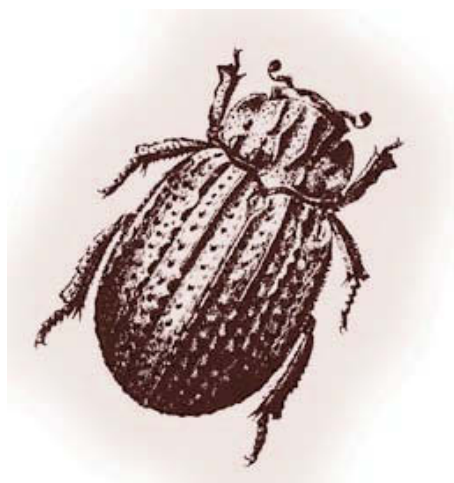


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AN UPDATED CLASSIFICATION OF THE RECENT CRUSTACEA

By J. W. Martin and G. E. Davis

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Crustaceans are a group of immense taxonomic richness and morphological diversity. There are an estimated 52 000 named species, but estimates for particular groups such as coral-reef peracarids exceed this number. The ‘real’ number of species is perhaps unimaginable at this point, and there is a huge flow of publications documenting new taxa. For the past twenty years the standard reference to classification of the Crustacea has been that of Bowman and Abele (1982). Over this period both minor and major changes (e.g. the Pentastomida accepted as maxillopodan crustaceans) have been made to that list of taxa. That publication can be regarded as the final classification of the era that preceded the acceptance of cladistic phylogenetic taxonomy into the world of crustacean taxonomy and it also predated the now ever-increasing use of molecular taxonomy to resolve many of the seemingly intractable debates, such as that over the monophyly (or otherwise) of the ‘Mysidacea’. There has been a wealth of additions and rearrangements since 1982, and the start (well, close to the start) of the 21st century seems a particularly appropriate time for publication of this volume.

At the closing of this text in 2001, a further 197 families had been added to those accepted by Bowman and Abele (1982) (849 families are now listed). As the authors comment, a ‘more compelling reason’ for presenting the classification is the existence of several non-congruent classification systems resulting from recent phylogenetic research. The authors are well aware that there are several works in progress that will result in further changes; for example, Gary Poore and Angelika Brandt presented a paper at ICC5 in Melbourne reassessing some of the isopod suborders, which, when published in full, will dismantle and reassemble the order Flabellifera (use of this category has already been dropped by some), resulting in a significantly different ordinal arrangement than presented here. These forthcoming and inevitable changes do not decrease the value of this book as family names will remain much the same other than the addition of new names. This publication is already being used as a point of reference in making decisions on the spelling of family names.

The book is divided into logical sections, with an extensive sub-headed introduction covering methods, nomenclature, the role of cladistics and molecular taxonomy, sperm and larval morphology and the fossil record. The authors clearly indicate how they arrived at their

classification and the constraints under which they made their decisions. The list of contributors is extensive and an appendix provides verbatim extracts from some of the correspondence. It is very pleasing to see the detailed and fulsome acknowledgement of all who participated in this exercise. I will comment on some of these sections.

The *Introduction* is comprehensive, covering the major forces that have affected crustacean classification and nomenclature over recent years. The new edition of the ICZN is discussed and the authors strongly advocate using names that promote nomenclatural stability. In fact, it is likely that this book in itself will contribute towards stability as it is already being recognised as a point of reference for nomenclatural usage.

Cladistics and Classification. It has long seemed that crustacean taxonomists, compared with entomologists, were particularly resistant to cladistic methods, but it can be seen that such studies burgeoned in the late 1980s and the 1990s with a consequent effect on crustacean classifications at all levels. While the authors are unambiguously in favour of classifications based on cladistic methods, they are mindful that the completeness of the data be considered and ‘hesitate to make sweeping changes before all the evidence is in’, citing examples where the analyses have used subsets of data; this is something that we all need to remember, as the authors state: ‘A phylogeny is not correct simply because it was generated using cladistics’. This section provides a nutshell summary of the key contributions in this area. *Molecular Systematics*, *Developmental Genetics* and *Spermiocladistics* are all succinctly discussed, and their critical influence in relation to classification is assessed, most particularly the rise of molecular taxonomy from the late 1980s. Again the authors resist making major changes based on new classifications derived from incomplete data sets of sample taxa.

