippines, and ssp. aliena in New Guinea. The new ssp. is distinct by its large size and expanded dark patches on the wing bases.

(445) BUCCIARELLI, I., 1972. L'Aeschna caerulea (Ström) in Italia e altre interessanti catture nella regione alpina. Boll. Soc. ent. ital. 104 (6-7): 94-99. – (*Mus. Civ. Stor. Nat., Corso Venezia 55, I-20121 Milano*).
After a brief description of the biotopes

visited during 1971 and 1972 in the Italian Alpine provinces of Belluno, Trento, Bolzano and Sondrio, new faunistic data for Erythromma najas. Aeshna coerulea. Somatochlora alpestris and S. arctica are brought on record.

(446) BURTON, G.J. & T.M. McRAE, 1972. Phoretic attachment of Simulium larvae and pupae to mayfly and dragonfly nymphs. Mosq. News 32 (3): 436-443. – (*Natl. Cancer Inst., Federal Buildings, Room 508, Natl. Inst. Health, Md. 20014, USA*).
Three 23 mm larvae of Zygonyx torrida were found at blackfly attachment sites in N. Ghana with pupae of Simulium spp. attached. In the Red Volta River at Nangodi, near Bolgatanga, 2 larvae were found, one with a complete pupa of S. adersi on the right outer wing pad and the other with an empty S. adersi cocoon at the left side of the head. On the dam spillway of the dam at Nalerigu, E. of Gambaga, a 3rd larva was found with a deteriorated, silt-covered pupa of S. hargreavesi attached to the right outer wing pad. The 3 phoretic attachments are illustrated by photographs. Phoresy involving Simulium spp. aquatic stages attached to larvae of Odon. and Ephem. is reviewed and discussed, and summarized in a comprehensive table.

(447) CAILLÈRE, L., 1972. Contribution à l'étude du comportement de capture chez la larve d'Agrion (Calopteryx auct.) splendens Harris (Odonatoptères). Thesis Univ. Lypon – Claude Bernard. 167 pp., 16 pls., 76 textfigs. (With Engl. s.). – (*Dépt. Biol. anim. et Zool., Univ. Claude Bernard Lyon I, 43 bd. du 11-novembre-1918, F-69 Villeurbanne*).
A study was made of the prey-catching behaviour in the larva of C. splendens, especially of its evolution in the course of ontogenesis. In the old larva 6 or 9 phases can be recognized, depending on the site of stimulation (tarsi or antennae), viz. (a) Tarsi: rotation of the body, flexing of the antennae, exploration, capture, ingestion, cleaning of the mouth parts, post-ingestion, return to resting position; (b) Antennae: taking of interest, orientation, displacement, flexing of the antennae, exploration, capture, ingestion, cleaning of the mouth parts, post-ingestion, return to resting position. The response is considered complete, if capture takes place. If it is limited to an exploration only, it is incomplete. The sequence of prey-catching actions is stereotyped: the projection of the mask (preceded by the convergence of the caudal lamellae, the release of the post-mentum and the opening of the labial palps) is synchronous with the dorso-ventral contraction of the abdomen and a piston movement of the digestive tract. The reaction of the mask is accompanied by the slackening of the abdomen, the return of the digestive tract to its anitial position, and the divergence of the caudal lamellae. The respiratory movements stop when the antennae flex. They begin again at the start of the ingestion, but at a faster rate. Variations in the behaviour of the prey may cause a permanent correction of the body orientation. The escape behaviour may take place prior to the actual capture or after the latter has failed. The larva, after having brought the prey to its mouth parts, may reject it; an escape response then ensues. In such a case a special antennal posture (inhibition posture) precedes the return to the resting position. The behaviour is the same when a dummy is substituted for a prey.
Releasing stimuli: Prey-catching behaviour is evoked essentially by vibrations produced by the movement of preys. The influences of amplitude, length and frequency of stimulations, and of the form of the vibratory movement were studied by means of a mechanical stimulator. The latency of the capture diminishes with diminishing length of the stimulations. Parallel to these, the frequency of captures not preceded by the exploration of the dummy, increases. A dummy vibrating with a deadened oscillatory movement is more effective than that vibrating sinusoidally.
The role of the sensory organs: The planes of innervation of the antennae, the mouth parts and the legs have been identified by

means of in vivo staining. Among the mechanoreceptors, the sensilla trichodea and, above all, the s. chaetica, are abundant. The proprioreceptors, hair plates, stretch receptors, and chordotonal organs are well developed; their topographic location enables the insect to control its posture at any movement. The density of the sensilla increases, regardless of the instar, from the base towards the tip of each appendage. It diminishes during the second half of larval life.

Ontogenesis of prey-catching behaviour: The sequence of reactions is the same in all instars: only the reaction of displacement is dispensable. From the 6th instar onwards the antennal mobility increases and the coherence of the phases increases. Larvae do not react to too small dummies, while they react by a flight response if the dummy exceeds a certain size. In the course of ontogenesis the maximum diameter of the acceptable dummy increases with the increased range of the antennal and tarsal detection.

Regulation of prey-catching behaviour: The orientation movements have been analyzed by means of a comparison between the posture resulting from stimulation of the prothoracic tarsi and that obtained after a blocking of various joints (at the head, thorax and antennae levels). They can be broken down into global orientation movements (bringing the antennal tips into close proximity of the source of stimulation by means of flexions and extensions of the legs and lateral inflexions of the body), and in those of fine orientation (by means of which the adjustment of the capture is achieved). The experiments with blocked joints had a different effect upon one or other of these orientation movements. The removal of an antenna, or the attaching of a catheter to it, brings about pseudoexploration reactions, resembling an exaggerated searching behaviour. The effect of single stimulations has been compared to that of stimulations of antennae and tarsi successively, and viceversa. The stimulation of a tarsus or an antenna diminishes the threshold of responsiveness of the other sensory organs. Severing of the ventral nervous cord proves that the command to capture originates at the level of the central nervous system: the projection of the mask does not take place. The exploration phase precedes a mere opening of the labial palps and the release of the post-mentum. It is suggested that the central body contributes effectively towards the coordination of the antennal movements preceding the capture, the control of which is probably ensured by the giant fibres system.

