Book reviews

A close up on aquatic insects

Wichard, W., Ahrens, W. & Eisenbeis, G. 2002: Biological Atlas of Aquatic Insects. — Apollo Books, Stenstrup (Denmark). 338 pp. 490 DKK.

This book is a revised and translated version of the German original published in 1995. The first impression is excellent. On the front cover a sample of the core of the book — spectacular electron micrographs — is lined up in an attractive layout; the feel (weighty!) is promising.

The text is primarily a translation, but many references have been added since the original edition. The book follows a systematic structure covering 12 insect orders whose representation is fair with respect to their diversity in aquatic environments. The basic design is openings with text and diagrams treating an area of focus, such as "The mode of life of…" or "Respiratory adaptations in..." on the left hand side and a set of micrographs to the right supporting the text (in most cases). The quality of the micrographs is superb.

There are generally six (rarely more) micrographs per opening. They depict overviews of an insect as well as vital parts with close-ups on particularly interesting details. The selection of details shown reflects the authors' interests. I see no problem with such an approach but other authors might have shown very different images! Of particular interest to the authors are obviously morphologies associated with various physiological functions, notably respiration, osmoregulation and respiration. However, other areas, such as food acquisition and oviposition, are also well represented. Only rarely are morphological traits, such as anti-predator adaptations (e.g. body spines) or those associated with mating, touched upon. Most examples come from European insects but there are also some American ones. Any person with an interest in aquatic insects must be thrilled by seeing their organisms at a resolution they rarely encounter. I saw many details other than the physiological ones pointed out in the text that arose my curiosity, and I have no doubt that this book would be the perfect basis for generating hypotheses of relevance for e.g. aquatic insect behaviour. Frequently, I found no mention in the text of a depicted structure, which perhaps is irritating for some readers, but might stimulate thinking in others.

There is an index to the scientific names but I miss a taxonomic overview; many names are given and a reminder of where in the system a mentioned species belongs would have been helpful even for a professional biologist.

Generally, the book is well produced and there are only few printing errors. Sometimes the text is, in my opinion, overly dry and overloaded with technical terms. A glossary would have made an important improvement of the book. Often, however, explanations could have been given in parentheses (sometimes they are) or more simply, the terms could have been avoided altogether. The language of this book clearly addresses professional biologists. This is regrettable, since the book represents a veritable gold mine of information for both laymen and biologists. Nevertheless, the text often describes complicated processes well, albeit in a highly technical way. Occasionally, the style gets more informal as is the case in the explanation of the functioning of the dragonfly mask (labium, i.e. lower lip), which is described as being ejected "lightening fast" to capture prey. The text also provides a vivid explanation as to why backswimmers swim upside down. Sometimes there are short useful texts summarising a trait in a taxon like the "Breathing organs of the aquatic Diptera pupae".

One example of a functional mechanism is the jet propulsion in aeshnid odonates. In these, pressure changes are caused by the coordination of muscles in the abdominal wall and rectum and the presence of a valve which can be open partially. When the opening is merely 0.01 mm^2 water can be expelled at a high rate (230 mm/s) generating a rapid forward thrust. Yet, albeit interesting, this account of a behaviour does not use any of the micrographs which are entirely reserved

