TUHINGA

Records of the Museum of New Zealand Te Papa Tongarewa

NEW SPECIES AND RECORDS OF DEEP-WATER MOLLUSCA FROM OFF NEW ZEALAND

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TE PAPA TONGAREWA
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NEW SPECIES AND RECORDS OF DEEP-WATER MOLLUSCA FROM OFF NEW ZEALAND

R.K. Dell[1]

ABSTRACT: New species of *Acharax*, *Adipicola*, *Lyonsiella*, *Poromya*, *Antimargarita* and *Antarctodomus* are described from off New Zealand. New records are given for *Galeodea triganceae* Dell, *Volutomitra banksii* Dell and *V. (Latiromitra) problematica* Ponder. The subspecies *Penion benthicolus delli* Powell can not be distinguished from *Penion benthicolus* Dell. *Boreotrophon shirleyi* Cernohorsky is transferred to the family Turbinellidae and placed in *Metzgeria* Norman. Two species, *Poromya undosa* Hedley and Petterd (described from off New South Wales) and *Claviscala kuroharai* Habe (described from off Japan) are recorded from New Zealand. The supposed scaphopod, *Dentalium tiwhana* Dell is transferred to the Polychaeta.

INTRODUCTION

Amongst the Mollusca collected by the USNS *Eltanin*, sent to the writer for identification and description, were some deep-water forms from off New Zealand. Some of the more striking of these, together with species collected during field work by the Museum of New Zealand and the New Zealand Oceanographic Institute, are described and recorded below. The material collected by the *Eltanin* will be deposited in the National Museum of Natural History, Washington, but some examples will be retained in the Museum of New Zealand.

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ABBREVIATIONS

The names for institutions mentioned in the text are abbreviated as follows:

MONZ – Museum of New Zealand

NZOI – New Zealand Oceanographic Institute

USNMNH – United States National Museum of Natural History, Washington.

SYSTEMATICS

Family SOLEMYIDAE Gray, 1840

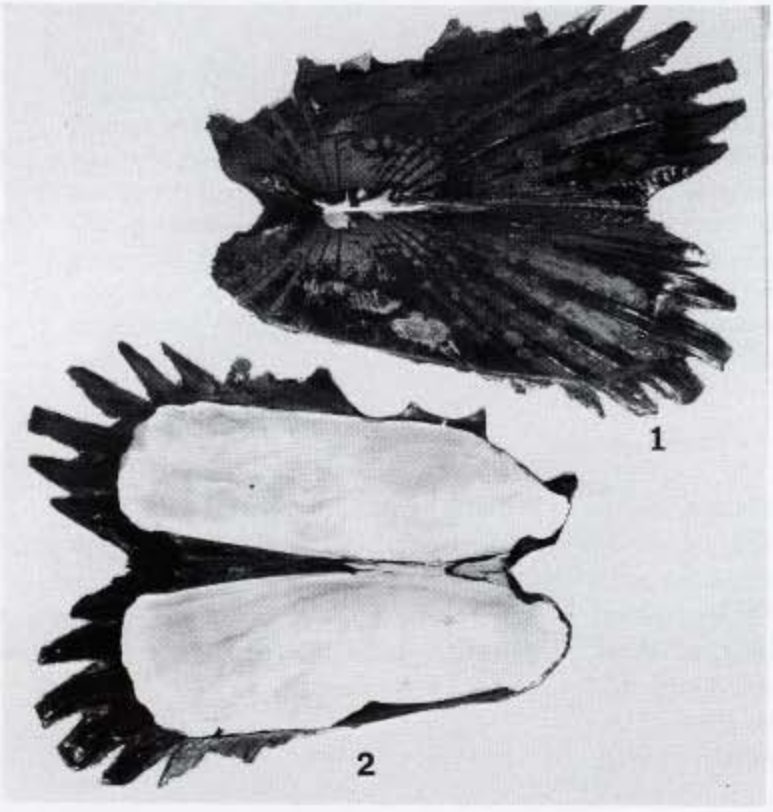
Genus *Acharax* Dall, 1908

Type species (original designation) *Solemya johnsoni* Dall, 1891, Recent, western North America.

***Acharax clarificata* n.sp.** Figs 1-3

Cyrtodaria sp. Dell, 1978: 161.

DESCRIPTION: Shell large, inequilateral, beaks situated about posterior third, dorsal and ventral margins almost straight and parallel, beaks hardly demarcated from dorsal margin. Anterior mar-gin truncate, sloping backwards, posterior margin more or less evenly rounded. Periostracum dark brown, almost black anteriorly, heavy, extending well beyond the shell margins, especially anteriorly where it splits into 6 extensions. Periostracum fused right along posterodorsal margins of the valves. Ligament external, relatively short, lightly calcified in larger shells, fixed to curving, thickened nymphs. External shell surface sculptured by deep radial grooves, most distinct towards anterior extremity, sparser and reduced to



Figs 1,2. *Acharax clarificatus* n.sp., holotype, 87.7 x 32.7 mm.

fine striae across disc of shell and posteriorly, the strongest grooves showing as wide, radiating ridges internally. Shell thickened especially around beaks, anterior adductor large, subtriangular, posterior adductor broadly triangular and smaller than anterior.

Dimensions without periostracum; length, 87.7 mm; height 32.7 mm.

