

Additional Pliocene bathyal mollusca from South Wairarapa, New Zealand

A. G. Beu

To cite this article: A. G. Beu (1969) Additional Pliocene bathyal mollusca from South Wairarapa, New Zealand, New Zealand Journal of Geology and Geophysics, 12:2-3, 484-496, DOI: [10.1080/00288306.1969.10420294](https://doi.org/10.1080/00288306.1969.10420294)

To link to this article: <http://dx.doi.org/10.1080/00288306.1969.10420294>



Published online: 05 Jan 2012.



Submit your article to this journal [↗](#)



Article views: 113



View related articles [↗](#)



Citing articles: 15 View citing articles [↗](#)

ADDITIONAL PLIOCENE BATHYAL MOLLUSCA FROM SOUTH WAIRARAPA, NEW ZEALAND

A. G. BEU

Geology Department, Victoria University of Wellington*

(Received for publication 23 September 1968)

ABSTRACT

Four Waitotaran bathyal molluscan faunas are listed, from localities at Palliser Bay and south-east of Martinborough. Additions to the list of species from the Lake Ferry coral thicket are made. *Scaphander flemingi* Marwick, *Parvamussium* aff. *maorium* Dell, *Retusa oruaensis* (Webster), *Euthrenopsis venusia* Powell, *Frigimatica amphiala* (Watson), and *Poroleda lanceolata* (Hutton) are recorded from the beds, and *Trochus murchisoni* Marwick is recorded and placed in *Terefundus*. New species of *Limopsis*, *Conominolia*, and *Mioawateria* are described, and the status of *Pellicaria mangaoparia* Vella is discussed. *Austrofusus incertus* King is placed in *Bentbindsia* Iredale, and *Mioawateria* is classed as a full genus of the Daphnellinae.

INTRODUCTION

The writer (Beu, 1967) listed and discussed bathyal Waitotaran Mollusca from a coral thicket and siltstone exposed in cliffs along the Lake Ferry-Whangaimoana coast, Palliser Bay, South Wairarapa. They were inferred to indicate a depth of deposition of about 400-600 m for the Waitotaran rocks at Palliser Bay. Similar faunas in beds of the same age in North Canterbury (part of the Greta Beds) and at two localities near White Rock Road, south-east of Martinborough, Wairarapa, were mentioned.

Since then, Mr T. E. Bates and Mr W. M. Briggs of Victoria University have collected bathyal Waitotaran Mollusca from two localities at Palliser Bay, one from V887 (= V888), previously reported on by the writer, and one from a small stream further east than any localities previously treated by the writer. These collections have brought to light several species of considerable interest. The writer has re-collected the two localities near White Rock Road. The faunas from the four localities are listed here. Several additional species from Alpha Creek, White Rock Road, and Palliser Bay localities were present in the collections of Mr P. Wellman, then of Victoria University, and of Mr D. Cowe, of Wellington, and are also discussed here.

Since the previous paper was written a sample of about 8 lb of rock from the centre of the Lake Ferry coral thicket (V1487) has been washed down and sieved for small molluscs. Several specimens of most of the small species previously recorded were found together with the following additional species: *Barbatia novaezelandiae* (Smith), one broken valve; *Leptomys* sp., one paired juvenile; *Hiatella australis* (Lamarck), one juvenile; minute, indeterminate eptoniid with oblique axials; *Odostomia* sp., one fragment; *Aoteadrillia alpha* (King), two specimens; and *Cadulus* sp., one specimen.

*Present address: New Zealand Geological Survey, DSIR, Lower Hutt.

Where possible, other relevant localities will be referred to hereafter by their collection numbers only. The full locality data are as follows: V1900, N165/883, grid ref. 716063*, approximately 1 mile east of Whangaimoana, Palliser Bay, T. E. Bates and W. M. Briggs, July 1966; V1901, N165/884, grid ref. 704068, stream approximately $\frac{1}{2}$ mile east of Whangaimoana, Palliser Bay, T. E. Bates and W. M. Briggs, July 1966; (= V887 and V888); V1958, N165/948, grid ref. 967184, "Alpha Creek", small tributary of Mangaopari Stream, White Rock Road, about 7 miles south-east of Martinborough, south Wairarapa; V1981 (= V300), N165/509, grid ref. 967182, type locality of *Pellicaria mangaoparia* and low cliffs for 50 yd to the north (to the base of the Nukumaruian), Mangaopari Stream, White Rock Road, south Wairarapa. All faunas are of Waitotaran age. Species, and the collections in which they occur, are as follows:

