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Abstract

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A NEW SPECIES OF THE BRACHIOPOD NOTANOPLIA (NOTANOPLIIDAE) FROM THE EARLY DEVONIAN OF NEW SOUTH WALES

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SUMMARY

Notanoplia mitchelli sp. nov., a new notanopliid brachiopod, is described from Bowning, N.S.W., probably from the Lochkovian (Early Devonian) Elmside Formation. The distinctive genus is known only from Early and Middle Devonian rocks, and is known from Australia and Western Europe, and possibly from China.

INTRODUCTION

Among collections purchased in 1930 by the Australian Museum are a number of brachiopods mostly labelled simply "Bowning". This material was collected by John Mitchell in the Yass, N.S.W., area in the years between 1883 and his death in 1928 (Brown, 1941). A few specimens belong to *Notanoplia* and constitute the basis of this paper; they appear to have previously received no more than passing attention. Nevertheless, in (presumably) Mitchell's handwriting, a label on the rock bearing one specimen (AMF 28650) bears the word "new". Another rock (bearing AMF 28873) bears the caption "*Stropheodonta*", reflecting Mitchell's broad concept of that genus (e.g. Mitchell, 1923). Other brachiopods curated with the above specimens — and possibly from the same formation — include mainly *Plectodonta bipartita* Chapman (= *P. davidi* Brown, 1949; see Savage, 1974, p.27), but inarticulate and orthacean brachiopods also occur.

The lithology, which is fine brown to grey mudstone, suggests that this material was from one of Mitchell's Upper Trilobite Bed localities. The problem of relating specimens to Mitchell's individual localities at Bowning has been discussed elsewhere (Sherwin, 1972), and appears to be insurmountable. Nevertheless, the label "Bowning" on specimens, the lithology and general fauna all point to the "Upper Trilobite Bed". Now assigned to the Elmside Formation (Link, 1970), the Upper Trilobite Bed (Mitchell, 1886) is placed at the same stratigraphic level as the algal limestones which yielded an *Icriodus woschmidti* conodont fauna (Link, 1970; Link and Druce, 1972); Klapper (1977, p.40) has suggested that the Yass *I. woschmidti* is more correctly *I. woschmidti hesperius*. The thickness of the Formation (Link, 1970, Fig. 1) appears to be about 20 m and the algal lenses occur towards the top of the unit (Link and Druce, 1972, Fig. 2). As the *I. woschmidti hesperius* occurrence is of earliest Devonian age (Klapper, 1977) this appears to be the most accurate age that can presently be inferred for the *Notanoplia* occurrence at Bowning. Mitchell (1923, p.470) and Gill (1953) had noted earlier the possibility of a Devonian age for the Upper Trilobite Bed. Lower parts of the Formation may be Pridolian (latest Silurian). The present occurrence supports the hypothesis that all *Notanoplia* are post-Silurian.

Collection of further material is considered unlikely, as fossiliferous outcrops of this "Bed" are sparse. However, I have seen no notanopliid from the lower horizons in the Yass Basin, and have been informed by the late Ida Browne and by K. S. W. Campbell and D. Strusz (pers. comm.) that they have seen no other *Notanoplia* from this area.

TAXONOMY

Family Notanopliidae Gill, 1969

Type Genus: *Notanoplia* Gill, 1950.

REMARKS: When erected in 1969, the family was restricted to Australia and included *Notanoplia* and *Boucotia* Gill, 1969. Since then the concept and geographic range of this distinctive family has been extended by the following occurrences. Boucot and Johnson (1972) described *Callicalyptella* from the Early Devonian of Nevada and assigned *Hollardiella* Drot, 1966 from the Devonian of the Sahara to the family. Johnson (1973) described *Notoparmella*, also from the Early Devonian of Nevada. At almost the same time Havlicek (1973) described *Plicanoplia* (non Boucot and Harper, 1968) from the Early Devonian of Bohemia, which he re-named *Plicanoplites* in 1974. Havlicek (1977) described the new notanopliid genera *Serrulatrypa* and *Imatrypa* from Bohemia. The former genus was based on a notanopliid, *Boucotia incognita*, previously described by Langenstrassen (1972) from Germany along with some other notanopliids. It is important to note that some of the German and Bohemian occurrences are of Middle Devonian age. Xu Han-kui (1977) has described a number of Middle Devonian genera, from the province of Guangxi, China; those placed in the Notanopliidae (sic.) were *Costanoplia*, *Paracostanoplia* and *Luofuia*. Xu Han-kui also introduced the new family Plicanopliidae for *Plicanoplia* Havlicek (see above) and *Paraplicanoplia*.