(448) CARPENTER, F.M. & E.S. RICHARDSON, 1972. Additional insects in Pennsylvanian concretions from Illinois. Psyche 78 (4): 267-295. – (*Dept. Biol., Harvard Univ., Cambridge, Mass. 02138. USA*).

7 spp. of 4 orders recovered from ironstone nodules from the Francis Creek shale of Illinois, USA, are described and illustrated. The material includes one protodonate of the family Paralogidae, viz. Oligotypus markowskii sp. n.

(449) CHAPPELL, R.L. & J.E. DOWLING, 1972. Neural organization of the median ocellus of the dragonfly. I. Intracellular electrical activity. J. Gen. Physiol. 60 (2): 121-147. – (*Wilmer Inst., Johns Hopkins Univ. Sch. Med., Baltimore, Md. 21205, USA*).

Intracellular responses from receptors and postsynaptic units were recorded in the median ocellus of Aeshna tuberculifera, Boyeria vinosa, Anax junius, Libellula luctuosa, Plathemis lydia, Erythemis simplicicollis, Plantala flavescens, Tramea carolina and T. lacerata. The receptors respond to light with a graded, depolarizing potential and a single, tetrodotoxinsensitive impulse at "on". The postsynaptic units (ocellar nerve dendrites) hyperpolarize during illumination and show a transient, depolarizing response at "off". The light-evoked slow potential responses of the postsynaptic units are not altered by the application of tetrodotoxin to the ocellus. It appears, therefore, that the graded receptor potential, which survives the application of tetrodotoxin, is responsible for mediating synaptic transmission in the ocellus. Comparison of pre- and post-

synaptic slow potential activity shows (1) longer latencies in postsynaptic units by 5-20 msec, (2) enhanced photosensitivity in postsynaptic units 1-2 log units and (3) more transient responses in postsynaptic units. It is suggested that enhanced photosensitivity of postsynaptic activity is a result of summation of many receptors onto the postsynaptic elements, and the transients in the postsynaptic responses are related to the complex synaptic arrangements in the ocellar plexus. (For Part II cf. *OA* No. 450).

(450) DOWLING, J.E. & R.L. CHAPPELL, 1972. Neural organization of the median ocellus of the dragonfly. II. Synaptic structure. J. Gen. Physiol. 60 (2): 148-165. – (*Wilmer Inst., Johns Hopkins Univ. Sch. Med., Baltimore, Md. 21205, USA*).
2 types of presumed synaptic contacts were recognized by electron microscopy in the synaptic plexus of the median ocellus of Anax junius and Aeshna tuberculifera. The first type is characterized by an electron-opaque, button-like organelle in the presynaptic cytoplasm, surrounded by a cluster of synaptic vesicles. 2 postsynaptic elements are associated with these junctions, which are termed button synapses. The 2nd synaptic type is characterized by a dense cluster of synaptic vesicles adjacent to the presumed presynaptic membrane. One postsynaptic element is observed at these juntions. The overwhelming majority of synapses seen in the plexus are button synapses. They are found most commonly in the receptor cell axons where they synaptically contact ocellar nerve dendrites and adjacent receptor cell axons. Button synapses are also seen in the ocellar nerve dendrites where they appear to make synapses back onto receptor axon terminals as well as onto adjacent ocellar nerve dendrites. Reciprocal and serial synaptic arrangements between receptor cell axon terminals and between receptor cell axon terminals and ocellar nerve dendrites are occasionally seen. It is suggested that the lateral and feedback synapses in the median ocelli of An. junius and Ae. tuberculifera play a role in enhancing transients in the postsynaptic responses. (For Pt. I cf. *OA* No. 449).

(451) ELOFSSON, R. & N. KLEMM, 1972. Monoamine-containing neurons in the optic ganglia of crustaceans and insects. Z. Zellf. mikr. Anat. 133 (4): 475-499. – (*Inst. Zool., Univ. Lund, Helgonavägen 3, S-223 62 Lund*).
Studies were made on 11 spp. of Crustacea and on 8 representatives of 7 insect orders, including Aeshna viridis. The fluorescence method of Falck and Hillarp was used to investigate the presence and localization of monoaminergic neurons in the optic ganglia. In both classes the monoaminergic terminals, when present, appeared (especially in the medullae externa and interna of the Crustacea and the medulla of the Insecta) in strata specific for each sp. So far, the only monoamine apparently present in the crustacean optic ganglia is dopamine, whereas in Insecta the catecholamines dopamine and noradrenaline and the indolamine 5-hydroxytryptamine are found in the optic lobe, different spp showing different contents of the compounds. Photographs of a horizontal section through the optic lobe of the ultimate instar larva of A. viridis and a schematic drawing of the optic ganglion in the same sp. are added.