	Collection No.
<i>Linucula</i> sp. (fragments)	1958
<i>Saccula</i> cf. <i>webbi</i> Marwick	1901
<i>Poroleda lanceolata</i> (Hutton)	1958
<i>Neilo australis wairoana</i> Marwick	1958
<i>Limopsis peteri</i> n. sp. (type locality)	1958
<i>Chlamys delicatula</i> (Hutton)	1901, 1958, 1981
<i>Parvanussium</i> aff. <i>maorium</i> Dell	1958
<i>Venericardia purpurata</i> (Deshayes)	1900
<i>Pleuromeris hectori</i> Powell	1958, 1981
<i>Neocardium (Pratulium) pulchellum</i> (Gray)	1958, 1981
<i>Marama murdochi</i> Marwick	1900, 1981
<i>Notocallista (Striacallista) multiistriata</i> (Sowerby)	1981
<i>Zenatia acinaces</i> (Quoy and Gaimard)	1981
<i>Leptomya</i> sp. (fragments)	1981
<i>Pellicaria acuminata mangaoparia</i> Vella	1958, 1981
<i>Zeacolpus (Stracolpus) quennelli</i> Marwick	1901, 1958, 1981
<i>Uberella cicatricella</i> Marwick	1901, 1958
<i>Proxiuber australe</i> (Hutton)	1901, 1958
<i>Friginatica amphiala</i> (Watson)	1958
<i>Cymatona kamplya</i> (Watson)	1958
<i>Poirieria zelandica</i> (Quoy and Gaimard)	1900, 1958, 1981
<i>Aeneator (Aeneator) imperator</i> King	1958, 1981
<i>Aeneator (Ellicea) orbitus</i> (Hutton)	1900, 1901, 1958, 1981
<i>Cominella (Eucominia) onokeana</i> (King)	1900, 1901, 1958, 1981
<i>Benthindsia incerta</i> (King)	1981
<i>Amalda (Gracilispira) novaezelandiae</i> (Sowerby)	1901, 1958
<i>Proximitra banksi</i> Dell	1958
<i>Bonellitia fundata</i> Marwick	1901, 1958
<i>Waipaoa marwicki</i> Dell	1901
<i>Alcihoë (Leporemax) brevis</i> Marwick	1900, 1901, 1959, 1981
<i>Iredalina mirabilis</i> Finlay	1900, 1901
<i>Comitas onokeana</i> King	1900, 1901, 1958, 1981
<i>Baibytoma (Micantapex) murdochi prior</i> Vella	1900, 1901, 1958, 1981
<i>Splendrillia whangaimoana</i> Vella	1900, 1901, 1958
<i>Aoteadrillia alba</i> (King)	1900, 1901, 1958
<i>Awateria retiolata</i> King	1901, 1958
<i>Maoritomella studiosorum</i> (King)	1901
<i>Mioawateria depressispira</i> n. sp. (type locality)	1901
<i>Scaphander flemingi</i> Marwick	1901
<i>Retusa oruaensis</i> (Webster)	1958
<i>Dentalium (Antalis) nanum</i> Hutton	1900, 1901, 1958, 1981

*Grid references are based on the sheet districts (e.g., N165) of the 1:63,360 topographical map series (NZMS 1) and the national thousand-yard grid shown on this series.

The uses of *Cominella* (*Eucominia*) instead of *Fax*, for *onokeana* King, and of *Amalda* instead of *Baryspira*, for *novaezelandiae* (Sowerby), follow Ponder (1968, pp. 36, 41).

The faunas are essentially the same as those from Palliser Bay listed by the writer in 1967, and they occur in strata deposited at similar depths. Many of the elements of the Palliser Bay fauna are absent at White Rock Road; the forms present at Alpha Creek but not yet recorded from Palliser Bay are compatible with a bathyal depth, but towards the top of the Waitotaran at Mangaopari Stream neritic elements such as *Zenatia acinaces* (Quoy and Gaimard) and *Notocallista multistriata* (Sowerby) appear. The main part of the section at Mangaopari Stream, including the type locality of *Pellicaria mangaoparia*, is apparently upper bathyal.

Type specimens of species described in this paper are lodged in the collections of the Geology Department of Victoria University of Wellington (registered numbers prefixed by VM), or of the New Zealand Geological Survey (registered numbers prefixed by TM).

TAXONOMY

Family NUCULANIDAE

Genus *Poroleda* Hutton, 1893

1893. *Poroleda* Hutton, Linn. Soc. N.S.W., MacLeay Mem. Vol.: 86.

