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An Upper Tertiary Nautiloid from the Little Totara River,  
Buller County

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*Abstract*

A collection of nautiloids very similar to *Aturia angustata* (Conrad), a species previously unrecorded in New Zealand, is described from Waiuan (Miocene) sediments near Charleston, south-west Nelson. The accompanying rich invertebrate fauna indicates shallow-water conditions.

INTRODUCTION

A fossiliferous band in the Upper Tertiary marine siltstone and sandstone of the West Coast (locally called "Blue Bottom" or "papa") is exposed in the Little Totara River and has been known to fossil collectors for several years. B. Curry senior (Westport) and S. Nathan spent a day in January, 1965, collecting from this horizon and obtained about a dozen specimens of a nautiloid very similar to *Aturia angustata* (Conrad), a species previously unrecorded in New Zealand. The specimens are described below, and, because the locality is now almost collected out, a complete fossil list is also presented. With the exception of collection S30/f557, which is held by Mr Curry, all specimens mentioned are held by the New Zealand Geological Survey, Lower Hutt. Specimens prefixed by the letters CE are held in the Geological Survey collection of cephalopoda.

The fossiliferous band is located approximately one mile upstream from the bridge over the Little Totara River (grid reference S30/986572). A microfossil sample (S30/f555) collected from the siltstone immediately overlying the fossiliferous horizon was examined by Mr G. H. Scott (New Zealand Geological Survey). He has reported (11.2.65) that it contains a small foraminiferal assemblage including:

*Loxostomum truncatum* Finlay

*Orbulina universa* d'Orbigny

*Globoquadrina dehiscens* (Chapman, Parr, and Collins)

which probably indicates a Waiuan age.

The macrofossil collection (S30/f557) was submitted to Mr P. A. Maxwell (New Zealand Geological Survey) for identification. Fossils in an earlier collection (GS3639), made in 1946 by Dr H. W. Wellman, are also included in the following list.

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- Pelecypoda: *Saccella* cf. *bellula* (Adams)  
*Cucullaea* sp.  
*Lentipecten* cf. *hochstetteri* (Zittel)  
*Lima* sp.  
*Atamarcia thomsoni* (Marwick)  
*Dosinia* (*Raina*) *macroptera* Fleming  
*Kuia* cf. *macdowelli* Marwick  
? *Kuia* sp.  
*Zenatia* cf. *acinaces* (Quoy and Gaimard)
- Gasteropoda: *Cirsotrema* sp.  
*Maoricrypta* cf. *radiata* (Hutton)  
*Zegalerus* sp.  
*Struthiolaria* sp. aff. *subspinosa* Marwick  
*Polinices* cf. *mucronatus* (Marwick)  
*Austrofuscus valedictus* King  
*Baryspira* (*Alocospira*) cf. *subhebera* Marwick  
*Olivella* sp.  
Volute gen. et sp. indet.  
*Zemacies* sp.
- Cephalopoda: *Aturia* cf. *angustata* (Conrad) (described below)
- Brachiopoda: *Notosaria* or *Tegulorhynchia* sp.
- Cirripedia: *Balanus* sp.
- Crustacea: Crab chela

Mr Maxwell (9.3.65) states "the occurrence of *Atamarcia thomsoni*, *Dosinia macroptera*, *Baryspira subhebera* and *Austrofuscus valedictus* in this fauna indicates an Upper Southland-Taranaki series age. The presence of *Struthiolaria* of the *subspinosa* lineage with strong spirals suggests an Upper Southland rather than a Taranaki age, and the likely age is Waiauan".

#### SYSTEMATIC PALEONTOLOGY

Phylum MOLLUSCA

Class CEPHALOPODA

Order NAUTILOIDEA

Genus ATURIA Bronn

1838. Leth. Geogn. 2, p. 1122.

Type by subsequent designation by Hermannsen, 1846: *Nautilus aturi* Basterot, 1825, Miocene, France.

#### *Aturia* cf. *angustata* (Conrad)

1849. *Nautilus angustatus* Conrad; in Dana, U.S. expl. exped. 1838-1842. U.S.N., vol. 10, p. 728, Pl. 20, Figs. 5, 6.
1931. *Aturia angustata* (Conrad); Schenck U. Cal. Publ. Bull. Dept. Geol. Sci., vol. 19, No. 19, pp. 457-61, Pl. 69-72.
1947. *Aturia angustata* (Conrad); Miller, G.S.A. Mem. 23, pp. 85-90, Pls. 48, 88, 90-93 (see for comprehensive synonymy).

MATERIAL: Several complete and excellently preserved phragmacones were examined, and two were dismantled to observe the inner structure. The thin outer shell of calcite was removed from all specimens to allow observation of the sutures. All specimens are held in the New Zealand Geological Survey's collection of cephalopoda, and catalogued as CE2231-40.

DESCRIPTION: \* The venter is narrowly rounded, the flanks compressed slightly in the region of the lateral lobes but widening at the lateral saddle. A sub-dorsal siphuncle "rides" on the venter of the preceding whorl (Pl. 1C).

