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BOOK REVIEW: MITES OF FRESHWATER MOLLUSKS BY EDWARDS D.D. AND VIDRINE M.F. 2013

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MITES OF FRESHWATER MOLLUSKS. EDWARDS, D.D. AND VIDRINE M.F. 2013

Water mites of the genus *Unionicola* (Hydrachnidia: Unionicolidae) are symbionts of freshwater mollusks and sponges, occurring on every continent except Antarctica. In part of their lifecycle the mites themselves are parasites of chironomids, while the mussels depend for their reproduction on fishes. Dale Edwards and Malcolm Vidrine spent a lifelong scientific career studying these mites. The first publication of Vidrine appeared as far back as 1973, the first publication of Edwards in 1988. All known information on these mites is now summarized in a self-published book. The 9 chapters deal with topics like biogeography, classification, mussel-mite interactions, coevolution and phylogenetics. Eight of the chapters present a lot of existing material, but the chapter on phylogenetic relationships provides a lot of new information. The book ends with seven appendices, where all information on the known species and subgenera of *Unionicola* can be found, as well as a list of the known higher taxa of freshwater mussels, snails and sponges which are known as host for *Unionicola* mites. Three genera are known as symbionts of freshwater molluscs, e.g. *Dockovdia*, *Najadicola* and *Unionicola*. The former two genera are symbionts of snails in Africa and freshwater mollusks in Asia, respectively, but they do not belong to the Unionicolidae. The freshwater fauna of North American mussels is extremely rich. Not only in number of species but sometimes in number of specimens as well. Mussels are occasionally so abundant that they form reefs, comparable with coral reefs. Unfortunately, freshwater mussels and their reefs are endangered and threatened in North America by changes in hydrology and pollution, which affect their mites also.

The subgeneric classification of the genus *Unionicola* has been altered considerably by the publications of these authors, especially by the publications of Vidrine. Karl Viets (1956) and later on Cook (1974) discerned eight subgenera, but the number of subgenera now tallies an astonishing 57 subgenera. Mitchell (1965) noted that oviposition sites within mussels are limited, and that varied mites have distinctive genital fields that are adapted for oviposition in varied tissues. This led Vidrine to use the genital fields for subgeneric classification in a large number of papers. However, this subgeneric classification has led to debate among acarologists. Hev-

ers (2010, 2012) stated that this subgeneric classification is an oversplitting, lacking a phylogenetic basis. Therefore, Hevers sticks in his publications to the old system of Cook (1974), but some of the "old" subgenera are surely of paraphyletic origin. In most cases the new subgeneric classification used by Edwards and Vidrine lacks a phylogenetic basis. In their opinion each subgenus is a working hypothesis and they cite two publications which confirm the justification of the splitting of one subgenus in two subgenera. However, for most subgenera such data (especially molecular data) are lacking. In appendix 3 the authors give a diagnosis of the genus and subgenera, but a large omission in the book is that a key to the subgenera is lacking.

Unionicola species are free-swimming, or associated with bivalves, gastropods or sponges. Within the bivalve-associated species, there are gill mites and mantle mites. The symbiosis of mussels and mites provides an interesting opportunity to study the coevolution of these species and the authors summarize all known data on their interactions . Unfortunately, much information on the nature of this relationship is lacking. Also, geographically large areas have been insufficiently studied. In addition, this study is hampered by the fact that there is no consensus on the evolutionary history for freshwater mussels.

In the chapter on phylogenetic relationships new data are presented. The results of several studies are congruent in that gill mites are of monophyletic origin. The authors constructed several trees based either on molecular data or on morphological data, but unfortunately these trees are not congruent. The authors state that a molecular approach would give the best result to unveil the phylogeny. This implies collecting a lot of new material, as water mites are normally not fixed in ethanol, but in so-called Koenike fluid, which makes molecular research impossible. Morphological methods do not have this problem, but not all morphological characters are phylogenetically reliable.

The book of Edwards and Vidrine is of interest to both acarologists and malacologists. Many of their proposals must be considered as hypotheses, and this gives researchers ample opportunities for further research.

Mites of freshwater mollusks. Edwards, D.D. and Vidrine M.F. 2013. ISBN (paper) 978-0-615-83471-9. Prize $50 (international shipping $20 added), and can ordered at Amazon.com or at Paypal to malcolmvidrine@yahoo.com.

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