(452) ETIENNE, A.S., 1972. The behaviour of the dragonfly larva Aeschna cyanea M. after a short presentation of a prey. Anim. Behav. 20: 724-731. – ( *Lab. Psychol. Exp., Psychol., Palais Wilson, CH-1200 Genève*).
When food deprived, A. cyanea larvae of the last 3 instars tended to decrease all movements leading to a change in visual input and to remain very quietly in ambush. If they were presented with a dummy prey which was withdrawn as soon as they had fixed it, they maintained their fixation position, thus looking motionless in the direction where the dummy had disappeared; locomotion and other movements leading to a change in visual input were progressively resumed and reached their former level within the third minute after the presentation of the dummy. No specific locomotor patterns were observed after the short presentation and withdrawal of the dummy.

The number of strikes during the projection of a-two dimensional dummy prey and the time the fixation position was maintained after the end of the projection depended on identical stimulus-properties. The results are discussed from the point of view of their causal and functional implications. (Author).

(453) GABE, M., 1972. Données histochimiques sur l'évolution du produit de neurosécrétion protocéphalique des Insectes Ptérygotes au cours de son cheminement axonal. Acta Histochem. 43 (I): 168-183; pls. V-VI (col.). – (*Lab. Evolut. Êtres Organ., Univ. Paris-VI, 105 blvd. Raspail, F-75 Paris-06*).
Histochemical data on the changes in the protocephalic neurosecrétory material in several pterygotes, including the larva of Aeshna cyanea, during axonal transport are presented. Following oxidation with permanganate, performate or peracetate, the protocephalic neurosecretory material (PNSM) stains with paraldehyde-fuchsin intensely and uniformly throughout the neurosecretory system, while with iodine or periodate oxidation staining is clear in the axon terminals but is completely absent from the perikarya. Following permanganate, performate or peracetate oxidation, the entire system shows a strong affinity for alcian blue and alcian yellow at pH 1·0. At pH 2·5, there is intense staining with alcian blue and alcian yellow in the distal parts of the system only. The techniques employed do not indicate any changes in the protein constituents of the PNSM during axonal transport, but the content of PAS-positive compounds increases markedly as the PNSM moves distally from the protocerebrum. Similar behaviour is observed in the hypothalamo-hypophysial tract in Rana temporaria (Amphibia), which indicates that in Pterygota also the PNSM becomes richer in 1,2-glycol groups as it moves along the neurosecretory axons. 9 colour photographs of the pars intercerebralis and of the corpus cardiacum of A. cyanea are added.

(454) GALLETTI, P.A., 1972. Nota sul popolamento odonatologico di un canale irriguo della Pianura Vercellese. Boll. Soc. ent. it. 104 (6-7): 124-129. – (*Via Monte Generoso 2, I-20155 Milano*).
An annotated list is given of 23 spp. collected from 1966 through 1971 at a small irrigation ditch nr. Santhia, Vercelli, Piedmont prov., Italy. More extensive notes are given on Boyeria irene and Ophiogomphus serpentinus (the first Italian exuviae). Aeshna affinis is the first record for the province. The fauna is considered characteristic of this type of biotopes in Northern Italy.

(455) HAMILTON, K.G.A., 1972. The insect wing, part II, Veil homology and the archetypal insect wing. J. Kansas Ent. Soc. 45 (1): 54-58. – (*Ent. Res. Inst., Central Exp. Farm, Ottawa, Ontario KIA 006, CA*).
The importance of using all available data to interpret venation is stressed. Several venational peculiarities of the Paleoptera indicate that many of the vein systems of the Neoptera are in fact compound in nature. „Radius sector" of Comstock and Needham is designated a separate vein system sector, and their first anal vein is designated the empusal vein; Forbes' designation of their second branch of cubitus (cubitus posterior of Edmunds and Traver) as the plical vein is upheld. The media is shown to be basically four-branched. (Author). For Pts. I, III, IV cf. *OA* Nos. 291, 456, 457).

(456) HAMILTON, K.G.A., 1972. The insect wing, part III. Venation of the orders. J. Kansas Ent. Soc. 45 (2): 145-162. – (*Ent. Res. Inst., Central Exp. Farm, Ottawa, Ontario KIA 0C6, CA*).
The venational nomenclature derived in the previous two parts of this paper (cf. *OA* Nos. 291, 455) is applied to 24 orders and compared to existing terminologies. Important works on the homologies and comparative morphology of the wing parts are listed and briefly discussed. Theories concerning the origins of the ephemeropteran anal brace, odon, triangle, orthopteroid anal fan, homopteran claval suture, and the so-called jugal veins are advanced. Most workers agree that the Protodonata (or Meganisoptera) is either the immediate ancestor of the Odon,

or very close to such an ancestor. Its venation lacks the subnodus ($R_S$ of Needham). The tracheation of this structure, therefore, has no significance in the ancestry of the wing venation, being merely an adventitious branch of the radius trachea that serves the subnodus and one of the intercalary veins. The triangle is a feature confined to the recent Odon. although it is lacking in the "Agrionidae". Its form is rather irregular in the other Zygoptera; it has thus been confused with the quadrilateral, which is not involved in the fluting. Fraser expressed the opinion that this triangle represents an aligning of cross-veins. The present author considers it an extension of the basal fluting of the odon. wing, a product of the curving of the main veins in the anal region. P lies in the plical furrow in both Odon. and Protodonata. This vein is straight in the latter, but is angled backward and then curves outward in the Odon. This results in a difference of slope of the membrane between P and Cu near the base, and of that further distad. This causes two folds to develop at an acute angle to each other, a process which can be demonstrated easily by folding a paper model in the same way. Sclerotization along these lines of bending, for strength, would result in the formation of the triangle. This theory explains the function of the triangle, which Fraser's theory does not. Woodworth proposed a similar theory, but based it on the highly modified venation of Archilestes, without explanation of the origin of the venation of this insect. Tracheation shows two branches of P, suggesting that E has fused with this vein. Further evidence for this conclusion is found in the Protodonata, in which P and E are separate at the base, and distinctly fluted. These vein bases are also separate in recent Odon., but are more firmly united and have lost their fluting at that point. (Author). (For Part IV cf. *OA* No. 457).