Although notanopliids occur widely in Early Devonian rocks, they rarely occur in sufficient numbers to permit definition of variation. This has implications at both specific and generic levels where there is difficulty in delimiting the morphology of taxa. Morphological features which I consider poorly known include the septa and ornamentation. Some of the above genera therefore will probably need reconsideration in the future.

Other interesting recent reports of this group are by Bourque (1977, pl. 24, Fig. 4-13), who has recorded *Boucotia* from Gaspé Peninsula, and by Boucot and Potter (1977, p.211), who recorded *Notoparmella* from Northern California; both occurrences are from Early Devonian sequences. It is further noted that *Notoparmella* occurs in New Zealand and Victoria, in Siluro-Devonian and Silurian strata respectively (M. J. Garratt, pers. comm. concerning Victoria).

Reports of notanopliids from the U.S.S.R. are, thus far, inconclusive. *Notanoplia ganinensis* (Gratsianova, 1967, p.52, Fig. 15, pl. 3, Figs. 17-19; see also Alekseeva *et al.*, 1970, p.36, pl. 3, Figs. 1, 2) does not closely resemble typical notanopliids and is here considered to belong outside the Notanopliidae. It should be noted in this context that the ordinal affinities of this family are not certain, although recent opinions (Havlicek, 1973; Johnson, 1973) favour inclusion with the atrypceans, normally classified as spiriferids.

Notanoplia Gill, 1950

?1977 **Costanoplia** Xu Han-kui, p.65

Type Species: *N. pherista* Gill, 1950

DISCUSSION: The Bowring material is placed in *Notanoplia* rather than *Boucotia* as it lacks crestsepta considered by Gill (1969) to be characteristic of *Boucotia*. Although Xu Han-kui (1977, p.64) shows *Notanoplia* and *Boucotia* as being smooth, the presence of

faint costellae in members of these genera is well established (Philip, 1962; Gill, 1969; Langenstrassen, 1972). Therefore *Costanoplia* Xu Han-kui is probably a synonym of *Notanoplia*.

***Notanoplia mitchelli* sp. nov.**

Fig. 1.

MATERIAL: Holotype, AMF 28650; paratypes AMF 29124, AMF 28873, AMF 29123a, AMF 29123b; ? AMF 28649. All from Bowning; presumably from the Upper Trilobite Bed of Mitchell (now placed in the Elmside Formation) of Lochkovian age.

DERIVATION OF NAME: The specific name records the outstanding contribution of the late John Mitchell to the geology of New South Wales.

DIAGNOSIS: *Notanoplia* with weakly ventri-biconvex shell, multiseptate pedicle interior and brachial valve with short peripheral septa. External ribs low and rounded.

DESCRIPTION: Weakly ventri-biconvex; brachial valve almost planar, especially antero-laterally. Outline sub-pentagonal to almost semi-circular; maximum width at about mid-length. Hingeline straight, nearly maximum width.

External ornamentation very weakly costellate, with closely spaced, faint growth lines (AMF 28873).

Pedicle interior dominated by robust median septum. Two further "principal septa" enclose slightly less than 90°; between these are up to 8 radial ridges of varied lengths but concentrated near, rarely at, valve margin; septa rarely occur between "principal septa" and hingeline. Hinge teeth stout. Pedicle tube prominent, musculature not visible as separate scars.

Brachial valve bears a prominent median septum which is stoutest posteriorly; in the largest specimen (AMF 28873 — valve length 4 mm) about 7 very short radial septa occur near the periphery. Muscle field obscure, may be weakly impressed alongside posterior end of median septum. Socket ridges low, rounded and weakly divergent from the hingeline. Cardinal process relatively short and wide, strongly convex towards the pedicle valve (scroll-like).

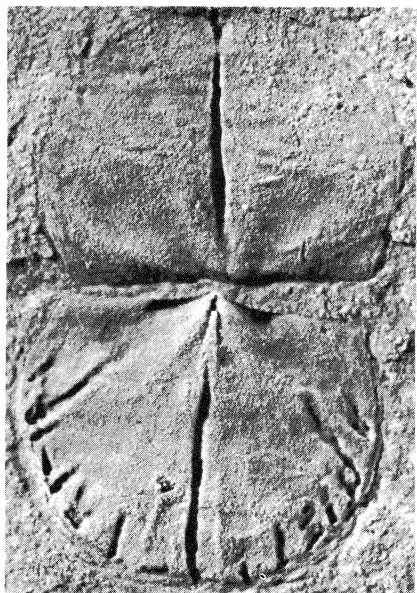
REMARKS: In addition to the above 5 specimens assigned to *N. mitchelli* sp. nov., the collection includes one further specimen (AMF 28649) which may belong there (Fig. 1, f-g). The specimen is an internal mould of an open bivalved juvenile shell (each is about 2.5 mm long) with a single weakly developed septum in each valve. In this latter aspect it differs markedly from AMF 28650 (the holotype) which, at a length of 3 mm for each valve, has well-developed peripheral septa in the pedicle valve.

