

BOOK REVIEW

Bullard, Stephan G. 2003. Larvae of Anomuran and Brachyuran Crabs of North Carolina. A Guide to the Described Larval Stages of Anomuran (Families Porcellanidae, Albuneidae, and Hippidae) and Brachyuran Crabs of North Carolina, U.S.A. *Crustaceana Monographs*, 1. Koninklijke Brill, Leiden, The Netherlands. ISBN 90-04-128417. List price: EUR 79.00/US\$ 107.00.

Like all students of the Crustacea, I am always pleased to see a new vehicle for the publication of large monographs on the group. With the rising costs of publishing, most mainline journals are prevented from encouraging monographic contributions, and it seems that there is an ever-present need for ways to publish the large, useful monographs that so often define our field.

The journal *Crustaceana*, published by Koninklijke Brill in Leiden, The Netherlands, recognized this need several years ago and began plans for creating a series of small to medium-sized book-length papers or monographs that would be associated with, and overseen by, the editors and publishers of *Crustaceana*. The result of their efforts is a new series entitled *Crustaceana Monographs*.

The frontispiece of the volume describes the new series as constituting "a series of books on carcinology in its widest sense." This definition is expanded on the back cover to "... books on carcinology in its widest sense to accommodate papers exceeding the page limit of the journal *Crustaceana*. Good quality contributions are sought that will preferably fill between 300 and 500 pages, but at least 100 pages and up to 600 pages in print." Later, we are told that "in all its aspects ... this series is indeed intended to represent a series of books truly 'attached' to *Crustaceana*."

The volume by Stephan Bullard is the first in the series. There are, as of this writing, two more volumes in the series that have appeared in print (No. 2 on terrestrial isopods and No. 3 on subterranean Australian copepods), both of which were published in 2004, and two more planned for the near future (No. 4 on freshwater crabs of Indo-China and No. 5 on callianassids of the world).

As the title suggests, Bullard's volume is an attempt to pull together all of the known papers that deal with larval development of selected decapods (true crabs and some of the anomurans) known from North Carolina. As noted by the author, the volume does not constitute research but is instead a "compilation of the available descriptions of the zoeal and megalopal stages of anomuran (families Porcellanidae, Albuneidae, and Hippidae) and brachyuran crabs of North Carolina, U.S.A." Hermit crabs are for some reason excluded, probably because they are not as "crab-like" as the porcellanids, albuneids, and hippids, but their omission leaves the title (and coverage) of the book slightly misleading and incomplete.

The volume treats the zoeal larval stages of 45 species and the megalopal stages of 34 species. The text is brief,

totaling 53 pages, many of which are printed on only half the page. All species treatments consist of reproduced illustrations from the published literature (or from unpublished sources in a few cases), arranged in 48 plates, and selected morphological characters thought to be of use in identifying the stages. Thus, each treatment is essentially a condensation of the major morphological characters available in the original larval description but in summary form and without the detail of the original work, with the hope that this might facilitate quick and easy identifications. The figures are all reproduced exactly as they were in the original publications or dissertations, with some minor exceptions necessitated by the paper size. There is no mention of any variability in size or morphology of the larvae of a given species from different parts of its range, and in fact size of the larvae is given only if it was included in the original description. The author does not indicate whether any of the original material was consulted, or whether he actually examined any larvae himself (as opposed to literature). Selected keys in the front of the book are provided to separate some of the larval forms and some of the species (e.g., a key to the "porcellanid-like zoea" and another to the "brachyuran-like zoea").

Unfortunately, Bullard's decision to use only the "external features visible with a dissecting microscope without the need for dissection" causes some immediate problems. Many species are not identifiable using his restricted criteria, and the absence of the detailed descriptions from the original literature is in many ways a large step backwards. This creates difficulties right away; the first key ("key to zoeae" on page 8), which is supposed to lead the user to either the "Porcellanid-like key" or the "Brachyuran-like key" [*sic*], has a footnote explaining that the larvae of *Emerita talpoida* do not really conform as they are "neither porcellanid-like nor brachyuran-like." The footnote needed to explain this is longer than the key by far, and would have been unnecessary had details present in the original descriptions not been discarded in favor of those easily visible. The same footnote also explains that "it is not possible to distinguish [larvae of] *Hypoconcha arcuata* [a brachyuran] from other anomuran larvae based upon the information presented here."

The volume relies heavily on the dissertation of Paul Sandifer (1972), which Bullard refers to as "the most comprehensive reference available for larval crabs of the east coast of North America," a statement that is in itself indicative of the rather superficial research that has gone into the book. Sandifer's dissertation, much of which has remained unpublished for decades, was indeed a landmark work that occupies an important role in the history of east coast decapod development studies, and bringing some of this material finally to light is one of the benefits of the current volume. What is confusing and unfortunate is that Bullard apparently was unaware of other unpublished theses

and dissertations, and even well-known publications in refereed journals, that are at least as pertinent to the decapod larvae of North Carolina as is Sandifer's dissertation. Foremost among these would be the monumental work by H. Kurata, based on his one-year study of the decapod larvae from Sapelo Island, Georgia (Kurata, 1970), a study that in turn formed the basis of some of the publications that Bullard does cite. Like Sandifer's dissertation, Kurata's work has remained unpublished for the most part, but it includes descriptions and figures of the larvae of a large number of decapods that occur in the Carolinas, including species excluded by Bullard because they were supposedly unknown. Kurata's work from Sapelo Island, Georgia, is as important to the Carolinian decapod fauna as Sandifer's, which was based mostly on larvae from Chesapeake Bay to the north. There are many species that occur in North Carolina waters and whose larvae (at least one stage) were described by Kurata or by other workers, and their absence in this compilation is unfortunate. Examples include *Albunea paretii* and *Lepidopa websteri* among the Anomura, and *Portunus gibbesii*, *Portunus sayi*, *Pilumnus sayi*, *Macrocoeloma trispinosum*, and many more among the Brachyura.