for external structures. Often text and illustrations match better, e.g. concerning stridulation (sound production). For example, I enjoyed reading about the 'squeak beetle' (*Hygrobia hermanni*) and to see its 'instrument'. Sound signals are often believed to function both to ward off intruders or to warn, although these assumptions are rarely tested. The description of the life of the wasp *Agriotypus armatus* parasitising the pupa or prepupa in the caddis family Goeridae is also very interesting. The parasite does not kill its host until the fourth instar. As long as the pupa is alive, it creates a flow of oxygen-rich water which suffices also for the parasite, but after the pupa has been killed the wasp constructs a characteristic 10–30 mm 'breathing ribbon' to enable respiration inside the case. Interesting couplings between structures and behaviour can be found in many Trichoptera. For example, the glands under the pronotum (the dorsal surface of the sclerite of the first thoracic segment) of *Apatania* larvae contain fatty acids that are used to ward off predacious insects such as larvae of *Isoperla* and of *Rhyacophila*. Frequently, the respiratory organs are bizarre, as the gills of Blephariceridae (Diptera) whose larvae move over smooth rock with suckers, and the plastron of mosquito pupae. I was fascinated by the mating of the marine midge *Clunio marinus*: for example, how a specialised genital organ in the male is used to open the female pupal cocoon like a can opener. I was also impressed to read that larvae of Ephydridae (Diptera) are capable of living not only in hot (40° C) and saline waters, but also in petroleum springs. The micrographs showing a dense cover of diatoms on the larval breathing tube and the pupa of this insect makes one wonder why some insects have such growths while most do not.

The diagrams often use the original German abbreviations and could easily have been adapted to English. The title of part 2 (most of the book), "Systematic of Aquatic Insects", is misleading as it does not relate to systematics, only that the order is systematic. There is a number of inconsistencies, e.g. it is claimed on p. 18 that the Ephemeroptera subimago is infertile, whereas on p. 34 it is the female subimagos of *Dolania americana* that mate. Maybe *Dolania* provides the exception that confirms the rule? Why are the spines in *Baetisca* (a mayfly) not mentioned as potential anti-predator devices? In the dragonfly *Leucorrhinia dubia* they are mentioned (and shown in excellent figures), but references to the detailed reporting on significance and plasticity of abdominal spines existing for this particular species are missing. The retractile gills of *Taeniopteryx* are not located between the head and the first thoracic segment but on the basal segment of each leg (coxa). Pygmy backswimmers are said to hunt small planktonic crustaceans and 'other small insects'. A phylogeny diagram showing the relationship between various Planipennia is difficult to understand as no explanation to the graph is presented. In the matching plate the legend to the inset is in the wrong place. The statement that anal papillae appear dark from silver precipitation in Fig. 8–22 is a bit strange as it is a drawing, not a photograph. References to plates are sometimes incorrect (e.g. p. 204). The text on the habitats of moths is confusing. Of the 11 European species only the five Central European ones are named. These are classified as habitat specialists with respect to host plant. After this we learn that the ovipositing females of one species may have difficulty in distinguishing between the water surface and *Potamogeton*. Suddenly this species is capable of accepting five different host plants. Sometimes further illustrations would have been necessary, as regards e.g. the case of *Helicopsyche* (a caddis) which spirals like a snail shell. According to the authors, the shape can be of two types, one 'helicelliform type' resembling the terrestrial snail *Helicella*, the other 'baikaliform' resembling the Lake Baikal snail endemic *Baikalia*. As I am neither familiar with terrestrial snails nor Baikal endemics this text was not much help to me, so illustrations would have been helpful here. The food of psychodid (Diptera) larvae is described as 'dirt particles' — perhaps an anthropogenic way of describing what ecologists would call 'fine particulate organic matter'? The spectacular behaviour of females of athericid flies to aggegate in clusters over running water is also mentioned (and illustrated with Wesenberg-Lund's illustration from 1943). It is claimed that the larvae feed on their dead mothers. This statement has been challenged by Itämies *et al*. (1990) who failed to find any signs of *Atherix ibis* females, dead in clusters, having been eaten. The question thus still remains open: why do females of these insects aggregate and form clusters in

which they die at the time of oviposition? Finally, we learn that syrphid flies live on 'fenmul'. I am not sure what that is, but given the variety of other food sources mentioned they appear omnivorous.

Despite the above criticism with regard to the text, small errors and slips, I wholeheartedly recommend this book to anyone interested in the biology of aquatic insects. The picture material is excellent food for thought and presents an exciting perspective on aquatic animals. The price is reasonable given its extent and high quality illustrations.

