

(O.P.-Cambridge, 1879); *Ent. erythropus* (Westring, 1851); *Erigone atra* (Blackwall, 1841); **E. dentipalpis* (Wider, 1834); *Gonatium rubellum* (Blackwall, 1841); **G. rubens* (Blackwall, 1833); **Hypomma bituberculatum* (Wider 1834); *Maso sundevalli* (Westring, 1851); *Micrargus herbigradus* (Blackwall, 1854); **Minyriolus pusillus* (Wider, 1834); **Oedothorax apicatus* (Blackwall, 1850); *O. fuscus* (Blackwall, 1834); *Saloca diceros* (O.P.-Cambridge, 1871); *Silometopus reussi* (Thorell, 1871); *Tapinocyba insecta* (L. Koch, 1869); *Tap. pallens* (O.P.-Cambridge, 1872); *Thyreosthenius parasiticus* (Westring, 1851); *Tiso vagans* (Blackwall, 1834); *Walckenaeria acuminata* Blackwall, 1833; *W. corniculans* (O.P.-Cambridge, 1875); *W. cucullata* (C.L. Koch, 1836); *W. cuspidata* Blackwall, 1833; *W. dysderoides* (Wider, 1834); *W. monoceros* (Wider, 1834); *W. obtusa* Blackwall, 1836; *W. unicornis* O.P.-Cambridge, 1861; ARANEIDAE: **Araneus diadematus* Clerck, 1757; *Araniella cucurbitina* (Clerck, 1757); **A. displicata* (Hentz, 1847); *Atea sturmi* (Hahn, 1831); *Cyclosa conica* (Pallas, 1772); **Gibbaranea omoeda* (Thorell, 1870); *Mangora acalypha* (Walckenaer, 1802); METIDAE: *Metellina mendei* (Blackwall, 1869); *Met. segmentata* (Clerck, 1757); TETRAGNATHIDAE:

**Pachygnatha degeeri* Sundevall, 1830; AGELENIDAE: *Cicurina cicur* (F., 1793); *Coelotes inermis* (C.L. Koch, 1855); *C. terrestris* (Wider, 1834); *Histopona torpida* (C.L. Koch, 1834); **Tegenaria silvestris* L. Koch, 1872; CYBAEIDAE: **Cybaeus angustiarum* L. Koch, 1868; HAHNIIDAE: *Hahnia pusilla* C.L. Koch, 1841; PISAUROIDAE: **Pisaura mirabilis* (Clerck, 1757); LYCOSIDAE: *Alopecosa pulverulenta* (Clerck, 1757); *Pardosa lugubris* (Walckenaer, 1802); *Trochosa ruricola* (De Geer, 1778); GNAPHOSIDAE: *Zelotes subterraneus* (C.L. Koch, 1833); LIOCRANIDAE: **Agroeca brunnea* (Blackwall, 1833); CLUBIONIDAE: *Clubiona compta* C.L. Koch, 1839; **C. diversa* O.P.-Cambridge, 1862; *Club. terrestris* Westring, 1851; ANYPHAENIDAE: **Anyphaena accentuata* (Walckenaer, 1802); ZORIDAE: **Zora spinimana* (Sundevall, 1833); THOMISIDAE: *Diaea dorsata* (F., 1777); **Xysticus cristatus* (Clerck, 1757); *X. lanio* C.L. Koch, 1824; PHILODROMIDAE: *Philodromus aureolus* (Clerck, 1757); *Ph. collinus* (C.L. Koch, 1835); SALTICIDAE: **Evarcha falcata* (Clerck, 1757); *Neon reticulatus* (Blackwall, 1853); DICTYNIDAE: *Lathys humilis* (Blackwall, 1855); AMAUROIDAE: *Amaurobius fenestralis* (Stroem, 1768); *Callobius claustrarius* (Hahn, 1831).

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BOOK REVIEW

GRODNITSKY D.L.: FORM AND FUNCTION OF INSECT WINGS. THE EVOLUTION OF BIOLOGICAL STRUCTURES. Johns Hopkins University Press, Baltimore and London, 1999, xvi + 261 pp. ISBN 0-8018-6003-2 (hardcover). Price USD 60.00.

The catching title of the book is misleading, being both too general and too restrictive. Four chapters deal with selected aspects of the structure and function of insect wings, an extensive Appendix attempts to discuss all the basic tenets of evolutionary biology concerning form and function.

The monograph is badly organized, and the chosen topics are extremely idiosyncratically conceived. The author attempts to encompass everything, from wing furrows to mechanisms of macroevolution, but does not take into account wing articulation or the approaches of developmental genetics to morphological evolution. Usually only the author's (or his Russian colleagues') hypotheses are considered well supported (though not provided in a falsifiable form), and only the facts that support favoured hypotheses are presented. There is a nice example of this on p. 84 when the author writes on the origin of wings: "...all recent and extinct aquatic insects breath with tracheal gills (emphatically, many do not – P.Š.).... This evidence (none given – P.Š.) strongly contradicts all hypotheses in which the wing originates from gills and gill-like structure, a currently popular belief in the West (italicized by P.Š.)." Is the cold war still with us?

Moreover, the book is not well balanced. Of all the wing functions only wingbeat and the resulting vorticity are covered (to be just: the reason is explained in the Preface, but nevertheless the contents of the book does not match the title), there is no glossary of wing and flight terms, but the Appendix starts with definitions of such general concepts like "taxon, evolution, adaptedness". Most author's research has been on holometabolous insects, hence other winged insects are given little

attention. The author claims in the Preface that the main problem considered by his book is the balance between ontogenetic and ecological constraints – one would expect this fascinating theme to be exploited particularly by reference to the Holometabola, but this statement does not concern the evolution of wings, but the theoretical evolutionary appendix. The author seems to have an idiosyncratic opinion of the phylogeny of higher taxa, but his views are poorly explained, e.g., p. 192: "A taxon will not become another taxon until all the constructions permitted by the morphology of the lower taxa have appeared and been tested by natural selection".

