THE BRACHIOPOD GENUS *VALDIVIATHYRIS* HELMCKE

*by A. J. Rowell*

**Abstract.** The type species of *Valdiviathysis* Helmcke 1940, which is known only from one specimen, is considered to be a young crinoidal, closely related to, if not actually congeneric with, *Ancistrocraea* Dall. The family Valdiviathysidae Helmcke is regarded as a junior synonym of Crinidae Forbes.

During the course of a revision of the inarticulate brachiopod genera for the forthcoming volume H of the Treatise on Invertebrate Paleontology it was necessary to examine the Recent genus *Valdiviathysis* Helmcke. The type species, *V. quenstedti* Helmcke, is known only from one specimen of the dorsal valve of the type species (Helmcke 1940, p. 222). This was obtained by the Deutschen Tiefsee Expedition in 1899 from their station 165, 38° 40' 00" S., 77° 38' 06" E., near the island of St. Paul in the southern Indian Ocean, at a depth of 672 m.

The specimen (Pl. 68, figs. 1, 5–7) was described in detail by Helmcke (1940, pp. 237–9). It is irregularly conical in form with sub-central apex, externally smooth except for growth lines and is rather small (length 2·5 mm., width 4·7 mm., height 1·3 mm.). It is characterized by having a thin, calcareous, punctate shell. The punctae originate on the inner side of the shell as simple tubes, but rapidly split up into four or five branches. Internally there are a pair of "craea" which arise near the apex and project into the valve. Two pairs of muscle scars are visible, an anterior pair, lateral and slightly

**Explanation of Plate 68**

The specimens in figures 3–7 were coated with ammonium chloride before photographing. Repositories: *Ancistrocraea parisiensis* Nos. B. 34, 482 and B. 34, 483, Sedgwick Museum, Cambridge. *Valdiviathysis quenstedti*, Brachiopod Catalogue No. 198, Institut für Spezielle Zoologie, Humboldt Universität zu Berlin. *Cronia anomala*, Author's Collection, Department of Geology, University of Nottingham.

Fig. 1. *Valdiviathysis quenstedti* Helmcke. Part of the dorsal valve viewed from the inside in transmitted light, stellate appearance of the punctae due to branching. × 100. Specimen No. 198. Recent. Station 165, Deutschen Tiefsee Expedition 1899 near St. Paul, South Indian Ocean, depth 672 m.

Fig. 2. *Cronia anomala* (Müller). Transverse section of part of a dorsal valve viewed in transmitted light, showing punctae branching arborescently at their distal ends. × 150. Recent. South-east of Garbh Reisa, coast of Argyll, W. Scotland.


Fig. 8. *Palaeoceras cf. retrorsum* Calman, left lateral view of specimen, BU 733, × 9. Coated with ammonium chloride.

behind the ‘crura’, and a posterior pair, less distinctly marked, near the posterior margin. Helmcke did not describe this latter pair of muscles, but this is a relatively minor disagreement. The interpretation of indifferently preserved scars in inarticulate brachiopods is particularly subjective. Except for this difference, I agree completely with Helmcke’s description of the specimen.

Helmcke realized that the gross morphology of the shell, its composition and irregular holopertial growth suggested the Cranidae, but in his opinion there were two major difficulties in putting the genus in this family. First, the nature of the punctae which are unlike those in the dorsal valve of any described adult cranidie, and second the presence of the ‘crura’ which he thought were comparable to those of the terebratelaceae genus *Kraussina* Davidson. He considered that it was unlikely that there was any close relationship between *Valdiviathyris* and the Cranidae and consequently erected a new family *Valdiviathyridae* for the one genus *Valdiviathyris* stating that “Da der Weichkörper dieser Tiere unbekannt ist, erscheint es nach diesen wenigen Merkmalen der Hartteile angebracht, diese neue Familie zwischen die beiden Familien der Cranidae und Terebratulidae einzureihen” (Helmcke 1940, p. 235).

The latter statement, if correct, is of considerable importance. No fossil genus of the Inarticulata hitherto examined shows characters in any way transitional between the Inarticulata and the Articulata. Indeed the fossil evidence clearly suggests that the two major divisions of the brachiopoda have been distinct from each other since the beginning of the Cambrian. Yet in Helmcke’s view, we have in the Recent family *Valdiviathyridae* a group morphologically transitional between them. It is this surprising systematic position of the family, between the Cranidae and Terebratulidae, which makes a re-investigation of the genus very desirable.