(457) HAMILTON, K.G.A., 1972. The insect wing, part IV. Venational trends and the phylogeny of the winged orders. J. Kansas Ent. Soc. 45 (3): 295-308. – (*Ent. Res. Inst., Central Exp. Farm, Ottawa, Ontario KIA 0C6, CA*).

Evolutionary trends of dissimilarity between wing pairs in shape and venation, of fusion of veil systems, of number of anal veins, and of crossvein types are traced.

It is concluded that the following are primitive characters: similar wings, the hind wing with a larger anal lobe; all vein systems separate to the base; 7 anal veins, unbranched; crossveins forming an archedictyon. 3 other types of primary crossveins, representing successive grades of evolutionary advancement, are discussed: polyneurous, costaneurous, and oligoneurous. These are contrasted with secondary venational types. A phylogeny of recent orders is constructed and compared to other data recorded previously in parts I, II and III of this series (cf. *OA* Nos. 291, 455, 456). Fossil orders are fitted to this phylogenetic scheme. This necessitates redefinition of the orders Hadentomoida, Protomecoptera, Protembiaria, and fossil Psocoptera. The Paleodictyoptera and Megasecoptera are closely related; their Cu, P and E are basally fused into a common unit. Their pectinate anal system and dorsally attached wings ally them to the Odon. and Protodonata. The basal plates of the paleodictyopterid Ostrava show a similar configuration to those of the Odon. Triadotypus retains a free cubital stem (a feature more primitive than that of other Protodonata, or of Odon.), but has cubitus unbranched, as in the Odon. It thus seems likely that the Odon. evolved from some primitive Protodonata. (Author).

(458) HURLBERT, S.H., M.S. MULLA & H.R. WILLSON, 1972. Effects of an organophosphorus insecticide on the phytoplankton, zooplankton, and insect populations of fresh-water ponds. Ecol. Monogr. 42 (3): 269-299. (*Dept. Biol., California State Univ., 5402 College Av., San Diego, Calif. 92115, USA*).

Dursban was applied on June 3, June 18 and July 1 to 8 shallow (24 cm) experimental ponds near Bakersfield, California, USA. 4 ponds were treated at 0·028 kg/ha (= 0.025

lb/acre), 4 at. 0,28 kg/ha and 4 were kept as controls. Phytoplankton, zooplankton and insect populations were sampled 21 times between May 20 and August 16. The number of insect larvae and nymphs were reduced more than that of the adults, reflecting in part the ability of the latter to emigrate and immigrate. Samples taken 24 hr after treatment for the 2nd and 3rd but not 1st treatments showed greater reductions in the numbers of predators (Notonectidae [Hem. – Het ]. Dytiscidae [Col.], Coenagrionidae [Odon.]. larval Hydrophilidae [Col.]) than of herbivores (Corixidae [Het.], Baetidae [Ephem.], adult Hydrophilidae). The populations of predators generally recovered to control-pond levels more slowly than herbivorous populations. 5 weeks after the last insecticide treatment, predators averaged only 45% and 9% as abundant in low and high dose ponds respectively compared with control ponds ($P < 0.02$); corresponding values for herbivores were 108% and 206% ($P < 0.10$). Similar data are presented for spp of Crustacea, Rotifera and Phytoplankton. The significance of the results for insect control programmes is discussed.

(459) MONTGOMERY, B.E., 1972. Survival of Odonata naiads through drought and freezing. Proc. Indiana Acad. Sci. 81 (1971): 171. (Abstract only). – *(906 North Chauncey Av., West Lafayette, Indiana 47906, USA).* Living Odonata larvae were found in a "dry" pond in late October (October 28, 1968) (in Indiana, USA). They were in damp situations, masses of fine roots or accumulations of debris on the exposed bottom surface. The natural environment was restored within a few days of the initial observations by fall rains. During the following winter an examination of the pond revealed that all water was frozen, but the bottom surface immediately beneath the ice was not. No larvae could be recovered from the pond following the fall rains which resulted in extensive marshy margins so that the central area of the pond could not be approached. Sampling was difficult in the spring for the same reason. However, larvae of Zygoptera (none of which had been found the previous fall), Aeshnidae and Libellulidae were collected. These were of such age that development from the egg during the spring appeared extremely improbable. Thus, the larvae must have survived the elimination of all water from their habitat twice - once, through drought and, then, be freezing. (Verbatim).

(460) MUSIAŁ, J., 1972. Dragonflies (Odonata) of Southern Great Poland. Badan. fizjogr. Pol. zachod., (B) 25: 69-81. (Polish, with Engl. s). – *(Lab. Gen. Zool., Inst. Biol., Univ. A. Mickiewicza, ul. Fredry 10, Poznán, PO).*
An annotated list is given of 42 spp. collected during 1968 in the district of Ostrow, Great Poland. It includes several spp. that in Poland are rare, viz. Coenagrion armatum, C. vernale. Chalcolestes viridis, Sympetrum depressiusculum and Leucorrhinia albifrons. In all, some 75% of spp. of Great Poland were recorded from the district studied. Special attention is being paid to the ecological features of the fauna and an analysis is given of the composition of the odon. faunas of the types of bodies of water most characteristic of the region.