The first part of Chapter 1, *Insect Taxonomy*, was written by A.P. Rasnitsyn. It includes an abbreviated history of the supraordinal classification of insects and a list of orders and higher taxa (both extinct and extant) following Rodendorf's typified nomenclature (see, e.g., Rodendorf & Rasnitsyn, 1980), and reflects the author's views on insect classification (not commented upon hereby). For the benefit of those who have not yet met with this nomenclature and classification I include it here in decimal notation. No evidence is provided, and entognathous taxa are relegated to "hexapod myriapods". The parenthesised synonymies are either Rasnitsyn's or mine, the latter explain the meaning of some not immediately obvious names.

SCARABAEODEA (Ectognatha)

1. LEPISMATONA (= "Thysanura"): Machilida (incl. †Monura), Lepismatida
2. SCARABAEONA (= Pterygota)
 - 2.1. SCARABAEONES
 - 2.1.1. †PAOLIIFORMES: †Paoliida (= Protoptera)
 - 2.1.2. LIBELLULIFORMES (= Hydropalaeoptera)
 - 2.1.2.1. EPHEMERIDEA: †Triplosobida (= Protephemerida), †Syntonopterida, Ephemerida

- 2.1.2.2. LIBELLULIDEA (=Geropteroidea): †Eugeroptera (=Geroptera), †Meganeurida, Libellulida (=Neodonata)
- 2.1.3. CIMICIFORMES (=Paraneoptera)
 - 2.1.3.1. CALONEURIDEA: †Cnemidolestida (=Gerarida), †Blatinopseida, †Caloneurida, Zorotypida
 - 2.1.3.2. †HYPOPERLIDEA: †Hypoperlida
 - 2.1.3.3. †DICTYONEURIDEA: †Cacurgida, †Dictyoneurida (=Palaeodictyoptera), †Mischopterida (=Megasecoptera, Archodonoata), †Diaphanopterida
 - 2.1.3.4. PSOCIDEA: Psocida, Nyrmida (=“Mallophaga”), Pediculida
 - 2.1.3.5. THRIPIDEA: Thripida
 - 2.1.3.6. CIMICIDEA (=Hemiptera): Cimicida
- 2.1.4. SCARABAEIFORMES (=Holometabola)
 - 2.1.4.1. †PALAEOMANTEIDEA: †Paleomanteida (=Miomoptera)
 - 2.1.4.1.1. SCARABAEIDEA: Scarabaeida, Stylopida
 - 2.1.4.1.2. MYRMELEONTOIDEA [sic!]: Raphidiida, Corydalida, Myrmeleontida, †Jurinida (=Glosselytrodea)
 - 2.1.4.3. PAPILIONIDEA (=Mecoptera): Panorpidia (incl. †Paratrachoptera, †Paramecoptera), Phryganeida, Papilionida, Muscida, Pulicida
 - 2.1.4.4. VESPIDEA: Vespida
- 2.2. GRYLLONES (=“Polyneoptera”)
 - 2.2.1. BLATTIDEA: †Eoblattida, Blattida, Termitida, Manteida
 - 2.2.2. PERLIDEA: Grylloblattida (incl. †Protorthoptera, †Paraplecoptera, †Protoperlaria), Perlida, Forficulida (incl. †Proteolyptoptera), Embiida
 - 2.2.3. GRYLLIDEA: Gryllida, Phasmatida

All the other parts of the book are written by Grodnitsky. First he strives to classify the kinematics of insect flight using the following criteria: Morphological and functional four- or two-wingedness, wing coupling, leading wing pair, and in-phase and anti-phase strokes. This is the most interesting part of the book for a general entomologist, although there are some obvious taxonomic and structural gaps in the comparative treatment.

The next chapter *Wingbeats and Vorticity* is probably the most authoritative; it is a review directed at specialists in the

field of aerodynamics. However, I feel that such a topic should have included not only biomechanics but also the functions of the wing articulatory apparatus, muscles, and sense organs.

The penultimate chapter is called *Evolution of Flight in the Insect Orders*. It does not suggest, in spite of its title, an independent evolution of flight in insect orders, but rather attempts to be anagenetically comparative. There are many interesting generalizations, particularly concerning flight and thermoregulation, conflicts between diverse functions performed by wings, and functional anteromotorism in contrast to posteromotorism, but they are spoilt by incomplete and sometimes incorrect information on individual orders.

The extensive last chapter *Problems of Endopterygote Insect Wing Functional Morphology* is a badly organized treasury of facts and original ideas. I particularly appreciate the attention paid by the author to features like folds, furrows, fractures, etc., usually too superficially treated in other treatises on wing functional morphology. However, there is no attempt to organize the material comparatively, and the chapter terminates with the rediscovery of the concept of preadaptation (=exaptation) called here *proto-adaptation*.

I refrain from commenting on the Appendix called *Form and function: A Review of General Concepts* despite its many merits and shortcomings as it deals with general evolutionary biology rather than entomology. The book ends with fifty two pages of references (including all the Russian literature, only a fraction of which is known abroad).

Summarizing: The book is badly written and organized, is strikingly incomplete and not well balanced, but nevertheless indispensable to insect morphologists trying to cope with wing structure and, in particular, wing function. Lack of editorial guidance is obvious.

REFERENCES

- RODENDORF B.B. & RASNITSYN A.P. (eds) 1980: *Istoricheskoe razvitie klassa nasekomykh [Historical Development of the Classe Insecta]*. Nauka, Moscow, 270 pp. (in Russian).

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