Type species (by monotypy): *Scaphula* (?) *lanceolata* Hutton, 1885, Upper Miocene to Recent, New Zealand.

Poroleda lanceolata (Hutton) has imbricating lamellar teeth, as in the species figured as *Lamellileda tatei* (Hedley) by Ludbrook (1961, p. 64, pl. 3, figs. 7, 8). The latter species should therefore be referred to *Poroleda*. Reference to the type species of *Lamellileda* (Cotton, 1930, p. 227) showed that it is a peculiar species with curved teeth, and the genus may continue to be recognised tentatively. Australian species having chevron-shaped teeth, such as "*Poroleda*" *huttoni* (Tenison-Woods) (see Ludbrook, 1961, p. 63, pl. 3, figs. 9, 10), cannot be located in *Poroleda* and would be better placed in *Propeleda* (Iredale, 1925, p. 186) or in a new genus.

Poroleda lanceolata (Hutton, 1885)

1885. *Scaphula* (?) *lanceolata* Hutton, Trans N.Z. Inst. 17: 332.

1893. *Poroleda lanceolata*: Hutton, Linn. Soc. N.S.W., MacLeay Mem. Vol.: 86.

1906. *Poroleda lanceolata*: Hedley, Trans. N.Z. Inst. 38: 71, pl. 2, fig. 7.

1913. *Poroleda lanceolata*: Suter, Manual N.Z. Mollusca: 839, pl. 51, figs 5, 5a.

1925. *Poroleda perturbata* Iredale, Proc. Linn. Soc. N.S.W. 49 (3): 186.

1927. *Poroleda perturbata*: Finlay, Trans. N.Z. Inst. 57: 445.

1942. *Poroleda lanceolata*: Marwick, Trans. R. Soc. N.Z. 72 (3): 269.

1962. *Poroleda lanceolata*: Powell, Shells of N.Z., 4th ed.: 116.

1966. *Poroleda lanceolata*: Fleming, Bull. N.Z. Dep. scient. ind. Res. 173: 17.

A single fragmentary specimen from V1958, Alpha Creek, is inseparable from *lanceolata*. The species is not common as a fossil, and is restricted to strata deposited in middle neritic and deeper environments. According to Fleming (1966, p. 17) its time range is Kapitean (uppermost Miocene) to Recent.

Family LIMOPSIDAE

Genus *Limopsis* Sassi, 1827

1827. *Limopsis* Sassi, Giorn. Sci. Ligustico 1: 476.

1931. *Versipella* Iredale, Rec. Aust. Mus. 18: 203. Type species (by original designation): *Versipella soboles* Iredale, 1931, Recent, New South Wales.

1931. *Senectidens* Iredale, Rec. Aust. Mus. 18: 204. Type species (by original designation): *Senectidens dannevigii* Iredale, 1931, Recent, New South Wales.

Type species (by subsequent designation, Gray, 1847): *Arca aurita* Brocchi, 1814, Miocene and Pliocene, Italy; Recent, Denmark to Madeira and the Mediterranean.

The type species of *Versipella* Iredale and *Senectidens* Iredale, recently figured and redescribed by McMichael and Voorwinde (1966, pp. 16, 17), are normal members of *Limopsis*.

Limopsis peteri n. sp.

(Figs. 1-3)

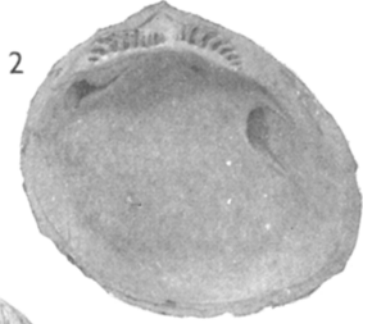
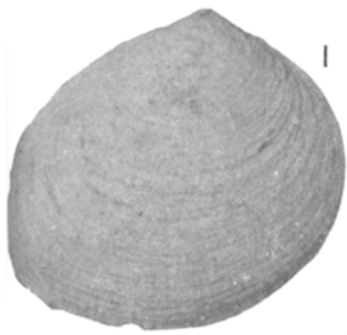
Shell small for the genus, thick but little inflated, with a smooth, flat, bevelled margin in the plane of the commissure. Umbo small, projecting moderately above the hinge line, little inflated. Hinge plate broad and thick, arcuate, bearing 8-10 curved teeth on each side, with a prominent, shallow, broad, triangular ligamental pit situated a little in front of centre. Area on each side of pit very narrowly triangular. Shape slightly to moderately oblique, large specimens resembling *L. marwicki* Powell, but small specimens (comparable in size with adult *L. marwicki*) considerably shorter and less oblique. Sculpture lightly fenestrated, consisting of about 60 fine, narrow, very slightly raised, flat-topped concentric ribs, about three and a half per mm, crossed by about 100 exceedingly weak radial grooves, about four per mm. Radials relatively weak over central portion of disc, stronger ventrally and much stronger over the posterior slope of all specimens. Interior surface inside the pallial line and muscle scars finely pitted and bearing weak, irregular, radial grooves. Posterior adductor muscle scar relatively large, obliquely oval, with a small separate retractor scar on the bottom of the hinge plate; anterior adductor muscle scar very small, quadrate, with a projection from the posterior dorsal corner leading up under the umbo, and a separate small retractor scar on the bottom of the hinge plate.