(461) PETERS' J.C., 1972. The ecology of Tarn Dub. Vasculum 57 (3): 42-50. – *(Water Resources Board, Res. Div., Reading, Berks. UK).*
The fauna and ecology of the fresh water pond, Tarn Dub, in the Upper Teesdale National Nature Reserve, north Yorks/Furham border, UK, were studied. The invertebrate fauna sampled quantitatively at monthly intervals during the period 1965-1967. Of Odon., only 2 Aeshna spp. were recorded. They are indicative of the two habits: A. juncea in rich fen areas, A. grandis in outlying bog pools. The total absence of Zygoptera is discussed, but no explanation could be found for it.

(462) POLENEC, A., 1972. Einige Besonderheiten der Tierwelt des Gebietes von Skofja Loka und Interessantes über die hier verbreiteten Arten. Loški razgl. 19: 356-374. (Slovene,

with German s.). – (*Natn. Mus. Nat. Hist., Prešernova c., YU-61000 Ljubljana*).
A popular, general review is given of the fauna of the Škofja Loka (Bischoflack) District in the Eastern Julian Alps, Slovenia, Yugoslavia. The odon. fauna of the region consists of 33 spp., 24 of which are of eurosibirian origin. The list is omitted, instead reference is made to the literature. Notes on childrens' attitudes towards dragonflies in the area are added.

(463) RAABE, M. & A.A. PROVANSAL. 1972. Les organes périsympathiques des Paléoptères. C.R. Acad. Sc. Paris, Sér. D, 275: 925-928. – (*Équipe Neuroendocrinol., Lab. Psysiol. Insectes, Fac. Sci., Univ. Paris-VI, 9 quai Saint-Bernard, F-75005 Paris*).
Metameric perisympathic organs are found in Ephemeroptera, Zygoptera and Anisoptera. In the abdomen they are mostly of the primitive, medio-transversal type. In the thorax they are of the primitive medio-transversal type in Ephemeroptera, and of the primitive transversal type in Odonata. The following odon. genera were studied: Calopteryx, Sapho, Anax, Aeshna, Sympetrum and Brachythemis. (CF. also *OA* Nos. 434, 439, 440).

(464) RESTIFO, R.A., 1972. Aeshna tuberculifera Walker, a new Ohio record. Ohio J. Sci. 72 (4): 183. – (*Dept. Ent., Coll. Biol. Sci., Ohio State Univ., 1735 Neil Avenue, Columbus, Ohio 43210, USA*).
7 specimens captured during August and September, 1971 at 2 localities in Ohio, USA are brought on record. This is a new sp. to the fauna of Ohio, bringing the total number of odon. spp. so far reported from the State to 145 (3 doubtful spp. excluded).

(465) SIEVERS, D.W. & A.C. HAMAN, 1972. Notes on snail feeding behavior of Anax junius (Drury) (Odonata). Proc. Iowa Acad. Sci. 79: 105-106. – (*Dept. Biol., Univ. Northern Iowa, Cedar Falls, Iowa 50613, USA*).
An ultimate instar larva of A. junius preyed upon 47 mature snails, Helisoma trivolvis (Say), during a period of 63 days. The feeding behaviour has potential significance: (1) with respect to biological control of trematode vectoring gastropods, (2) as a mechanism for vectoring trematodes between snails and birds, and (3) in interpreting structural adaptations and perception in immature Odon. (Author).

(466) SLIFER, E.H. & S.S. SEKHON, 1972. Sense organs on the antennal flagella of damselflies and dragonflies (Odonata). Int. J. Insect Morphol. Embryol. 1 (4): 289-300. – (*Acad. Nat. Sci., Philadelphia, Pa., USA*).
The sense-organs on the antennal flagella of 6 spp. of Zygoptera (genera Argia, Enallagma, Ischnura, Heteragrion and Zenithoptera) and 11 spp. of Anisoptera (genera Aeshna, Anax, Cyanogomphus, Erythemis, Erythrodiplax, Gomphus, Micrathyria, Nephepeltia, Plathemis, Orthemis and Uracis) were studied with the light-microscope and the scanning and transmission electron microscopes. Both simple and compound coeloconic sense-organs (pit pegs) are present on the flagella examined. They are more numerous in Anisoptera than in Zygoptera. More than one type of peg is present in the pits, and electron micrographs of sections show pores to be present in the wall of some of them. The pores indicate that the structures are chemoreceptors. No other sense-organs are present on the flagellar surface, though a very small hair was found on each of 2 of the 66 antennae examined. These 2 are almost certainly anomalous.

(467) STROTHER, G.K. & A.J. CASELLA, 1972. Microspectrophotometry of arthropod screening pigments. J. Gen. Physiol. 59 (5): 616-636. – (*Dept. Biophys. and Physics, Pennsylvania State Univ., University Park, Pa. 16802, USA*).
Absorption spectra of visual screening pigments obtained in vitro with a microspectrophotometer using frozen sections are given for several spp. of Arachnidae, Diptera, Hymenoptera and for Libellulla luctuosa. A complete description of the instrumentation is given. The dark red pigments of L. luctuosa absorb strongly over a wide spectral range and therefore prevent chemical identification.

(468) WILLEY, R.L., 1972. The damselfly (Odonata) hindgut as host organ for the euglenoid flagellate Colacium. Trans. Amer. Micros. Soc. 91 (4): 585-593. – *(Dept. Biol. sci., Univ. Illinois, Chicago, Illinois 60680, USA).*

In an interdunal pond of northern Indiana, USA, a euglenoid flagellate of the genus Colacium inhabits the rectal part of the hindgut of several zygopteran spp. during the winter. The Colacium sp. enters the anus in the fall, multiplies, and forms a green mass in the lumen. The symbiotic organisms remain attached to the rectal wall by a gelatinous secretion. The mass of cells is little affected by the movement of the host's fecal pellets whose passage is aided by the movement of spicules and spines attached to the culticular lining of the hindgut. The flagellates are ejected from the rectum in the spring only when the larval cuticular lining is cast off during the molt. The damselfly larvae are not reinfected before they emerge as adults. (Author).