\* The terminology of Schenck (1931) for the description and measurement of *Aturia* is used in this paper.

The sutures are concave towards the aperture across the venter (Pl. 1A, Fig. 1A). Each suture is composed of a lateral lobe and a broadly rounded lateral saddle, and the point of each lateral lobe almost touches the preceding lobe. The axis of each lateral lobe forms an acute angle with a tangent to the periphery of the phragmacone, thus forming ascending lobes. The lateral lobes are tongue-shaped, and the dorsal limb of each sweeps forward into an evenly arched lateral saddle. The lateral lobes maintain the same relationship to one another throughout the phragmacone, as illustrated in Pl. 1A.

**DIMENSIONS:** The dimensions of the three best-preserved specimens are given in Table I. These specimens show the extremes of variation in the collection, and incomplete measurements from other specimens are intermediate between the values given in the Table. One problem should be noted. There is no way to tell whether the specimens are complete or partial phragmacones, and it is probable that at least some of the specimens have become dismantled, as illustrated in Pl. 2.

TABLE I.—Measurements of three specimens of *Aturia* cf. *angustata*.

Specimen	Outer Whorl		Preceding Whorl		Altitude
	Height	Width	Height	Width	
CE2232	31mm	24mm	14mm	12mm	50mm
CE2231	24mm	20mm	8mm	10mm	42mm
CE2234	15mm	11mm	8mm	7mm	25mm

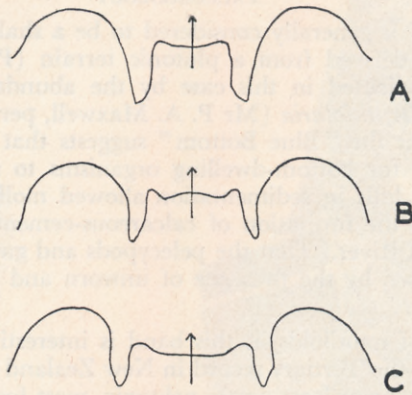


FIG. 1.—Suture diagrams of three species of *Aturia* from New Zealand. A. *Aturia* cf. *angustata* (Conrad) (CE2232). B. *Aturia* (*Aturia*) *grangei* Fleming (holotype, from Fleming, 1945). C. *Aturia* (*Brazaturia*) *mackayi* Fleming (holotype, from Fleming, 1945).

**DISCUSSION:** The Little Totara nautiloids closely resemble *Aturia angustata* in all respects but one; the sutures in *A. angustata* are very slightly convex towards the aperture on the venter (Miller, 1947), whereas in the specimen described above the sutures are very slightly concave. The Little Totara specimens also show resemblances to *A. ?coxi* (see Miller, 1947: 88), particularly in the shape of the lobes and the concavity of the sutures, but the original specimens of this species (described as *A. narica* Vredenburg by Cox, 1927: 19–20) are unfortunately poorly preserved and

incomplete. In view of the uncertainty, and also because of the fact that most of the species of *Aturia* that have been named "are very similar, and it is still a question how many really distinct species should be recognised" (Olssen, 1928), the present writers have preferred not to erect a new species, but rather to await a comprehensive review of the whole genus.

Fleming (1945) has described two other species of *Aturia* from New Zealand—*A. (Brazaturia) mackayi* and *Aturia (Aturia) grangei*. Suture diagrams of these two species are given in Fig. 1. In comparison with *A. cf. angustata*, *A. mackayi* has a distinct ventrally directed kink on the lateral lobes, and the sutures are almost straight across the venter but with small shallow saddles on the ventral base of the lateral lobes (see Fig. 1C). The sutures of *A. grangei* are crowded orally so that the top of a lateral lobe enters the preceding lobe, but are less crowded on the preceding whorl where the tip fails to reach the base of the preceding lobe. *A. cf. angustata* has evenly spaced sutures. Further, *A. grangei* possesses a well-defined obliquely directed saddle at the ventral corner of the base of the lateral lobe (Fig. 1B), whereas *A. cf. angustata* does not. The sutures of the specimen from Te Waewae Bay recently described by Beu (1968) as *A. cf. grangei* are rather similar to those of *A. cf. angustata*, but have a shallow sulcus in the central part of the suture crossing the venter which is not seen in *A. cf. angustata*.

**DISTRIBUTION:** *Aturia angustata* was first described by Conrad from the Astoria Shale (Miocene) of Oregon. Since then it has been found in many localities, particularly in North America. Its known age range is from Oligocene to Miocene (Schenck, 1931; Miller, 1947). Teichert (1944) does not record *A. angustata* among the species of *Aturia* found in Australia. Specimens similar to *A. cf. angustata* have been collected in New Zealand from the Wanganui River near Taumarunui and also from Cape Foulwind (Mr P. A. Maxwell, pers. comm.).

