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BOOK REVIEW

THORP J.H. & ROGERS D.C. (eds) 2015: ECOLOGY AND GENERAL BIOLOGY. THORP AND COVICH'S FRESHWATER INVERTEBRATES. Vol. 1. 4th ed. Academic Press, Elsevier, Amsterdam, Boston, Heidelberg, London, New York, Oxford, Paris, San Diego, San Francisco, Singapore, Sydney, Tokyo, 1118 pp. ISBN 9780123850263 (Print Book), 9780123850270 (eBook). Prices: Print Book + eBook: EUR 210.95 (currently reduced to EUR 126.57); Hardcover EUR 118.00; eBook EUR 92.95.

Thorp and Covich's Freshwater Invertebrates is an ambitious publication, which is planned to consist of nine volumes on the inland water invertebrates of the world. The first volume reviewed below is on the general biology and ecology of invertebrates. Eight other planned taxonomic volumes will contain both more detailed keys for identifying the invertebrates in particular zoogeographic regions and details of the anatomical features needed to use the keys.

But let's come to the published "first swallow" of this planned series. The first edition of Thorp and Covich's book titled *Ecology and Classification of North American Freshwater Invertebrates* was published in 1991. The second and third editions followed in 2001 and 2010, respectively. The book being reviewed is the fourth edition and differs from the previous editions as it is a comprehensive revision and expansion of the previous edition and now deals with the ecology, biology and fauna of invertebrates worldwide. This voluminous book includes six sections and forty one chapters, written by more than eighty American, European and Australian experts on aquatic invertebrate ecology, taxonomy and biology of each invertebrate group. It includes not only discussions on invertebrate ecology and general biology, but also information on phylogeny, invasive species, collecting and culturing techniques, and identification keys to higher taxonomic levels. It is designed as a standalone book independent of the rest of the planned series.

The first two sections present an overview of freshwater inland ecology and freshwater invertebrates and included in the six chapters in these two sections are general environmental issues that are common to many invertebrates. The first section, "*Introduction*" (three chapters), introduces the reader to the study of freshwater invertebrates. It explains the importance of the species concept and the role of phylogeny in understanding the ecology and behaviour of invertebrates and provides high quality information on collecting, preserving, and culturing freshwater invertebrates and surveying inland water habitats. The second section, "*General Ecology and Human Impacts*" (three chapters), presents the principles of water ecology, ecology of invasive non-native invertebrates, and also deals with the economic and health aspects of freshwater invertebrates.

Other sections are devoted to special groups, not only invertebrates but also Protozoa. The third section titled "*Protozoa to Tardigrada*" (eleven chapters) includes free living protists, freshwater Porifera and Cnidaria, Platyhelminthes, Nemertea, Gastrotricha, Rotifera, Nematoda (or Nemata), Ectoprocta and Entoprocta, and Tardigrada. The fourth section "*Phyllum Mollusca*" (two chapters) includes various aspects of Gastropoda and Bivalvia diversity, biology, ecology and conservation. The fifth section "*Phylum Annelida*" (four chapters) includes freshwater "Polychaeta", Oligochaeta, Branchiobdellida, Hirudinida and Acanthobdellida. The last sixth section "*Phylum Arthropoda*" (eighteen chapters) consisting of nearly six hundred pages is the most extensive part of the book. In this section, issues concerning individual subphyla are discussed with particular reference to the following special groups of freshwater arthropods: Chelicerata – spiders and mites; Myriapoda – millipedes; Crustacea – classes Branchiopoda, Maxillopoda, Ostracoda, Malacostraca (superorders Peracarida, Syncarida, and the order Decapoda); Hexapoda – classes Collembolla and Insecta (orders Ephemeroptera, Odonata, Plecoptera, Hemiptera, Trichoptera, Coleoptera, Diptera, and "minor insect orders" – Megaloptera, Neuroptera, Blattodea, Hymenoptera, Lepidoptera, Mecoptera and Orthoptera, of which there are only a few species in freshwater habitats).

The editors of this comprehensive treatise had to resolve at least two important problems: (i) the shared features of the structure of individual chapters dealing with different animal groups, and (ii) taxonomic level and classification of the different groups. Editors and authors of the first volume of "*Thorp and Covich's Freshwater Invertebrates*" have resolved these problems for the benefit of readers. Each of the "taxonomic" chapters contains subchapters "Introduction", "General Biology", "General Ecology and Behaviour", "Collecting, Culturing, Specimen Preparation" and "References". Naturally, the size of the remaining subchapters is variable and dependent on the size of a particular phylum, complexity of its classification and species richness. The text of the chapters dealing with individual "taxa" (protists or invertebrate phyla, respectively) cover various taxonomic levels, from phylum (e.g., Nemertea) to orders (e.g., orders of Insecta). One exception is the protists, which are presented as "Protozoa" and ordered and structured as multiple phyla or as morphological and functional units, without any reference to their phylogenetic relationships.

The book is well arranged and presented. Its text is accompanied by numerous drawings, photographs, schemes and tables. All chapters start by presenting a transparent and graphically highlighted "Chapter Outline". Attached are extensive subject and taxonomy indices.

Without question, this book is a huge undertaking. It is an important and quite unique contribution to the comprehensive monographs dealing with the biology and ecology of water invertebrates. Nevertheless, it is possible to find a few weak features in this otherwise praiseworthy book. This review is not the appropriate place for a detailed analysis, but can be used to present some examples: (1) some significant papers and books dealing with the biology, ecology and phylogeny of water invertebrates published after 2010 are not cited in the book*; they are cited below in References; (2) there are some errors in the captions of

* For instance, Lancaster & Downes (2013), which is not cited in chapter 33 ("Hexapoda – Introduction to Insects and Collembola"). Furthermore, the last publication on water bug phylogeny cited in chapter 37 ("Order Hemiptera") is Mahner's (1993) study, whereas the later papers of Hebsgaard et al. (2004), Hua et al. (2009), Li et al. (2012), and Damgaard (2008) are ignored. Naturally, Brožek's (2014) phylogenetic study is probably omitted because it was published at the same time as the book reviewed.

some of the figures or figure plates*; (3) some analogical chapters are not utterly well-balanced**.

The first volume of *Thorp and Covich's Freshwater Invertebrates – Ecology and General Biology* provides a really good source of information on the biology and ecology of free-living protists and freshwater invertebrates**.** It is a comprehensive source of information for all those interested in the biology of these freshwater organisms. This book is a helpful guide and/or textbook for students of hydrobiology, aquatic ecology, invertebrate zoology, professional scientists and nature conservationists. I recommend it as valuable reading for everyone who needs to develop a more detailed world-wide understanding of freshwater invertebrates.

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* For instance, Fig. 33.5 with caption: "Ventral air bubble in the backswimmer *Neoplea* (Heteroptera: Pleidae)." Correct common name used for species of the family Pleidae is pygmy backswimmers. Drawings b) and c) in this figure do not have captions.

** For instance, chapter on Coleoptera is unlike the chapters on other insect orders as it includes a survey of families, which the chapters on other insect orders do not.

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