## 1973

(469) (Anonymous), 1973. Insect distribution maps scheme. Critical species Odonata. Biological Records Centre, Abbots Ripton, 1 p. – *(c/o Dr. J. Heath, Biological Records Centre, Nature Conservancy, Monks Wood Expl. Stn, Abbots Ripton, Huntingdon, PE 17 2LS, UK).*

In order to ensure the greatest possible accuracy the attention of all recorders participating in the odon. scheme of the Insect Distribution Maps Scheme is drawn to a number of critical spp. These are divided into 2 categories, viz. (1) those for which voucher specimens are required, and (2) those that should be carefully checked because of possible confusion. Among others, for each of the spp. listed notes are provided as to the allied forms and the way of taxonomic separation. (Cf. also *OA* Nos. 368 and 392).

(470) ACHTERBERG, C. van, 1973. A study about the Arthropoda caught by Drosera species. Ent. Ber., Amsterdam 33 (7): 137-140. – *(Oosteinde 34, Waarder, post Woerden, Z.H., NL).*

The arthropod diets of D. intermedia, D. rotundifolia and D. anglica were studied in June, 1972 in the Drenthe prov., the Netherlands. D. rotundifolia was the only one in which 3 specimens (♂) of Enallagma cyathigerum were found, constituting 1.3% of the total arthropod diet of this species. These represent by far the largest item in the catches of the plant.

(471) BABUEVA, R.V., G.N. MYSEIKO & O.D. NOVIKOVA, 1973. The nourishment of Abramis brama L. in reservoir of Novosibirsk. Problemy Ekol. 3: 207-212. Russian, with Engl. s.). – *(Ecol. Lab., Tomsk State Pedagogical Inst., Tomsk, USSR).*

The diet of the Bream, Abramis brama, from the Novosibirsk Basin, Siberia, USSR, is analysed. Up to the age of 1 year the fish feeds entirely on planctonic organisms, but in 20.6% of older specimens (length 16-55 cm) 1-2 dragonfly larvae were found in the period June through October. The sexually mature fish (length 24 cm onwards) has a benthonic diet; odon. larvae were found in 27.0% of specimens examined.

(472) BELYSHEV, B.F., 1973. The dragonflies as water biocenosis components and some general questions on predation in nature. Problemy Ekol. 3: 131-134. (Russian, with Engl. s.). – *(Biol, Inst., Siberian Branch USSR Acad. Sci., Ul. Frunse 11, Novosibirsk-91. USSR).*

A popular account on the role of odon. larvae in aquatic biocenoses. They are regarded particularly important as accumulators of animal proteins.

(473) BELYSHEV, B.F., 1973. The dragonflies of Siberia (Odonata). (Russian title: Strekozy Sibiri [Odonata]). Vol. I, Part 1, part 2. Nauka, Novosibirsk. 620 pp. (each part separately bound, but consecutively paginated), 270 figs. (Russian, with Engl. translation of the title and of a brief characterization of the book and its author). – *(Biol. Inst., Siberian Branch USSR Acad. Sci., Ul. Frunse 11, Novosibirsk-91, USSR).*

This is the most comprehensive monograph yet written on the Odon. of Siberia, USSR. The general part (173 pp.) is divided into the following chapters: Morphology (Adult, Larva, Egg, Some regularities in the distribution and variation of colour patterns in the dragonflies of Siberia and adjacent territories, Classification), Fossil Odon. and phylogeny of the order, General features of dragonfly biology, Dragonfly migratory flights and their origin, Zonal distribution of dragonflies in general and that of Siberian spp. in particular; Geographic distribution of dragonflies in general and that of Siberian spp. in particular; (some general odon. references and complete bibliography for Siberia up to 1968). Throughout the text special attention is paid to the Siberian fauna and most general features are illustrated by Siberian observations, many of which are here published for the first time. Extensive sections on predators, parasites (Prosthogonimus), sociology etc. in Siberia are of more than odonatological interest. In the systematic part keys are given for all taxa, including 119 Siberian spp. and numerous local sspp. The treatment of each sp. includes the following headings: Taxonomic notes, Geographic distribution (in most cases a map is added), Chorogeographic history, Biology (phenology, ecology, life history, behaviour etc.). Extensive morphological descriptions and keys to the Siberian infraspecific forms, supported by good illustrations of structural characters, allow an easy taxonomic identification. (*Abstracter's note:* The books can be purchased from any scientific bookseller; the original price for both parts is 3.78 Rubles).

(474) BELYSHEV, B.[F]., 1973. Glazami uchenogo. (With the eyes of a scientist). Sovr. Sibir', Novosibirsk 1973 (140): 1 p. (issue of June 17, 1973). (Russian). – (*Biol. Inst., Siberian Branch USSR Acad. Sci., Ul. Frunse 11, Novosibirsk-91, USSR*).
A popular article, in a daily newspaper, on dragonflies, their paleontological history, biological features and, particularly, on their role in the natural ecosystems, hence their economic importance. A paragraph on the broad scientific interest in their study and on odonatological journals and societies is also included.