The accessory septa in *N. mitchelli* sp. nov. are noteworthy in their almost haphazard development (Fig. 1). Further, in side view they are mostly short and seem to terminate in a spur directed anteriorly. The function of the septa may therefore have been as a barrier between external objects and the mantle cavity; Gill (1969, p.1228) has noted that where septa were developed in both valves of a single shell, the crests of the septa touched neither the crests nor the floor in the opposing valve when the valves were closed.

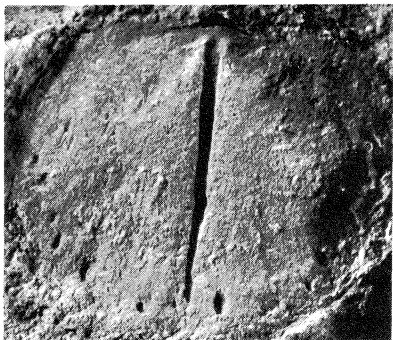
COMPARISONS: *N. pherista* (Gill, 1950, 1969) is characterised by poorly developed

Figure 1 — a-e. *Notanoplia mitchelli*, sp. nov. **a.** holotype AMF 28650, internal mould of both valves. **b.** paratype AMF 28873, internal mould of brachial valve. **c.** paratype AMF 29124, internal mould of pedicle valve. **d.** paratype AMF 29123a, partly testiferous pedicle valve. **e.** paratype AMF 29123b, external mould of pedicle valve. f-g. ? *Notanoplia mitchelli* sp. nov., AMF 28649. **f.** view of internal mould of both valves, pedicle valve at foot of page. **g.** brachial valve.

All x 10 approximately except for **a** which is x 12 approximately.



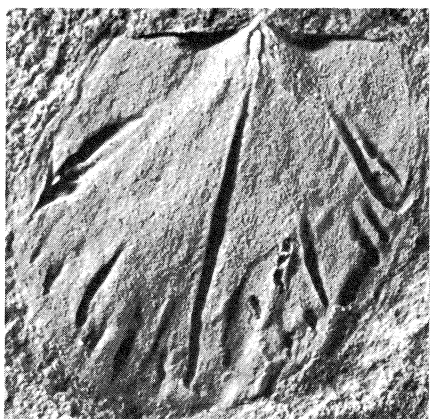
a



b



f



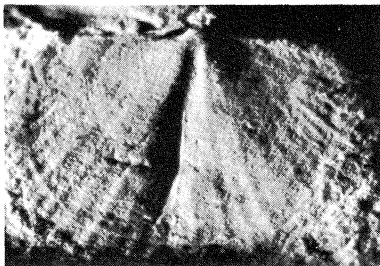
c



d



e



g

lateral septa in the pedicle valve; its brachial valve contains the characteristic trifid septal pattern. In *N. mitchelli* sp. nov. the septa in the brachial valve are, except for the long, anteriorly bifurcating median septum, notably concentrated peripherally.

STRATIGRAPHIC SIGNIFICANCE

Apart from the aforementioned Silurian *Notoparmella*, all known notanopliids are Devonian. That is, all strongly septate notanopliid genera are, as far as is known, good Devonian indicators. This appears to support the conclusion of Philip (1967) that the upper part of the Mt Ida Formation at Heathcote, Victoria is Devonian as it contains *Notanoplia*. However, the Silurian *Notoparmella* necessitates some reappraisal of the phylogeny proposed by Johnson (1973, text-fig. 2).

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NOTE ADDED IN PRESS

M. J. Garratt has drawn my attention to the discovery of true notanopliids in the U.S.S.R. (Gratsianova and Schischkina, 1977). Modzalevskaia in Rzonnsnitskaja (1978) has described a further species from the U.S.S.R.

Xu Han-kui (1979) now considers that the age of the Tangxiang Formation, which yielded the notanopliids he described in 1977, is Early Devonian.

Savage *et al.* (1979, p.178) have listed some recently discovered notanopliids from North America.

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