Dimensions (in mm):

	Length	Height
Holotype	18.4	16.5
Figured paratype, VM374	15.7	14.7
Paratype VM375, Alpha Creek (incomplete)	19.0	19.2
Paratype VM376, Alpha Creek	13.5	12.8
Paratype VM410, Palliser Bay	15.0	14.5

Localities: V1958, Alpha Creek, holotype (VM373) and 14 paratypes (VM374 to VM837); V1351 (= V887 and 888), cliffs east of Whangaimoana, Palliser Bay (Waitotaran), one paratype (VM410); V1883, N165/f886, grid ref. 942161, small tributary of Ruakokopatuna River, Ruakokopatuna Valley, T. E. Bates (Nukumaruan), three paratypes (VM404 to VM406); V1878, N165/f861, grid ref. 906135, small tributary of Ruakokopatuna River, T. E. Bates (Nukumaruan), 16 paratypes (VM388 to VM403).

- FIGS. 1-3—*Limopsis peteri* n. sp., V1958, Alpha Creek, White Rock Road, south Wairarapa (Waitotaran). Figs. 1, 2, holotype, 18.4×16.5 mm; Fig. 3, paratype VM374, showing radial sculpture, 15.7×14.7 mm.
- FIGS. 4, 5—*Friginatica amphiala* (Watson), V887, cliffs east of Whangaimoana, Palliser Bay (Waitotaran), 10.3×9.7 mm.
- FIG. 6—*Terefundus murchisoni* (Marwick), holotype, GS1099, Maraekakaho, Hawke's Bay (Nukumaru), 13×7 mm.
- FIG. 7—*Mioawateria depressispira* n. sp., holotype, V1901, cliffs east of Whangaimoana, Palliser Bay (Waitotaran), 4.6×3.7 mm.
- FIGS. 8-10—*Benthindsia incerta* (King), cliffs east of Lake Ferry, Palliser Bay (Waitotaran). Figs. 8, 9, 32.8×18.3 mm; Fig. 10, 35.9×19.5 mm.
- FIGS. 11-13—*Conominolia cowei* n. sp., holotype, cliffs east of Lake Ferry, Palliser Bay (Waitotaran), 4.1×3.3 mm.



4



5

6

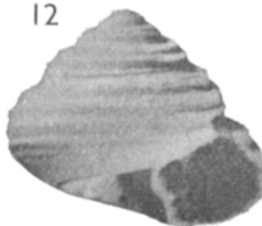
7



8

9

10



11

12

13

Since the Waitotaran and Hautawan *Limopsis* was listed by the writer (Beu, 1967) as *Limopsis* aff. *marwicki* Powell, many more specimens have been collected. They definitely represent a distinct species, differing from *L. marwicki* in the considerably greater size, much thicker shell, wider bevelled margin, and stronger sculpture. Immature specimens of *L. peteri* are shorter than *L. marwicki*, but adult specimens are the same shape. *L. peteri* resembles the Tongaporutuan (Upper Miocene) *L. lawsi* King in most features, but is significantly smaller and more oblique, and has weaker sculpture, a broader ligamental area, and weaker inflation.

The species is named for Mr Peter Wellman, who has been a frequent collecting companion in the Wairarapa district. His unpublished B.Sc. (Hons) project on *Limopsis* was consulted in this work.

Family PECTINIDAE

Genus *Parvamussium* Sacco, 1897

1897. *Parvamussium* Sacco, I Molluschi dei Terreni Terziari del Piemonte e della Liguria (24): 48.

Type species (by original designation): *Pecten duodecimlamellatus* Bronn, Miocene and Pliocene, Italy.