References

Itämies, J., Kuusela, K. & Räinä, P. 1990: Records of *Atherix ibis* in Finland (Diptera, Athericidae). — Entomol. Fennica 1: 113–117.

Björn Malmqvist

Insects on the move

Woiwood, I. P., Reynolds, D. R. & Thomas, C. D. 2001: Insect Movement: mechanisms and consequences. CABI-Publishing, Wallingford, Oxon (U.K.) and New York (U.S.A.). 458 pp.

I must admit that when I first flicked through the pages of this book, I felt a bit cheated. The title promised information on biomechanisms of insects on the move and I expected to find examples on actions and reactions of insect muscles during digging, jumping, swimming, and flying. I hoped to learn something about insect tendons, joints, and the way movement was controlled centrally. But almost none of that is in this book. Yet, upon reading the chapters one by one, I began to get more and more captivated by the excellent writing.

The 19 chapters, written by 39 authors, fall into six categories. Largely focusing on flying insects (the two exceptions being the migrations of army ants by N. R. Franks in chapter 13 and the individual-based models presented in Chapter 14 by N. F. Britton, G. P. Boswell and N. R. Franks), flight mechanisms and reasons to migrate as well as consequences of such migrations are being explored. The articles cover a broad range of topics, but the sequence in which the topics are presented is very well chosen. As is nowadays inevitable, and indeed a requirement for a publication that wants to be called "comprehensive", this book ends with two chapters on genetics and consequences of global warming.

As the three editors explain in their Introduction and Overview chapter, the book is based on scientific presentations given at the 20th Symposium of the Royal Entomological Society on 'Insect Movement' held in London during September 1999. The only previous symposium that had had a similar theme, namely 'Insect Flight', took place in 1973. Chapters 2, 3 and 4 by R. Dudley, R. J. Wootton, and G. Goldsworthy & M. Joyce, respectively, are neatly providing the connection to the earlier symposium in that they are occupying themselves with the basic mechanics and functional diversity of flight, the still hotly-debated topic of the evolutionary origin of flight, and the physiology and endocrine control of flight.

The behavioural patterns of insects associated with resource finding, host location strategies, and flight trajectory observations on foraging insects, using radar, form the next group of articles. They, too, almost exclusively involve flying insects, but nevertheless make fascinating reading. Each chapter has been thoroughly researched and frequently more than 100 articles, most of them recent, are being cited by the various authors. Wilf Powell & Guy Poppy (chapter 6) are no exception, demonstrating that host location by parasitoids is a field that has begun to attract a lot of interest from insect physiologists and applied entomologists. The well-known 'radar entomologists' J. R. Riley & J. L.Osborne examine flight paths of bumblebees, honeybees, and moths and show that insects can compensate for sideways drift and honeybees improve navigational skills through learning. Passive transport by wind, water, or phoresis is not ignored and 'vegetative movements' are distinguished from true migration in chapter 5 by J. Hardie *et al*. The terms 'dispersal' and 'population redistribution' receive a thorough examination a little later in chapter 12 by W. W. Weisser.

In some ways the 'centrepiece' of all that research on insect movements, namely the 'evolution of migratory behaviour', is tackled by H.

Dingle in chapter 8 with emphasis on wing polymorphism. Orientation mechanisms, used by migrating insects, are reviewed in chapter 9 by R. B. Srygley and E. G. Oliveira and well-illustrated examples, but actually termed "preliminary findings" by authors V. A.Drake *et al.* in chapter 10, show how migrations in two Australian species, the plague locust *Chortoicetes terminifera* and the budworm *Helicoverpa punctigera*, can be characterized. Using wing-dimorphic planthoppers R. F. Denno *et al.* examine how habitat structure and the need to maximize reproductive success affect the ability of flight. Another variable, predation, is added to the discussion of dispersal by W. W. Weisser in chapter 12. To study movement patterns of individuals and populations, army ants are extraordinarily useful insects as N. R. Franks (as a single author) demonstrates in chapter 13 and, together with N. F. Britton and G. P. Boswell, elaborates upon with the aid of models in chapter 14.