Having essentially accepted Helmcke’s description of the specimen, one can only challenge his interpretation of the structures and his views on the taxonomic position of the animal. Muir Wood (1955, pp. 63-64) has already indicated her doubts about the latter point and has tentatively included the family in the Cranacea, a conclusion with which I agree. It is possible now to substantiate this point of view and suggest a more restricted relationship of *Valdiviathyris* within the Cranacea. It would appear that Helmcke has over-emphasized the difficulties of assigning *Valdiviathyris* to the Cranidae and that both the nature of the punctae and the presence of ‘crura’ can be reconciled to a systematic position within this family.

The punctae of *Valdiviathyris* with their short simple tubes rapidly splitting into several branches, admittedly do not closely resemble the punctae of adult *Crania*. They are, however, basically similar to the outer, arboreously branching part (Pl. 68, fig. 2) and with the punctae in young stages of *Crania anomala* (Müller) (Rowell 1960, p. 40). The outer branching part of the puncta of adult *Crania* is formed early in the secretion of that particular part of the shell, before the fine thread-like papillae have united to form a single papilla projecting from the mantle. The inner part of the puncta, the simple tube showing only occasional branches, is formed later as the shell is thickened. In adult *C. anomala* this outer part of the punctae varies in length, but is usually between 0.06 and 0.12 mm. This is comparable with the shell thickness in *Valdiviathyris*, but it is difficult to measure this in the specimen of *V. quenstedti* without risk of damaging it. The shell is, of course, thickest at the apex and tapers to nothing at the margin of the valve, but the mean thickness is in the order of 0.1 mm. So the punctae in *Valdiviathyris*
are comparable in size as well as in structure with the arboreal part of the punctae of Cranida. It appears then that the punctae of Valdiviathyris are of craniiaceid type and that they differ from those of a typical adult Cranida simply because the shell has not been thickened. It is here suggested that the specimen of V. quenstedti is a juvenile craniiid, although the possibility that it is an adult of a very thin shelled stock cannot be eliminated. Such thin shells are very rare amongst the post Palaeozoic Cranidae.

Helmcke's second difficulty was the presence of the two ventrally directed processes in the dorsal valve, the structures which he considered to be 'crura' (Pl. 68, fig. 7) associated with the support of the lophophore. There is no direct evidence to suggest that these structures ever had such a function. Moreover, somewhat similar fulera are already known in the dorsal valves of some Craniiacea. Dall (1871, p. 72) describes the 'two slender pointed apophyses diverging from the internal apex of the upper valve', which are typical of the craniiid Ancistrocrania Dall, type species A. parisiensis (Defrance) (Pl. 68, Figs. 3–4). Similar processes occur in the dorsal valves of the related Recent species A. japonica (Adams) and A. sleeki Allan, although as Allan (1940, p. 279) has pointed out, these two species may not be congeneric with A. parisiensis. There is no doubt, however, that these three species are all members of the Craniiacea. In the adult Ancistrocrania the two processes are directed posteriorly ventrally (Pl. 68, fig. 4), a direction which suggests that it is very unlikely that they supported the lophophore. In the adult condition they may have been in part associated with the seat of attachment of the anterior adductor muscles. In view of the other characters of the shell of Valdiviathyris it seems inherently more probable that the dorsal processes in this genus are comparable with the early stages in the development of the processes in Ancistrocrania, rather than with a loop of terabrattellaceid type.

Unfortunately, the young stages of A. parisiensis are unknown and it is impossible to compare V. quenstedti with specimens of A. parisiensis in a similar stage of development or size. Consequently, it is difficult to know what taxonomic weight should be given to the differences in the dorsal processes in these two species and the presence of a small triangular septum in A. parisiensis. In view of this uncertainty it is preferable to retain Valdiviathyris as a distinct genus rather than place it in synonymy with Ancistrocrania, but at the same time recognizing the possibility that the discovery of more material may well show them to be congeneric.

It is considered that Valdiviathyris is a craniiaceid, and as it is not felt desirable at present to have a separate family for craniiaceids possessing ventrally directed processes in their dorsal valves, the family Valdiviathyridae Helmcke 1940 is here regarded as a junior synonym of Craniiidae Forbes 1838.

Acknowledgements. I am indebted to Professor J. G. Helmcke and Dr. R. Kilians of the Institute for Spezielle Zoologie, Humboldt Universität zu Berlin, for the loan of the holotype of V. quenstedti and to Mr. A. G. Brighter of the Sedgwick Museum, Cambridge, for the loan of specimens of A. parisiensis and permission to develop the dorsal valve figured in Pl. 68, fig. 4. I am grateful to my colleague, Mr. A. M. Honeyman, for reading the manuscript.

REFERENCES

A. J. ROWELL: BRACHIOPOD GENUS VALDIVIATHYRIS HELMCKE


Manuscript received 1 March 1961

A. J. ROWELL,
Department of Geology,
University of Nottingham
ROWELL, Inarticulate brachiopods
ROLFE, Syncarid crustacean