

Book Review

When few become many—on a difficult group of bivalves

Review of G. Høpner Petersen 2001: *Studies on some Arctic and Baltic Astarte species (Bivalvia, Mollusca). Meddelelser om Grønland. Bioscience 52*. Copenhagen: Danish Polar Center. 71 pp. ISBN 87-90369-43-2.

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Astarte is probably one of the most difficult groups of bivalves for which to work out the systematics. The group is very old, it is widely spread and most of the known species are very variable in morphology. *Astarte* species lack a planktonic larval stage, which is correlated with a large egg size (e.g. Ockelmann 1965). This gives a potential for genetic drift in local populations. Because of the difficulties of the group, the author of the book was warned against a study of *Astarte* species, but when the result is at hand one can only be pleased that he did not heed this advice. The result is a delightful slim volume with beautiful color illustrations, informative text and easy-to-use keys—all topped off with an interesting discussion.

Astarte is infamous for including numerous named species, varieties and forms, all very variable in morphology. The proliferation of names occurs both among the fossil species (e.g. Spaink 1972; Lauriat-Rage 1982) and among the recent (e.g. Smith 1881). *Astarte* has a long and important fossil record, used for example as evidence for an early opening of the Bering Strait (Marincovich & Gladenkov 1999). The literature is extensive and the job to try to trace all the type material seems almost insuperable. There are therefore a number of reasons why a revision of Arctic and Baltic *Astarte* has been awaiting.

Petersen does not investigate all *Astarte* species in the region. In addition to the geographical delimitation (Arctic and Baltic), he also confines himself to specimens > 20 mm, and to specimens with a sharp margin. He has also limited his studies to material in the Zoological Museum (University of Copenhagen) and the Swedish Museum of Natural History in Stockholm, omitting other collections in Scandinavia and elsewhere. In spite of this, he manages to come up with six new Arctic species and eight (!) new species from the Baltic. He also re-describes three species and proposes a neotype for *A. borealis* (Schumacher, 1817).

So what about all those species? Petersen obviously uses a very pragmatic species concept: if you can tell it apart from others, it is a new species. This may be problematic with a group such as *Astarte*, where the lack of a larval stage in combination with a complicated phylogeographic history offers numerous possibilities for local varieties. What is considered a species may easily be a result of genetic drift in an isolated population. And isolated populations we have. *Astarte elliptica*, for example, occurs very patchily along the Swedish and Norwegian coasts (own unpubl. observations). Petersen himself admits in the acknowledgements that he is not pleased with all the species, but it is nonetheless the solution he came up with.

Besides this, we have the bordering regions—North America, the Siberian Arctic, the British Isles and Europe—that have not been investigated in this study. With the species strategy applied in this study, more species are bound to turn up, and there is an obvious risk for introducing synonymy. When it comes to the new Baltic species it would be an advantage to compare the new recent species to the specimens of *Astarte* commonly found in many quaternary beds in Scandinavia (e.g. de Geer 1910). Petersen does not like fossil and recent species to share the same names, hence the new name *A. neocrassa* in this work, and previously *Mya neoovata* and *M. neouddvallensis* (Petersen 1999). This is a practice in which I have difficulty seeing any justification. To confer a separate name to the fossil or sub-fossil species it is in my opinion necessary to demonstrate a speciation event or break in the lineage, something Petersen does not do convincingly. In my view, the fact that the fossil and the recent are separated in time is not enough.

Whether or not one accepts the multitude of

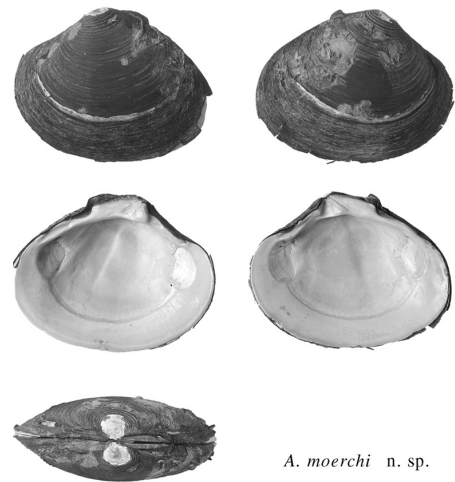
new species introduced in Petersen's work, the problems pointed out are fascinating. The new Arctic and, especially, the new Baltic species open up amazing possibilities for studying the genetics of isolated populations over long time periods. Besides the characters used by Petersen in this study numerous others are available. Petersen himself is sceptical toward the use of biochemical methods for distinguishing species, mostly because of lack of funding and time, but also due to problems with species concepts. Even if molecular methods are discarded, there is a range of other methods that also can be used. I have found the scanning electron microscope useful for studies of the *Astarte* periostracum (Schander 1992) and the structure of the shell matrix (unpubl.). Saleuddin (1974) also used the SEM to differentiate species of *Astarte*. I also believe that sequencing of parts of the genome can yield important clues if it is possible to obtain material from the various localities mentioned by Petersen, a problem he also points out. The new species are all described solely from the shell; surely the soft part anatomy will bring additional information. The sexual mode within *Astarte* is known to vary between species (von Oertzen 1972 and references therein) and ought to be investigated further.

Additional data concerning reproduction (e.g. von Oertzen 1972) on *Astarte* "*borealis*" and *A. elliptica*" as well as biometric data (Schaefer et al. 1985) clearly show that there is variation in different Baltic populations. Populations of *A. borealis*" and *A. elliptica*" have, for example, more separation of the spawning season in the Bay of Lübeck and the Bay of Mecklenburg than the other species in the study by von Oertzen (1972).

I sincerely hope that someone will pick up and expand on this interesting work by Petersen. The subject is difficult but inspiring. Given the situation in many museums, where shrinking personnel resources are diminishing the research possibilities, the prognosis is poor. I would love to see a couple of inspired PhD students take on the task within the near future, clarifying what is going on with *Astarte* in the Baltic and in the Arctic. I can recommend this book to anyone interested in bivalves, and to anyone interested in the consequences of genetic processes in isolated populations.

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A. moerchi n. sp.

Plate 9, Petersen 2001. *Astarte moerchi* n. sp. holotype, from Spitsbergen. Printed with permission of the Danish Polar Center.