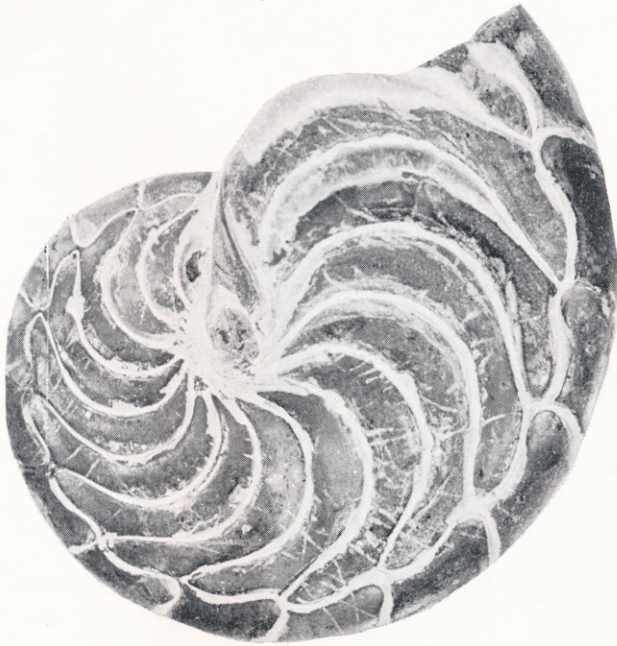
#### PALEOECOLOGY

The "Blue Bottom" is generally considered to be a shallow to moderately deep water marine sediment derived from a plutonic terrain (Phillips, 1963); shallow-water conditions are indicated in this case by the abundance of such species as *Dosinia*, *Panopea*, and *Struthiolaria* (Mr P. A. Maxwell, pers. comm.). The general lack of fossils throughout the "Blue Bottom" suggests that the supply of sediment was generally too great for bottom-dwelling organisms to survive. However, it is inferred that occasional lulls in sedimentation allowed molluscs to colonise the sea bottom, and resulted in the formation of calcareous-cemented fossil bands such as that in the Little Totara River. That the pelecypods and gastropods there belong to a life assemblage is shown by the presence of unworn and unbroken shells such as double-valved *Panopeas*.

The concentration of nautiloids in this band is interesting, particularly in view of their scarcity through the Tertiary record in New Zealand (Fleming, 1945). Since nautiloids are thought to be at least partly nektonic, most fossils found will therefore belong to death assemblages. A concentration of phragmacones, such as the one recorded above, may indicate a sudden change in physical conditions, causing large scale mortality; alternatively, since nautiloids probably float until becoming water-logged, the Little Totara shell bed may have been simply a particularly favourable place for the concentration of floating shells.

#### ACKNOWLEDGMENTS

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A



B



C

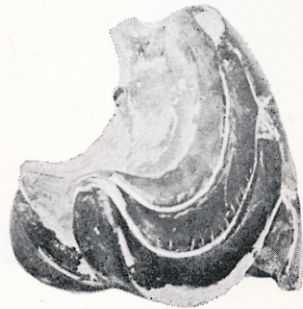
*Aturia* cf. *angustata* (for measurements of specimens see Table I). A. Side view of CE2232. B. Apertural view of CE2231. C. Cross section through CE2233 to show the position of the siphuncle.



A



B



C

*Aturia* cf. *angustata* (for measurements of specimens see Table I). A. Side view of CE2231 dismantled. B. Side view of CE2231 complete. C. Three chambers of CE2231, showing the position of the siphuncle.

the manuscript. The photographs were taken by Mr D. J. Jones (Geology Department, University of Canterbury).

## REFERENCES

- BEU, A. G., 1968. A specimen of the nautiloid *Aturia* from the Kapitean (uppermost Miocene) Stage of New Zealand. *N.Z. Jl Geol. Geophys.* 11: 161-5.
- COX, L. R., 1927. *Neogene and Quaternary Mollusca from the Zanzibar Protectorate*. Rep. Palaeont. Zanzibar Protectorate, Government of Zanzibar. 180 pp.
- FLEMING, C. A., 1945. Some New Zealand Tertiary Cephalopods. *Trans. R. Soc. N.Z.* 74: 411-8, Pls. 1-3.
- MILLER, A. K., 1947. Tertiary nautiloids of the Americas. *Geol. Soc. Amer. Mem.* 23.
- OLSSON, A. A., 1928. Contributions to the Tertiary palaeontology of northern Peru: Part 1, Eocene molluscs and brachiopods. *Bull. Am. Paleont.* 14: 1-154, Pls. 1-26.
- PHILLIPS, T. D., 1963. Tertiary geology of the area around Inangahua Junction. M.Sc. Thesis, University of Canterbury.
- SCHENCK, H. G., 1931. Cephalopods of the genus *Aturia* from western North America. *Calif. Univ. Pub., Dept. geol. Sci. Bull.* 18: 1-150.
- TEICHERT, C., 1944. The genus *Aturia* in the Tertiary of Australia, *J. Paleont.* 18: 73-82, Pls. 14-6.

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