Migrations lead to gene flow (the topic of chapter 16 by J. Mallet) and genetic diversity, examined in butterflies by H. D. Loxdale and G. Lushai in chapter 17. The book concludes with two very timely chapters on butterflies as indicators of global warming. C. Parmesan in chapter 18 gives wonderful examples, suggests implications for future work, and does not forget to mention that over the past 30 years *Carterocephalus palaemon* has become extinct in the southern parts of both the UK and Finland.The final chapter by J. K. Hill *et al.* provides an excellent summary of the changes that have already occurred in the distributions and abundances of butterflies in Britain over the last 200 years.

In terms of its coverage, the way the chapters are arranged and recent literature has been cited, I find this book one of the best texts I have read in years. It immerses the reader in the problem of insect flight and wing evolution; it informs the reader on orientation mechanisms, on the many causes as well as consequences of insect migrations and it has the 'finger on the pulse' with regard to gene flow and changing global climates. If only it had had some more exciting illustrations, but nevertheless, for the serious entomologist with ecological, ethological, or physiological interests this book, even for a price of £70.00, is a 'must'. I higly recommend it.

V. B. Meyer-Rochow

Spanish ground-living longhorn beetles

Romero Samper, J. 2002: Iconografía del género *Iberodorcadion*. — Argania editio (Barcelona), 192 pp. Price 105 Euros.

From a North European perspective the family Cerambycidae is typically recognized as a consumer of wood — the few species whose larvae live in herbaceous plants are seen rather as odd outsiders. Yet somewhat further south we already encounter a large group with a different way of life. The tribe Dorcadionini, with several hundred species ranging from Morocco and Portugal in the west to China in the east, is characterized by flightless species, feeding both as larvae and as adults on grass roots. Some of the species vary to a high degree, a fact that can be recognized from the large number of synonyms and variety names found here. Being flightless, these beetles are rather poor dispersers, and a lot of the species are restricted to quite small areas.

Most of the Dorcadionini have generally been included in the large genus *Dorcadion*, in which several subgenera have been recognized. Recently the subgenus *Iberodorcadion* has occasionally also been considered a separate genus — an arrangement not based on a total overview of the traditional *Dorcadion*. A decision on the final status will obviously demand a phylogenetic analysis.

Still, *Iberodorcadion* appears to be a natural group. It is mainly found in the Iberian peninsula, with a few species reaching on one side North-West Africa, on the other southern Germany. Lately there has been considerable work on this genus/subgenus.

As in other Dorcadionini, there is much intraspecific variation in *Iberodorcadion*. This new book by Jesús Romero Samper purports to present the variation for the included species. There is an illustration of every species, and for most species numerous varieties; occasionally more than thirty such different colour forms. In the preface the author states that he does not in-

tend the book to be a systematic treatment, accordingly the arrangement of the species or subspecies is based on recent revisionary work, and there is an extensive bibliography, where such papers can be found. Occasionally experts disagree, and Romero does not generally explain why he chose one over the other.

Some of the species are widely distributed, others are restricted to a small area. Although Romero does explain in the text where they are found, distribution maps would have been a great aid to the reader. Many of the recognized species have two or more subspecies. In some cases we get an indication on where the different subspecies live, but in many other cases there is no information whatsoever on this rather essential matter.

For every illustrated specimen we get information on the collection from which it came. What we do not get is any information on the original locality for the specimen in question. Seeing a number of highly polymorphic species, the obvious question is whether the variation is geographical or individual, and in what proportions the individual varieties occur in different areas. By just giving this information Romero could have made his book a valuable taxonomical contribution. Unfortunately he did not, and although his book can raise much interest in a remarkable group of beetles, it leaves a lot of questions unanswered.

Hans Silfverberg