The result is as might be expected: although the volume does include most of the papers that have been published on crab larvae from the Carolinas and includes some unpublished figures and descriptions (mostly from Sandifer's dissertation), it ignores many unpublished as well as published works. Thus, for example, when the author lists *Menippe mercenaria* among the species whose megalopa larval stage is "not available, or poorly developed" (page 13), he is correct as far as North Carolina is concerned, but that larval stage is known from other geographic regions where that species occurs (including Georgia—Kurata again—and the Gulf of Mexico, published in a well-known peer-reviewed journal), and its omission here is as unfortunate as it is unnecessary. The usefulness of the volume is thus seriously undermined. Why would one unpublished volume (Sandifer's dissertation) merit inclusion but not the other? A further and more troubling question is: Why were the editors or reviewers of this volume unaware of the large body of literature that is overlooked here? The only plausible answer is that the volume was not seen by workers who are familiar with the study of larval brachyurans and anomurans of the western Atlantic.

The literature covered is woefully inadequate for a publication that is supposedly a monograph on any aspect of crab larvae. There are only 46 references listed. Although I recognize that the scope of the book is intentionally limited, this low number is still surprising, and for the beginning student of decapod larvae it means a missed opportunity to be introduced to some of the classic literature on this topic. For example, there is no mention of any of the papers on zoeal descriptions and proper terminology by P. Clark, not a single reference to the work of A. L. Rice, no mention of the work by D. I. Williamson, no references to any publications on crab relationships based on zoeal or megalopal characters, no attempt at synthesis and no mention of the large body of literature that attempts to place our knowledge of decapod larvae into a phylogenetic

context, and so on. Why is there no mention of papers on larvae of species that also occur in North Carolina, even though the papers may be based on material from other geographic regions? Where are the other regional keys that also cover and apply to species found off North Carolina? (One example is the key to megalopae of panopeid crabs of the southwestern Atlantic by Rodriguez and Spivak, 2001, *Journal of Crustacean Biology* 21(3)). While perhaps not essential for inclusion in a local guide to crab larvae, these additions would have been relatively easy to incorporate without adding appreciably to the bulk of the volume, and the resulting work would have been of far more value, especially to the beginning student. The logic of presenting a compilation of information on larvae of just one of the eastern U.S. states also escaped me. Decapods recognize no geopolitical boundaries, and it would seem far more logical to circumscribe the region of interest by known biogeographical limits or boundaries.

There is a very brief glossary ("Definitions") given on page 4 that includes a total of 7 terms. Amazingly, one is not a definition at all, and two are grammatically incorrect. The chromatophore is described as a "contractile pigment bearing cell," and the melanophore is described as a "black contractile pigment bearing cell," as though both were pigments (rather than cell types) and as though compound adjectives (such as pigment-bearing) had yet to be invented. The fact that the error occurs twice goes beyond bad writing; editors and reviewers must also take some blame here. In this same poorly-prepared and inadequate list, "swimming setae" are defined as "long setae on the exopod of each maxilliped," causing the reader to wonder what term might be applied to the long natatory setae of other appendages illustrated throughout the volume.

The classification scheme used to organize the information is based on Williams (1984), which would seem to be a logical choice if it were not so widely known that (1) there are other, more recent, classifications of the decapods; (2) that there is a recently-published update of the list of species given by Williams; and (3) that there is a soon-to-be-published update to the nomenclature of all North American crustaceans, including the decapods. Had he known about any of these, the author might have been able to avoid such obvious errors as listing as valid species names *Sesarma cinereum* (transferred to the genus *Armases* in 1992); *Pinnotheres ostreum* (transferred to *Zaops* in 1993); *Pinnotheres chamae* (transferred to *Gemmotheres* in 1996); *Pinnotheres maculatus* (transferred to *Tumidotheres* in 1989); *Pinnixa cristata* (transferred to *Austinixa* in 1997); listing *Ovalipes ocellatus* as a member of the "Family Polybiinae" [*sic*] and treating it separately from the portunids (which was not done by Williams, 1984); and other mistakes. There is perhaps some merit to the argument that the author could not have known about all of these developments, as some were in press at the same time this volume was in press. But not much merit, as the primary sources were also missed. And I would counter that argument also by saying that yes, indeed, he could have and should have known about all of these ongoing works, as should his advisor(s), the reviewers, and editors. In this day of ready communication and research

networking, there is no need to work in a vacuum, which appears to have been the case here.

I found the volume disappointing on almost all levels save one: it is slim and attractively packaged, and it is nice to have many of these descriptions, some of which date back to the 1960s and 1970s, together in one place instead of in scattered reprints, and with crisply reproduced artwork to replace the photocopies in my files. Apart from that, there is very little to recommend it, and at US\$107, it is hardly a bargain. Perhaps most surprising to me was the realization that the book was not really "monographic" in any sense of

the word; it is not a thorough coverage from a taxonomic, geographic, bibliographic, or topical point of view.

I do hope that the series can rebound from this inauspicious beginning; it is not off to a good start.—Joel W. Martin, Natural History Museum of Los Angeles County, Los Angeles, California.

LITERATURE CITED

- Kurata, H. 1970. Studies on the life histories of decapod Crustacea of Georgia.—Unpublished Report, The University of Georgia Marine Institute, Sapelo Island, Georgia.