

THE BRACHIOPOD GENUS *VALDIVIATHYRIS* HELMCKE

by A. J. ROWELL

ABSTRACT. The type species of *Valdiviathyris* Helmcke 1940, which is known only from one specimen, is considered to be a young craniaceid, closely related to, if not actually congeneric with, *Ancistrocrania* Dall. The family Valdiviathyridae Helmcke is regarded as a junior synonym of Craniidae 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 *Valdiviathyris* 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 'crura' 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: *Ancistrocrania parisiensis* Nos. B. 34, 482 and B. 34, 483, Sedgwick Museum, Cambridge. *Valdiviathyris quenstedti*, Brachiopod Catalogue No. 198, Institut für Spezielle Zoologie, Humboldt Universität zu Berlin. *Crania anomala*, Author's Collection, Department of Geology, University of Nottingham.

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

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

Figs. 3-4. *Ancistrocrania parisiensis* (Defrance). 3, Dorsal exterior. $\times 2$. B. 34, 482. Lunata zone, U. Cretaceous; Trimmingham, Norfolk. 4, Dorsal interior showing muscle scars, postero-ventrally directed processes, small median septum and submarginal papillose flange. $\times 2$. B. 34, 483. Lunata zone, U. Cretaceous; Trimmingham, Norfolk.

Figs. 5-7. *Valdiviathyris quenstedti* Helmcke. Specimen No. 198. 5, Dorsal exterior, lateral view. $\times 6$. 6, Dorsal exterior, $\times 6$. 7, Dorsal interior showing muscle scars, dorsal processes, punctae and submarginal papillose flange. $\times 12$.

Fig. 8. *Palaeocaris* cf. *retractata* Calman, left lateral view of specimen, BU 733, $\times 9$. Coated with ammonium chloride.

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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 holoperipheral growth suggested the Craniidae, 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 craniaceid, and second the presence of the 'crura' which he thought were comparable to those of the terebratulaceid genus *Kraussina* Davidson. He considered that it was unlikely that there was any close relationship between *Valdiviathyris* and the Craniidae 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 Craniidae 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 Craniidae 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 Craniacea, 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 Craniacea. It would appear that Helmcke has over-emphasized the difficulties of assigning *Valdiviathyris* to the Craniidae 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, arborescently 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 arborescent part of the punctae of *Crania*. It appears then that the punctae of *Valdiviathyris* are of craniaceid type and that they differ from those of a typical adult *Crania* simply because the shell has not been thickened. It is here suggested that the specimen of *V. quenstedti* is a juvenile craniid, 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 Craniidae.

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 fulcra are already known in the dorsal valves of some Craniacea. Dall (1871, p. 72) describes the 'two slender pointed apophyses divaricating from the internal apex of the upper valve', which are typical of the craniid *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. skeatsi* 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 Craniidae. In the adult *Ancistrocrania* the two processes are directed postero-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 terebratellaceid 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 craniaceid, and as it is not felt desirable at present to have a separate family for craniaceids possessing ventrally directed processes in their dorsal valves, the family *Valdiviathyridae* Helmcke 1940 is here regarded as a junior synonym of *Craniidae* Forbes 1838.

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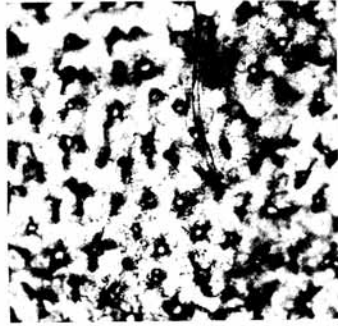
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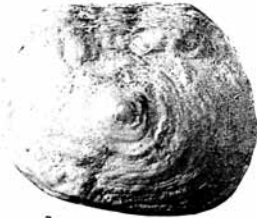
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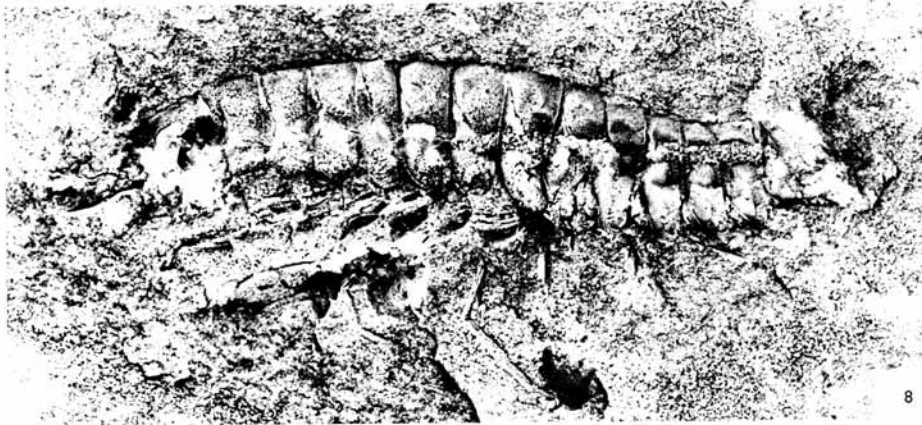
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ROWELL, Inarticulate brachiopods
ROLFE, Syncarid crustacean