Parvamussium aff. *maorium* Dell, 1956

1956. *Parvamussium maoria* Dell, Bull. Dom. Mus., Wellington 18: 20, pl. 4, figs. 30, 31.

1963. *Parvamussium maoria*: Dell, Trans. R. Soc. N.Z., zool., 3 (20): 206.

Three fragments of *Parvamussium* from V1958, Alpha Creek, have the internal ribs extending to the outer margins of the valves, but as they represent specimens that were only about 9 mm high, they are impossible to identify with certainty. They are tentatively identified as *P.* aff. *maorium* Dell.

Family TROCHIDAE

Genus *Conominolia* Finlay, 1927

1927. *Conominolia* Finlay, Trans. N.Z. Inst. 57: 359.

Type species (by original designation): *Heliacus conicus* Marshall, 1917, Paleocene, New Zealand.

Conominolia cowei n. sp. (Figs. 11–13)

Shell small, conical, slightly wider than high, with strong spiral and weak axial sculpture. Spiral sculpture of three prominent, well-raised, flat-topped cords on spire whorls and four on the upper surface of the last whorl, the lowest at the periphery. Base slightly convex, with about 10 fine, faint spiral threads decreasing in strength from the periphery towards the umbilicus. Three prominent, smooth, flat-topped, closely spaced cords

margin the umbilicus, the innermost just within the umbilicus and meeting the apertural lip at the base of the columella. Axial sculpture of faint, widely spaced, prosocline lamellae that do not form gemmae on the spiral cords. Inner lip strongly flexed just below the parietal region by a marked spiral swelling within the umbilicus. Protoconch poorly preserved, apparently typical.

Dimensions of holotype: diameter, 4.1 mm; height, 3.3 mm.

Locality: Cliffs east of Lake Ferry, Palliser Bay (Waitotaran), collected by Mr D. Cowe.

Holotype (TM4303) and single small paratype (TM4304) in New Zealand Geological Survey.

The new species is nearest to *C. woodsi* Laws, from Sutherlands, Tenga-wai River, South Canterbury (Awamoan, Lower Miocene), differing in its slightly shorter form, fewer spiral cords, and considerably weaker axial sculpture. The only other small, similarly shaped species is *C. aflexura* Laws, from Pakaurangi Point, Kaipara Harbour, Northland (Hutchinsonian, Lower Miocene), but that species lacks the flexuous inner lip of all other species of *Conominolia*.

Conominolia has not previously been recognised above the Awamoan (Lower Miocene), and the Palliser Bay occurrence provides another example of a supposedly Miocene genus that lived on until the late Pliocene in deep water.

Family STRUTHIOLARIIDAE

Genus *Pelicaria* Gray, 1857

1857. *Pelicaria* Gray, Guide Syst. Distr. Moll. Brit. Mus. (1): 77.

Type species (by monotypy): *Pelicaria vermis* (sic) (= *Buccinum vermis* Martyn, 1874, validated I.C.Z.N. Opinion 479), Lower Pleistocene to Recent, New Zealand.

Pelicaria acuminata mangaoparia Vella, 1953

1953. *Pelicaria mangaoparia* Vella, Trans. R. Soc. N.Z. 81 (1): 40, pl. 4, figs. 8-10.

Vella (1953, p. 30) described the form as a full species, but it is extremely similar to *P. acuminata* (Marwick) and should not be given more than sub-specific rank. It is common at the type locality, V300 (an earlier collection equal to V1981). One specimen was collected at V1958, and fragments were recorded from most of the Palliser Bay localities listed by the writer (Beu, 1967). The form differs consistently from the variable neritic Nukumaruan *P. acuminata* in its shorter spire and less incised sutures, and usually has narrower cinguli.

P. acuminata mangaoparia appears to be chronologically segregated from *P. acuminata* (*sensu stricto*), and is probably a chrono-subspecies. However, distinctive deep-water populations of *Pelicaria vermis* exist today (G. Neef, pers. comm.) and *mangaoparia* could be interpreted as a similar deep-water form of *acuminata*.

Family NATICIDAE

Genus *Friginatica* Hedley, 1916

1916. *Friginatica* Hedley, A.N.A.R.E. Rep., ser. C, 4 (1): 61.

Type species (by original designation): *Natica beddomei* Johnston, Recent, south-eastern Australia.

Friginatica amphiala (Watson, 1881)

(Figs. 4, 5)

1881. *Natica amphiala* Watson, J. Linn. Soc. Lond. 15: 260.

1886. *Natica amphiala*: Watson, Rep. Voy. *Challenger*, Zool., 15: 437, pl. 27, fig. 6.

