

## Short note and reviews

### Arthropods galore

John W.M. Jagt

*Natuurhistorisch Museum Maastricht, de Bosquetplein 6-7, 6211 KJ Maastricht, Netherlands*

Review of: **Crustacea and Arthropod Relationships, Festschrift for Fredrick [sic] R. Schram** [Crustacean Issues 16], Stefan Koenemann and Ronald A. Jenner (eds). CRC Press (Taylor and Francis Group), Boca Raton, FL, 2005. x + 423 pp., ISBN 0-8493-3498-5.

Volume 16 of the *Crustacean Issues* is a bit of an odd-man-out, but is bound to find a wider readership just because of that. How, then, does it differ from previous volumes? First of all, it is dedicated to Fred Schram's numerous achievements in arthropod evolutionary biology, and that of crustaceans in particular, on the occasion of his retirement. Rodney Feldmann, in his dedication, aptly sums up Schram's exploits. Secondly, the volume incorporates discussions of other representatives of the phylum Arthropoda as well, e.g. trilobites and ostracods, and in fact, goes much further than that.

With so many aspects covered, there is always the risk of producing a 'hotchpotch' volume; however, the editors cleverly grouped the fourteen contributions, all written by acclaimed specialists, into five sections (plus an introduction), under the headings 'Paleozoology', 'Development and evolution', 'Comparative morphology', 'Arthropod phylogenetics' and 'Metazoan phylogenetics'; this works well. The main theme of the volume is the evaluation of higher-level relationships within the Arthropoda, still controversial, discussing novel approaches and new techniques to tackle this issue, as well as a critical reappraisal of existing ideas. The evolutionary and phylogenetic relationships of arthropods are outlined on the basis of molecular structure, development, morphology and the fossil record. There is a good mix of 'wider-ranging' papers and those covering very specific issues, such as phylogenetic position of a particular , >500 million-year-old species, and all

are concisely written, well illustrated (SEM images and neat line drawings) and with very few typographical errors left.

The introduction, by Baron and Høeg, presents the authors' personal view of the careers of the late Stephen J. Gould and Fred Schram, and shows that both agreed on the importance of fossil data sets. In fact, Schram, as a staunch supporter of modern cladistics, invariably makes use of whatever fossil evidence is available as primary input in his analyses; in fact, 'bold ideas' appear to be the central theme in Schram's work.

Section II comprises a discussion (by Schweitzer and Feldmann) of the high survival rate (pseudoe-extinctions) in decapod crustacean families across the Cretaceous-Paleogene (K/Pg) boundary, as based on evidence mainly from the North Pacific Ocean, Central America (close to the impact site!) and the Southern Hemisphere, followed by a description (with great SEM pictures and interpretative line drawings; by Stein *et al.*) of new material of diminutive *Oelandocaris oelandica* (upper Cambrian 'Orsten', Sweden), mainly in the light of the species' feeding apparatus. It appears to be the earliest offshoot of the stem lineage of Crustacea. Next are Bergström and Hou, who focus on evolutionary steps (in two discrete patterns) leading to basal crustaceomorphs, and present an illustration of the last shared ancestor, the 'ur-arthropod'. The section concludes with an in-depth discussion (by Cotton and Fortey) of the comparative morphology and relationships of agnostid trilobites – always controversial; interestingly, new synapomorphies uniting agnostids and eodiscinids are described – although not a trilobite worker, I would say they have a strong case.

Section III starts with Scholtz and Edgecombe, who make an equally strong case for a trilobite/man-dibulate alliance, noting that these groups share a

‘secondary antenna’ and a clearly delimited head tagma. The authors pay tribute to Fred Schram and ‘his willingness to explore dangerous ideas’, which inspired their own alternative interpretation of heads, Hox and the phylogenetic position of trilobites. Next is a personal view (by Hrycaj and Popadic) on ‘how to resolve the issue of homologies of morphological traits that have traditionally been used in arthropod systematics’, calling for a delineation of entire developmental pathways in our pursuit of understanding the origins of key morphological features.

In Section IV, one particular feature, eye structure and its evolution, and its impact on arthropod phylogeny is discussed by Bitsch and Bitsch, who note that the evolution of different eye types in the major groups is consistent with the outcome of phylogenetic studies of morphology. On eye structure, the authors place Myriapoda within the Mandibulata. Next are Maruzzo *et al.*, who review appendage loss and regeneration in arthropod groups – a truly fascinating story, using personal and literature data from all groups, and with suggestive patterns discussed in the light of phylogeny and comparative development.

The next section heads off begging the question, “What are Ostracoda” (by Horne *et al.*), hinting at possible future vistas to determine whether ostracods are mono- or polyphyletic; followed by a discussion of relationships within the Pancrustacea (by Babbitt and Patel), who provide evidence to support that the Crustacea, Eucarida and Peracarida are not monophyletic, and who suggest that fossil evidence appears best to resolve deep arthropod relationships. Taking this broader theme a bit further are Carapelli *et al.*, who discuss hexapod-crustacean relationships based on four mitochondrial genes, and by Giribet *et al.*,

who use molecular loci and morphology to assess the monophyly of Crustacea, and duly note that, “Most of the current disagreement over deep divisions in Arthropoda [...] can be viewed as uncertainty regarding the position of the root in the arthropod cladogram rather than as fundamental topological disagreement as supported in earlier studies [...]”

The final word in this volume, section VI, is by Jenner and Scholtz, who respectfully ‘play around’ with the theme of monophyly of the Articulata and Ecdysozoa, and hope that their treatment of multiple alternative hypotheses is in line with Fred Schram’s views of “what good science is all about”. In fact, in expressing that wish they neatly summarise the underlying theme of this volume. It is a highly appropriate collection of thought-provoking and innovative papers (well, some more than others) which should do Fred Schram proud. The final pages are devoted to two appendices (one listing all of Schram’s publications between 1967 and 2004 (and those in press), the other comprising all taxa erected by Schram as sole author, or as co-author), a list of contributors, an index and three colour plates to go with the paper by Hrycaj and Popadic.

Type setting is neat throughout (very few typographical errors, indeed), but there is some inconsistency in American and British spelling. This aside, for anyone who is interested in current views on arthropod and/or crustacean relationships, and who does not shy away from interpretations that deviate strongly from the general views, this is a must-have volume.

Received: 9 October 2005



