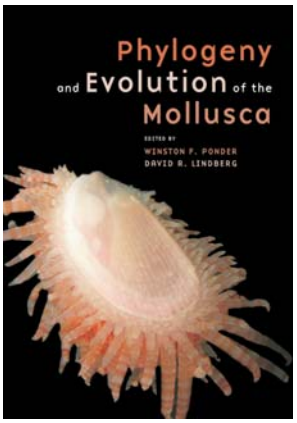
Book review

*Acta Palaeontologica Polonica* 54 (1): 110, 2009




# Mollusca: A state-of-the-art summary

**Winston F. Ponder and David R. Lindberg (eds.) 2008. *Phylogeny and Evolution of the Mollusca*. 469 pp. University of California Press, Berkeley–Los Angeles–London. ISBN 978-0-520-25092-5; Price USD 49.95.**

The book contains 17 chapters, written by 36 authors: (1) Molluscan Evolution and Phylogeny: an Introduction; (2) Relationships of Higher Nolluscan Taxa; (3) The Early Cambrian Radiation of Mollusca; (4) Solenogastres, Caudofoveata and Polyplacophora; (5) Monoplacophora (Tryblidiida); (6) Bivalvia; (7) Scaphopoda; (8) Cephalopoda; (9) Gastropoda: an overview and Analysis; (10) Paleozoic Gastropoda; (11) Patellogastropoda, Neritimorpha, and Cocculinoidea: the Low-Diversity Gastropod Clades; (12) Vetigastropoda; (13) Caenogastropoda; (14) Heterobranchia I: the Opisthobranchia; (15) Heterobranchia II: the Pulmonata; (16) Molluscan Evolutionary Development; (17) Molluscan Evolutionary Genomics.

The Mollusca, with more than 150,000 known Recent species (the number that only the Arthropoda surpass) coupled with the extremely rich fossil record (about 70,000) dated from the early Cambrian (or, rather, Upper Proterozoic), are at the same time incomparably morphologically diverse. For more than a century ago it has been obvious that the shell and other hard parts are not sufficient for the reconstruction of phylogeny and evolutionary processes within the group. However, as there are hardly any other data available in the fossil record, the palaeontologist's interpretations are often incompatible to neontologist's ones. On the other hand, the soft parts provide a rich character set, which at the same time abounds in parallelisms, convergences and reversals rendering the group very prone to horizontal classification. Recently, molecular data have been more and more widely used enabling many questions to be answered. Notwithstanding the progress they made possible, we are aware that the molecular data cannot solve all problems. Anyway, there has been a big progress in understanding the molluscan phylogeny and evolution during the last two decades. The integrative approach that tries to combine all the palaeontological and neontological morphological data, molecular data, as well as genetic and evolutionary developmental studies, has brought about a much better understanding of the pattern and processes. This book summarizes all those data and displays both the present state-of-art and gaps in knowledge that inspire future studies.

This integrative approach prevails in all the chapters. However, given the diversity of the Mollusca, and as many as 36 contributors, various groups are treated in a somewhat different way. The relationships of the higher molluscan taxa are just briefly outlined. It is clear that in spite of the recent progress in the field, the accumulation of molecular data, the data on morphology and fossil record, the relationships of the Mollusca, as well as the relationships within the phylum remain obscure. The chapter on the early Cambrian radiation of the Mollusca, containing many data not widely known among malacologists, is probably one of the most interesting. It extensively reviews and summarizes the most recent data on the subject, and documents the progress in our understanding of the relationships of the Coeloscleritophora, as well as the early Cambrian Conchifera. However, in my opinion, some reconstructions of the soft part morphology are not convincing. An example can be the helcionelloid "torted" and "untorted"—the latter with a mantle cavity situated anteriorly, above the head, to say nothing on the intestine vs. oesophagus arrangement typical of a torted gastropod.

The Aculifera are treated briefly, but the text is rich in information. Unfortunately, in spite of all the new data on morphology, fossil record and molecules, we cannot yet solve the questions of either relationships between the Aculifera and Conchifera, or within the Aculifera; even the monophyly of the latter remains doubtful. There is a very short chapter on the Monoplacophora, in which just a few major questions are dealt with. Among them, convincing arguments against the metamerism in the early Mollusca are summarized; the same conclusions can be found in the chapter on evolutionary development. Bivalvia—the second class of the Mollusca considering species number and diversity (morphological and ecological)—are, in my opinion, treated too briefly; anyway, the main problems of their phylogenetic classification and an outline of their classification based on the present state-of-art are given. Similar remarks concern the Scaphopoda and Cephalopoda; for the latter, the Palaeozoic groups are also included.

Nearly a half of the book: 226 pages, and seven chapters, is devoted to the Gastropoda. Given the possible mechanism of the phylogenetic torsion—the way of origin of the class—as well as all the known fossil record, one may suppose that the group may be not monophyletic because torsion may have happened more than once in the Early Cambrian. Thus the diphyletism of the Gastropoda, as inferred from the molecular data, is interesting but certainly not much surprising. So, the monophyly of the group as a result of simultaneous analysis of combined morphological and molecular data is not convincing as an argument for the superiority of simultaneous analysis of the combined data in the long lasting methodological discussion. We have rather to conclude that the Gastropoda are most probably not monophyletic. A separate chapter describes the Palaeozoic Gastropoda: their diversity, main evolutionary processes and the origin of the main gastropod lineages. For more than two decades we have known that Thiele's classification of the "Prosobranchia" (Archaeogastropoda, Mesogastropoda, and Neogastropoda) was horizontal, but only recently the accumulated knowledge and understanding have made it possible to try to infer relationships that are more close to the real phylogeny. They are outlined in this book. A separate chapter describes the Patellogastropoda, Neritimorpha, and Cocculinoidea, lineages that are old and distinct though not rich in representatives. In particular, the Patellogastropoda remain enigmatic. Their morphology is a combination of primitive characters shared with the Monoplacophora or even Polyplacophora, and advanced autapomorphies. The whole pattern suggests a lineage that has been evolving separately from the very beginning of the Gastropoda, but this is in conflict with the fossil record, as their first representatives verified by shell microstructure are not known before the Triassic. Separate chapters are devoted to the Vetigastropoda, Caenogastropoda, Opisthobranchia, and Pulmonata, each.

The book should be accessible in any zoological or palaeontological library, and is necessary for any malacologist working on evolution or taxonomy.

*Andrzej Falniowski [faln@zuk.iz.uj.edu.pl], Zakład Malakologii, Instytut Zoologii, Uniwersytet Jagielloński, ul. Ingardena 6, PL-30-060 Kraków, Poland.*