1913. *Polinices amphialus*: Suter, Manual N.Z. Mollusca: 290 (in part).

1953. *Friginatica conjuncta* Dell, Rec. Dom. Mus., Wellington 2: 43, fig. 8.

1956. *Friginatica conjuncta*: Dell, Bull. Dom. Mus., Wellington 18: 73.

1956. *Uberella amphiala*: Dell, Bull. Dom. Mus., Wellington 18: 76.

1963. *Friginatica amphiala*: Dell, Trans. R. Soc. N.Z., Zool., 3 (17): 175.

1967. *Friginatica* sp. Beu, Trans. R. Soc. N.Z., Geol. 5 (3): 100.

Comparison of Palliser Bay specimens identified by Beu (1967) as *Friginatica* sp. with a suite of specimens of *F. amphiala* (Watson) in the Dominion Museum showed them to be indistinguishable. Recent specimens are highly variable in shape, depth of the sutural channel, and width of the umbilicus; some have tall spires and a narrow form like the Recent Australian *F. beddomei* (Johnston), and others are short and broad. Most have a narrow or a closed umbilicus, and a few have a relatively broad, open umbilicus like Palliser Bay fossils. All have a weak basal sulcus in the umbilicus, or passing beneath the columellar callus of imperforate specimens, suggesting that *Friginatica* Hedley and *Sulconacca* Marwick may not be distinct.

Localities: V887 and V888, cliffs east of Whangaimoana, Palliser Bay (Waitotaran); V1958, Alpha Creek (Waitotaran); V1878, N165/f861, grid ref. 906135, small tributary of Ruakokopatuna River, T. E. Bates (Nukumaruau).

Family MURICIDAE

Genus *Terefundus* Finlay, 1927

1927. *Terefundus* Finlay, Trans. N.Z. Inst. 57: 425.

Type species (by original designation): *Trophon crispulatus* Suter, 1907, Recent, New Zealand.

Terefundus murdochi (Marwick, 1924)

(Fig. 6)

1924. *Trophon murdochi* Marwick, Trans. N.Z. Inst. 55: 198, pl. 17, figs. 12, 13.

1966. *Axymene murdochi*: Fleming, Bull. N.Z. Dep. scient. ind. Res. 173: 57, pl. 103, figs. 1248, 1249.

The species was previously known only by the holotype, from GS1099, blue clays in road cutting, Maraekakaho, Hawke's Bay, grid ref. N134/045200, Nukumaruan (lower Pleistocene). Two incomplete specimens were collected from V1489, at the largest stream on the coast, halfway between Lake Ferry and Whangaimoana, by Mr P. Wellman, and a third specimen is in the collection of Mr D. Cowe. They are identical to the holotype of *murdochi* in all significant features. The species was placed in *Axymene* by Fleming (1966, p. 57), but closely resembles *Terefundus axirugosus* Dell, 1956, differing in its larger size, broader shoulders on early whorls, and narrower, more widely spaced, spiral cords. Thus *murdochi* is placed in *Terefundus*. It is the largest member of the genus, the holotype being 13 mm high and 7 mm in diameter.

Family BUCCINIDAE

Genus *Euthrenopsis* Powell, 1929

1929. *Euthrenopsis* Powell, Trans. N.Z. Inst. 60 (1): 88.

Type species (by original designation): *Euthrenopsis otagoensis* Powell, Recent, New Zealand.

Euthrenopsis venusta Powell, 1929

1929. *Euthrenopsis venusta* Powell, Trans. N.Z. Inst. 60 (1): 89, pl. 3, fig. 56.

1967. *Buccinulum (Evarnula)* cf. *benthicola* Beu, Trans. R. Soc. N.Z., Geol., 5 (3): 107 (not of Dell, 1951).

Re-examination of the three specimens identified by Beu (1967, p. 107) as *Buccinulum* cf. *benthicola* Dell showed that they lack the parietal tubercle of *Buccinulum*, and have the sculptural, apertural, and protoconch features of *Euthrenopsis*. The Palliser Bay shells are similar in size and sculpture to *E. venusta*, and two are of the same shape, but the third is taller and resembles *E. bountyensis* Powell. They are not considered to be separable from *E. venusta*. *E. venusta* is the only species of *Euthrenopsis* recorded from the bathyal zone by Dell (1956, p. 174), who recorded the depth range as 50-300 fm.

This species strongly supports the bathyal depth of deposition of the Palliser Bay siltstones suggested previously by the writer.