(475) DEFOSSEZ, A., 1973. Développement de l'appareil copulateur mâle au cours de la métamorphose des Aeschnidae (Odonata). Int. J. Insect Morphol. Ecol. 2 (2): 153-167. – (*Lab. Biol. anim., SN 3, Univ. Sci. Techn. Lille-I, B.P. 36, F-59 Villeneuve d'Ascq*).
In Aeshnidae, the ♂ copulatory organ is located on the 2nd and 3rd abdominal segments and has a complicated organization. Its development occurs mainly during metamorphosis. It is the result of folds and thickenings of the epidermis, which is pulled into the abdominal cavity. These morphogenetic movements, which begin after an early apolysis, are related to an intensive mitotic activity, and they finish with the deposition of the imaginal cuticle. (Author).

(476) HARPAZ, I., 1973. Early entomology in the Middle East. *In:* R.F. Smith, T.E. Mittler & C.N. Smith (Eds), History of entomology (suppl. vol. Ann. Rev. Ent.). Annual Reviews, Palo Alto pp. 21-36. (*Dept. Ent., Fac. Agric., Hebrew Univ., Rehovot, Israel*).
Extensive reference is made to the Har-ra = Hubullu series of tablets from the collection of cuneiform texts assembled by the Assirian king Ashurbanipal (669-626 B.C.), discovered at Niniveh and at present in the British Museum. This is a bilingual Sumero-Akkadian lexicographical dictionary, compiled during the 9th century B.C., containing systematically arranged lists of Sumerian names with their Akkadian translations. The lists originate from Sumerian ones as were used in the period of Hammurabi (ca. 1792-1750 B.C.), but were developed from much older lists. Tablets XI-XV contain a list of wild and domestic animals (407 names), including 121 insects. The latter are arranged in groups more or less equivalent to the modern taxa Orthoptera, Coleoptera (?), Odon., Formicidae and Diptera-Hymenoptera. Har-ra = Hubullu tablets represent the oldest book on zoology (and

odonatology) known to date.

(477) JOHNSON, C., 1973. Distributional patterns and their interpretation in Hetaerina (Odonata: Calopterygidae). Fla Ent. 56 (1): 24-42. – *(Dept. Zool., Univ. Florida, Gainesville, Florida 32601, USA).*
The geographical distribution, north of Mexico, for damselflies in the genus Hetaerina appears by county for each state and nearest community for 2 Canadian provinces. Hetaerina americana. H. titia, and H. vulnerata occur in 41, 24 and 4 US states respectively, and H. americana exists also in Quebec and Ontario, Canada.
Likely explanations of these geographic patterns follow the distributional data. Temperature probably controls the northern limits in H. americana and H. titia; adult behavioral preferences affect western limits of H. titia; drought severely limits distribution of H. vulnerata in the southwestern USA. A well-isolated, pleistocene relict describes the single Florida colony of H. americana. Isolated colonies of H. americana also characterize part of its southwestern distribution. Flight season data show a 12 month adult activity period in tropical climes dropping to an approximately 3 month interval in northern colonies of H. americana, and an even shorter time in populations of northern H. titia. (Author).

(478) JURZITZA, G., 1973, Eine Meisterin des Segelfluges. Sechs Wochen für Fotos der Braunen Mosaikjungfer. Das Tier (13 (5): 11-13. – *(Zehntwiesenstrasse 40, D-7505, Ettlingen, GFR).*
A popular narrative of the adult life of Aeshna grandis (♂ behaviour, pairing, oviposition), with 4 colour and 1 black-and-white photograph. *(Abstracter's note:* reprints are not available. The journal's issue can be obtained directly from the Publisher, Hallwag Verlag AG. Nordring 4, CH-3001 Bern, Switzerland).

(479) JURZITZA, G., 1973. Heymer, A., 1973. Verhaltensstudien an Prachtlibellen. Ent. Ber., Amsterdam 33 (4): 78. (Engl.). – *(Zehntwiesenstrasse 40, D-7505 Ettlingen, GFR).*
Book review of the paper listed in *OA* No. 309.

(480) KALLAPUR, V.L. & C.J. GEORGE, 1973. Fatty acid oxidation by the flight muscles of the dragonfly, Pantala flavescens. J. Insect, Physiol. 19: 1035-1040. – *(Dept. Zool., Karnatak Univ., Dharwar, India).*
P. flavescens remains air-borne for many hours and should be expected to utilize fat during its prolonged flight. In vitro studies on fatty acid oxidation in the flight muscles have revealed that the muscles are capable of oxidizing butyrate, octanoate, palmitate, and stearate. However, there seems to be a preferential oxidation of short chain fatty acids.
Added carnitine appears to have a stimulatory effect on palmitic acid oxidation in the homogenate as well as the mitochondrial preparation. (Authors).

(481) KLAUTA, B., 1973. Notes on new or little known dragonfly karyotypes. III. Spermatocyte chromosomes of four nearctic anisopterans, Aeshna californica Calvert (Aeshnidae), Cordulia shurtleffi Scudder (Corduliidae), Sympetrum internum Montgomery, and S. madidum (Hagen) (Libellulidae). Genen Phaenen 16 (1): 7-12. – *(Inst. Genet., Univ. Utrecht, Opaalweg 20, Utrecht, NL).*
Spermatocyte chromosomes of A. californica Calv. (n = 14), Vancouver Island, Canada, and those of C. shurtleffi Scudd. (n = 13), S. internum Mtgm. (n = 14, seldom 13) and S. madidum (Hag.) n = 13). all from Alberta, Canada, are described. A pair of m-chromosomes is present in all of them. S. internum is the only known Sympetrum species (out of 17 studied) with a haploid number of 14. The karyotype of C. shurtleffi is peculiar in several features, notably in the large size of X and its precocious division at metaphase I. A cytotaxonomic comparison is made between C. shurtleffi and the closely allied palearctic C. aenea (L.): their karyotypes appear identic in all features. The suggestion is put forward to reexamine the taxonomic status of the two species. (Author).