The *Rationale* section contains the real substance that underpins the classification. The authors, here, clearly discuss the key issues, identify areas of disagreement and explain, where necessary, why they have adopted a particular classification. Sections include: Are crustaceans a monophyletic group? How many classes are there? Which is the most primitive class? Some nomenclatural misconceptions or errors are corrected, such as the name Crustacea being correctly attributed to Brönnich, 1772, not Pennant, 1777. The basis for classification is then discussed on a class-by-class, order-by-order basis, down to superfamily in some groups, including assessment of divergent opinions. The Amphipoda demonstrate some of the problems currently faced in achieving a classification. The families of the Gammaridea—which have nearly doubled in number (from 69 to 127) since 1982—are all listed alphabetically, to the displeasure of some. Isopod classification apparently contains a greater level of conflicting opinions than do other groups, with the nett result

being that the paraphyletic Flabellifera (Gnathiidae included) is maintained. A curious point is the removal of some family names by recommendation of correspondents when these have already been dealt with in the literature, in some cases in the relatively distant past. This applies to several removals from the family list of the Isopoda and also to the elevation to family rank of the Kakaducaridae.

Although allusion is made to the need for phylogenetic and classificatory improvements for many crustacean taxa, the rationale over the classification of the Caridea does seem to indicate that these generally large-sized crustaceans are perhaps the most problematic, with areas of wide disagreement and many 'artificial' taxa (such as the Bresilioidea). The several cladistic analyses authored by M. Christoffersen, which suggested substantial rearrangements of families as well as a number of new taxa, are referred to, with the observation that his suggestions have not gained acceptance for the most part. As the authors indicate, decapod taxonomists are still left using 'clearly non-phylogenetic listings'. In one of the rare instances of direct opinion, Martin and Davis do indicate that they consider that some of Christoffersen's 'employed characters are questionable'. The detailed discussion given for the Brachyura indicates that there is also considerable divergence of opinion and data for that group of Decapoda.

There are three appendices, the most interesting being Appendix 1 (even entertaining—which contributor uses the most exclamation marks? Who has the most opinion?), which includes direct quotes from contributors on diverse points of difference, even, in some cases, of conflict. These summary discussions concerning the differences of opinion between some of the contributors (e.g. Schram, Olesen and Fryer; Wägele and Wilson; Bousfield [who writes in the third person] and Lowry) with verbatim extracts from the correspondence, give valuable insight into these debates (though I wonder what the editors may have omitted). Christoffersen comments, perhaps with some justification, that his apomorphy-based classifications have been 'dismissed as totally heretical'. Why has no one responded to these proposals as first-step

phylogenetic hypotheses and risen to the challenge to reassess the data and provide alternative character-based phylogenetic analyses? *Appendix II* lists all contributors to the volume, and *Appendix III* lists other crustacean resources, a useful guide to finding out where it all happens in the world of journals, societies, newsletters, email-discussion groups and the Internet.

This book has already been, and will increasingly be, used by students, taxonomists, crustacean biologists, museum curators and collections managers throughout the world. The fact that it is well referenced means that it can be used by many as the starting resource for relevant summary information on cladistics, molecular systematics, palaeontology and other such methods and disciplines directly relevant to crustacean systematics, as well as a guide to some of the recent critical debates. In a recent email discussion on the correct spelling of isopod family names and when not to correct them, it was clear that the spellings used in this book would be widely followed, providing a position to retain accepted usage unless there are strong reasons to do otherwise.

This book is a superb effort and one with which both the authors and the scientific community can be well pleased. An added bonus is that the book is available from the Los Angeles County Museum at the relatively low price of US\$20, and anyone and everyone with an interest in the Crustacea should own a copy.

Reference

- Bowman, T. E., and Abele, L.G. (1982). Classification of the recent Crustacea. In 'The Biology of Crustacea. Volume 1. Systematics, The Fossil Record, and Biogeography'. (Ed. L. G. Abele.) pp. 1–27. (Academic Press: New York, USA.)

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