Genus *Benthindsia* Iredale, 1936

1936. *Benthindsia* Iredale, Rec. Aust. Mus. 19: 317.

Type species (by monotypy): *Benthindsia problematica* Iredale, 1936, Recent, 110 fm, off Sydney, New South Wales.

Benthindsia incerta (King, 1933)

(Figs. 8-10)

1933. *Austrofusus incertus* King, Trans. N.Z. Inst. 63 (3): 343, pl. 35, fig. 4.

1966. *Austrofusus incertus*: Fleming, Bull. N.Z. Dep. scient. ind. Res. 173: 61.

1967. *Austrofusus incertus*: Beu, Trans. R. Soc. N.Z., Geol. 5 (3): 108.

Complete specimens of "*Austrofusus*" *incertus* King from Palliser Bay have not been collected, so that the nature of the canal and outer lip is not known. In shell form and sculpture the species compares closely with *Benthindsia miriamae* Dell (Dell, 1967, p. 312, figs. 3-5) and with species of *Benthindsia* from Australia and Japan. When complete specimens are found the canal should prove to be short and strongly twisted, and the outer lip should be variced. *B. incerta* is apparently very closely related to *B. miriamae* Dell, trawled in about 300-400 fm between New Zealand and Norfolk Island and between New Zealand and the Kermadec Islands. *B. miriamae* differs from *B. incerta* mainly in having fewer spiral cords and a broader, more concave shoulder. *B. incerta* is a rare species, and only 10 specimens, including the holotype and four paratypes, are known to me. The two best-preserved of these are figured here (Figs. 8-10). They are lodged in the type collection of the Geology Department of Victoria University of Wellington (VM360, VM361).

Family TURRIDAE

The relegation of *Micantapex* to a subgenus of *Bathytoma* in the species list on p. 485 follows the generic revision of the Turridae by Powell (1966).

Subfamily DAPHNELLINAE

Genus Mioawateria Vella, 1954

1954. *Mioawateria* Vella, Trans. R. Soc. N.Z. 81 (4): 552 (as a subgenus of *Awateria*).

Type species (by original designation): *Awateria personata* Powell, 1942, Pliocene, New Zealand.

Awateria is customarily placed in the Subfamily Borsoniinae, and this appears correct on the available evidence. The protoconch is poorly preserved on previously described species of *Mioawateria*. Mr P. A. Maxwell, of the New Zealand Geological Survey, recently discovered that specimens of *Mioawateria* close to *M. personata* (Powell), from the Waiauan Stage at Kororo Brickworks, Greymouth, have a well-preserved, narrowly conical, diagonally reticulate, "daphnellid" protoconch. Thus *Mioawateria* must be raised to generic rank and transferred to the Subfamily Daphnellinae.

Mioawateria depressispira n. sp.

(Fig. 7)

Protoconch decorticated. Shell small, short, and broad. Whorls broad and low, with a prominent peripheral carina around the edge of a flat tabulate shoulder that bears a few widely spaced, fine, spiral threads. Sides of spire whorls shorter than width of shoulder, contracted below the keel. Sculpture of three fine, widely spaced, spiral cords on sides of penultimate whorl, none on whorls above, and 10 major spirals on sides of last whorl and base, with one secondary thread and two fine tertiary lirae in each interspace

except the upper three. These cross low, rounded, oblique, widely spaced, axial folds that commence below the peripheral carina, 11 on the penultimate whorl. Outer lip and canal broken away; from sinuous axial growth lines, sinus apparently typical of the genus.

Dimensions: height, 4.6 mm; diameter, 3.7 mm.

Locality: V1901 (= V887 and 888), cliffs east of Whangaimoana Stream, Palliser Bay (Waitotaran), unique holotype (VM349).

The species differs strongly from other members of the genus in its very low spire and broad, tabulate shoulders. Although not well preserved, the single specimen shows the distinguishing features clearly.

Family SCAPHANDRIDAE

Genus Scaphander Montfort, 1810

1810. *Scaphander* Montfort, Conchyliologie Systematique 2: 335.

Type species (by monotypy): *Bulla lignaria* Linnaeus, 1758, Recent, Mediterranean Sea.

Scaphander flemingi Marwick, 1965

1965. *Scaphander flemingi* Marwick, Paleont. Bull. N.Z. geol. Surv. 39: 46, pl. 8, figs. 4, 11.