(482) KONISHI, M. & Y. ITO, 1973. Early ento-

mology in East Asia. *In:* R.F. Smith, T.E. Mittler & C.N. Smith (Eds), History of entomology (suppl. vol. Ann. Rev. Ent.). Annual Review, Palo Alto. pp. 1-20. – (*Hokko Chem. Ind. Co., Tokyo, JA*).
The paper includes a table of synonyms of insects mentioned in Li Shih-Chen's work, Pên Tshao Kang Mu of 1596. The latter was evaluated as the greatest scientific achievement of the Chinese Ming dynasty period. His classification of insects (73 kinds) into 3 main classes such as oviparous, spontaneous and moisture-born insects is probably based on the 4 births of Buddhism (oviparous, spontaneous, moisture-born, viviparous). Odon. (Chinese "Ching Ling") are listed in the oviparous group.

(483) LAMBECK H.J.P. & B. KIAUTA, 1973. On a small collection of syrphid flies (Diptera: Syrphidae) from the Kathmandu Valley and the Khumbu Himal Region (Nepal). Ent. Ber., Amsterdam 33 (4): 70-78. – (*Inst. Genet., Univ. Utrecht, Opaalweg 20, Utrecht, NL*).
The syrphids Helophilus (Mesembrius) quadrivittatus (Wied.) and Eristalis (Lathyrophthalmus) arvorum (Fabr.) are referred to as often falling a prey to the dragonfly Orthetrum sabina (Drury) in the Kathmandu Valley, Nepal.

(484) L [EM] PK [E, B.J.], 1973. Odonatologica, vol. I, 1972. Ent. Ber., Amsterdam 33 (4): 68. (Dutch). – (*Oude IJsselstraat 12-III, Amsterdam 1010, NL*).
A book review

(485) PRUSEVICH, N.A. & L.S. PRUSEVICH, 1973. To the study of fish nourishment in the basin of the Ket. Problemy Ekol. 3: 213-218. (Russian, with Engl. s.). – (*Lab. Hydrobiol. a. Fishing, Inst. Biol. a. Biophysics, Tomsk State Univ., Tomsk, USSR*).
The diets of 15 fish spp. from the river basin of Ket, tributary of Ob, Siberia, USSR, were studied. Odon. were found in 3 spp. Thus, in 61 specimens of the Siberian Dace, Leuciscus leuciscus baicalensis (Dybowski), dragonflies constituted 0.8% of the food, in the 87 specimens of the Ruff, Acerina cernua (L.) 22.5%, while the figures of the Perch, Perca fluviatilis L., (288 specimens examined) amounted to 0.1% for the riverine population and 11.8% for lacustrine specimens. There is a marked seasonal variation in the role Odon. play in the fish diet. While in May they form 23.0% of the food of the Ruff, they represent 65.5% of the diet of this sp. in July. In the Perch, the peak is reached in the months of June and July.

(486) SMITH, R.F., T.E. MITTLER & C.N. SMITH (Eds.), 1973. History of Entomology. Annual Reviews, Palo Alto. 517 pp. – (Publishers' address: *Annual Reviews Inc., 4139 El Camino Way, Palo Alto, California 94306, USA*).
This is a supplementary volume to the Ann. Rev. Ent., and represents a collection of 20 papers on various aspects of the subject. Odon. and odonatologists are mentioned in the following papers: *Konishi, M. & Y. Ito:* Early entomology in East Asia (cf. *OA* No. 482); – *Harpaz, I:* Early entomology in the Middle East (cf. *OA* No. 476); – *Tuxen, S.L.:* Entomology systematizes and describes: 1700-1815; – *Lindroth, C.H.:* Systematics specializes between Fabricius and Darwin: 1800-1859; – *Rohdendorf, B.B* The history of paleoentomology; – *Ross, H.H.:* Evolution and phylogeny; – *Richard, A.G.:* Anatomy and morphology; – *Wigglesworth, V.B* The history of insect physiology (cf. *OA* No. 487). (*Abstracter's note:* References to Odon. given in the Subject Index are very incomplete).

(487) WIGGLESWORTH, V.B., 1973. The history of insect physiology. *IN:* R.F. Smith, T.E. Mittler & C.N. Smith (Eds), History of entomology (suppl. vol. Ann. Rev. Ent.). Annual Reviews, Palo Alto. pp. 203-228. – (*Dept. Zool., Univ. Cambridge, UK*).
As important contributions to the general achievements in insect physiology several works on Odon. are mentioned. First of these is Seidel's discovery (1924 et seq.) of an activation centre, which initiates embryonic development at the posteriour pole of Platycnemis. Jousset de Bellesme (1877) first recognized, in Libellula, the role of swallowed air in distending all the external

organs with blood to produce their definitive form. In the field of muscular system and locomotion important work for the understanding of the flight has been produced by Voss (1913, 1914) who noted that in "Agrion" the two pairs of wings operate independently, while the steering mechanism was described, in the same genus, by Bull (1904, et seq.). Matula (1911) has shown the inhibitory effect of nerves appropriately stimulated in the leg muscles of Libellula.

Though Marshall Hall already in 1842 had shown that isolated abdominal segments of Libellula can perform respiratory movements and had compared the ganglia with the medulla oblongata of vertebrates, it was Wallengren (1913) who obtained, in Aeshna larvae, good evidence of an overall respiratory centre in the thorax, controlling the primary centres in the ganglia. Working with the same material, he produced (1915) experimental support that the gill membrane represents a passive diffusion barrier. *(Abstracter's note*: The list of literature cited is omitted and reference is made to the bibliography in the author's book, Principles of insect physiology, Chapman & Hall, Londen, 1972).