The species was described from GS1215, on the coast 1-2 miles west of Wairoa River mouth, northern Hawke's Bay (Nukumaruan). Marwick (1965, p. 46) commented on the extremely thick inner lip, which is one of the distinctive features of the species. A fragment of the last whorl of a large *Scaphander* from V1901, from the cliffs east of Whangaimoana, Palliser Bay (Waitotaran), has the thick inner lip typical of *S. flemingi*. The species appears to be ancestral to *S. otagoensis* Dell, 1956.

Family RETUSIDAE

Genus Retusa Brown, 1827

1827. *Retusa* Brown, Illust. Conch. of Great Britain and Ireland: expl. to pl. 38, figs. 1-6.

Type species (by subsequent designation, Iredale, 1915): *Bulla obtusa* Montagu, 1807, Recent, Europe.

Retusa oruaensis (Webster, 1908)

1908. *Tornatina oruaensis* Webster, Trans. N.Z. Inst. 40: 255, pl. 20, figs. 12-15.

1956. *Retusa oruaensis*; Dell, Bull. Dom. Mus., Wellington 18: 152, pl. 22, figs. 224-229, pl. 23, figs. 238-242 (with full synonymy).

A single specimen from V1958, Alpha Creek, collected by Mr P. Wellman, has a rather tall spire and parallel sides, and is inseparable from tall-spired specimens of *R. oruaensis* (Webster) discussed and figured at length by Dell (1956, p. 152). The species was recorded from the Nukumaruan Stage (Lower Pleistocene) by Fleming (1966, p. 79).

ACKNOWLEDGMENTS

I would like to thank Mr T. E. Bates for permission to use specimens collected in the course of mapping for his M.Sc. thesis; Mr P. Wellman and Mr D. Cowe for the use of specimens from their collections; Mr P. A. Maxwell for permission to publish his discovery on the protoconch of *Mioawateria*; Dr R. K. Dell of the Dominion Museum for information on *Bentbindsia* and related genera; and Dr C. A. Fleming of the New Zealand Geological Survey and Professor P. P. Vella of Victoria University of Wellington for criticism of the manuscript. Mr D. L. Homer and Mr T. R. Ulyatt, New Zealand Geological Survey, took the photographs reproduced as Figs. 6 and 11-13.

REFERENCES

- BEU, A. G. 1967: Deep-water Pliocene Mollusca from Palliser Bay, New Zealand. *Trans. R. Soc. N.Z., Geol.*, 5 (3): 89-122, pls. 1, 2.
- COTTON, B. C. 1930: Pelecypoda of the "Flindersian" Region, Southern Australia. No. 1. *Rec. S. Aust. Mus.* 4 (2): 223-40, 15 figs.
- DELL, R. K. 1956: The archibenthal Mollusca of New Zealand. *Bull. Dom. Mus., Wellington* 18. 235 pp., 27 pls.
- 1967: Some Mollusca from deep water to the north of New Zealand, collected by the *Tui*, 1962. *Rec. Dom. Mus., Wellington* 5 (25): 305-15, 9 figs.
- FLEMING, C. A. 1966: Marwicks' illustrations of New Zealand shells, with a checklist of New Zealand Cenozoic Mollusca. *Bull. N.Z. Dep. scient. ind. Res.* 173. 456 pp., 145 pls.
- IREDALE, T. 1925: Results from Roy Bell's molluscan collections. *Proc. Linn. Soc. N.S.W.* 49: 179-278, pls. 33-36.
- LUDBROOK, N. H. 1961: Revision of the Tate molluscan types: Pelecypoda-Nuculidae and Nuculanidae. *Trans. R. Soc. S. Aust.* 85: 55-65, pls. 1-3.
- MCMICHAEL, D. R.; VOORWINDE, J. 1966: Illustrations of unfigured New South Wales marine Mollusca. Part 1. *J. Malac. Soc. Aust.* 10: 13-20, pls. 2, 3.
- MARWICK, J. 1965: Upper Cenozoic Mollusca of Wairoa District, Hawke's Bay. *Paleont. Bull. N.Z. geol. Surv* 39: 59 pp., 11 pls.
- PONDER, W. F. 1968: Nomenclatural notes on some New Zealand rachiglossan gastropods with descriptions of five new species. *Rec. Dom. Mus., Wellington* 6 (4): 29-47, 5 pls.
- POWELL, A. W. B. 1966: The molluscan families Turridae and Speightiidae. *Bull. Auckland Inst. Mus.* 5. 184 pp., 23 pls.
- VELLA, P. 1953: The genus *Pellicaria* in the Tertiary of East Wairarapa. *Trans. R. Soc. N.Z.* 81: 35-48, pl. 4.