TYPE MATERIAL: BS 652, 42°50.5'S, 175°43.8'E northern Mernoo Slope, Chatham Rise, 683-703 m, r.v. *Tangaroa* (NZOI Stn R. 10) 11 Jan. 1979 (paratypes, M.60312); BS 666, 42°08.9'S, 174°25.4'E off Clarence River mouth, 1104-1099 m, r.v. *Tangaroa* (NZOI Stn R. 24), 14 Jan. 1979 (holotype M.59662), in Museum of New Zealand).

OTHER MATERIAL: BS667, 42°08.3'S, 174°28.4'E off Clarence River mouth, 1054-1163 m, r.v. *Tangaroa* (NZOI Stn R.25), 14 Jan. 1979; off Aldermen Islands, 366-549 m, prawn trawl, May, 1969, N. Douglas collection (MONZ).

REMARKS: Within a few months of recording a fragment of the beaks of a large bivalve from deep water off Cape Palliser, complete specimens were obtained by a National Museum party working from the r.v. *Tangaroa*. These specimens show that the writer's original identification of the fragment as a species of *Cyrtodaria* was about as far astray as it is possible to be in the Bivalvia, since the complete specimens show that a species of the solemyid genus *Acharax* is involved. All the material obtained was collected dead on a muddy substrate.

The relationships of the species of *Acharax* are poorly known. Knudsen (1970, p. 70) considered *A. agassizi* Dall, 1908 to be synonymous with *A. johnsoni* Dall, 1891. The writer has recently examined material from southern South America and concluded that *A. macrodactyla* Rochebrune and Mabille, 1891 cannot be differentiated from *A. patagonica*, Smith, 1885, and that this form is very close to *A. johnsoni*. The New Zealand form appears to differ from the "*agassizi - patagonica* group" in the relatively higher shell and in the shape of the adductor muscle scars. The Japanese *A. tibae* Kuroda, 1948 is also close but the new species differs in the greater extension of the posterior shell behind the beaks, the different shape of the adductor muscle scars and the rather narrower shell outline than those of *A. tibiae*.

Family MYTILIDAE Rafinesque, 1815

Warén (1991: 115) has argued for the retention of *Idas* Jeffreys, 1876 rather than the use of Iredale's replacement name *Idasola* as advocated by the writer (Dell, 1987: 25). Since the publication of *Idas* Mulsant cannot be dated accurately within 1876, it must be considered to date from 31 December, 1876, and *Idas* Jeffreys which apparently appeared in November, 1876 would therefore have priority. Strict application of the Rules of Zoological Nomenclature would probably uphold this decision. Analysis of whether the use of either name would result in greater stability of nomenclature would be time consuming and of doubtful value.

Warén queried if there were any grounds for distinguishing *Idas* (or *Idasola*) from *Adipicola* Dautzenberg since some adult specimens of *A. simpsoni* (Marshall) retain a series of weak striations on the posterodorsal hinge line. Warén also concluded that specimens both he (Warén, 1979, pl. 7, figs 11-12) and the writer (Dell, 1987: 27, figs 29-30) had figured as *I. argentea* Jeffreys were young examples of *A. simpsoni*. However, the specimen figured by the writer from *Triton* Stn 10 in the collection of the British Museum (Natural History) showed very well developed epidermal hairs. No sign of any such hairs can be detected in any of the undoubted adult specimens of *A. simpsoni* examined.

All the material of these deep-water mytilids examined by the writer, amounting to several thousand specimens from the New Zealand area, has been readily assigned to *Idas* or *Idasola* on the basis of size, presence or absence of epidermal hairs, and the presence of well marked anterior and posterior striated areas on the hinge line persisting in adults. The only exception in all the species of the group in general is found in a relatively few adult specimens of *A. simpsoni*. The distinction between the two groups seems a useful one to maintain in the meantime although further study especially of the development of hinge line elements during growth may well modify this conclusion.

There is still a great deal of uncertainty regarding the systematics of the group. In the Atlantic Ocean and Mediterranean such forms as *Myrina dalmasi* Dautzenberg and Fischer, 1897 and *Myrina modiolaeformis* Sturany, 1893 and even *Idas argenteus* Jeffreys itself are not well understood. Few species have been described or recorded from other areas apart from New Zealand although much material must have been collected.

Since the writer prepared a review of the New Zealand deep-water mytilids associated with organic substrates (Dell, 1986), a range of additional material, including a new species of *Adipicola* (described below) has been obtained. *Idas washingtoniana* (Bernard, 1978) has been identified from a further 21 stations in depths from between 490 and 1203 m, in all cases attached to sunken wood (including the cone of a species of *Pinus*). *Adipicola osseocola* Dell, 1986 is now known from seven other stations, six attached to wood and one from a whale skull, in depths ranging from 880 to 1120 m.

Genus *Adipicola* Dautzenberg, 1927

Type species (monotypy) *Myrina denhami* H. & A. Adams, 1854 = *Modiolarca pelagica* Woodward, 1854, Recent, South Atlantic.

***Adipicola arcuatilis* n.sp.** Figs 4-9

DESCRIPTION: Shell of medium size (up to 30 mm in length), thin and fragile, with a shiny brown periostracum, elongate, the anterodorsal and posterodorsal margins meeting at a broad angle, ventral margin deeply and broadly sinuate, and constricted to give a bow-shaped outline.

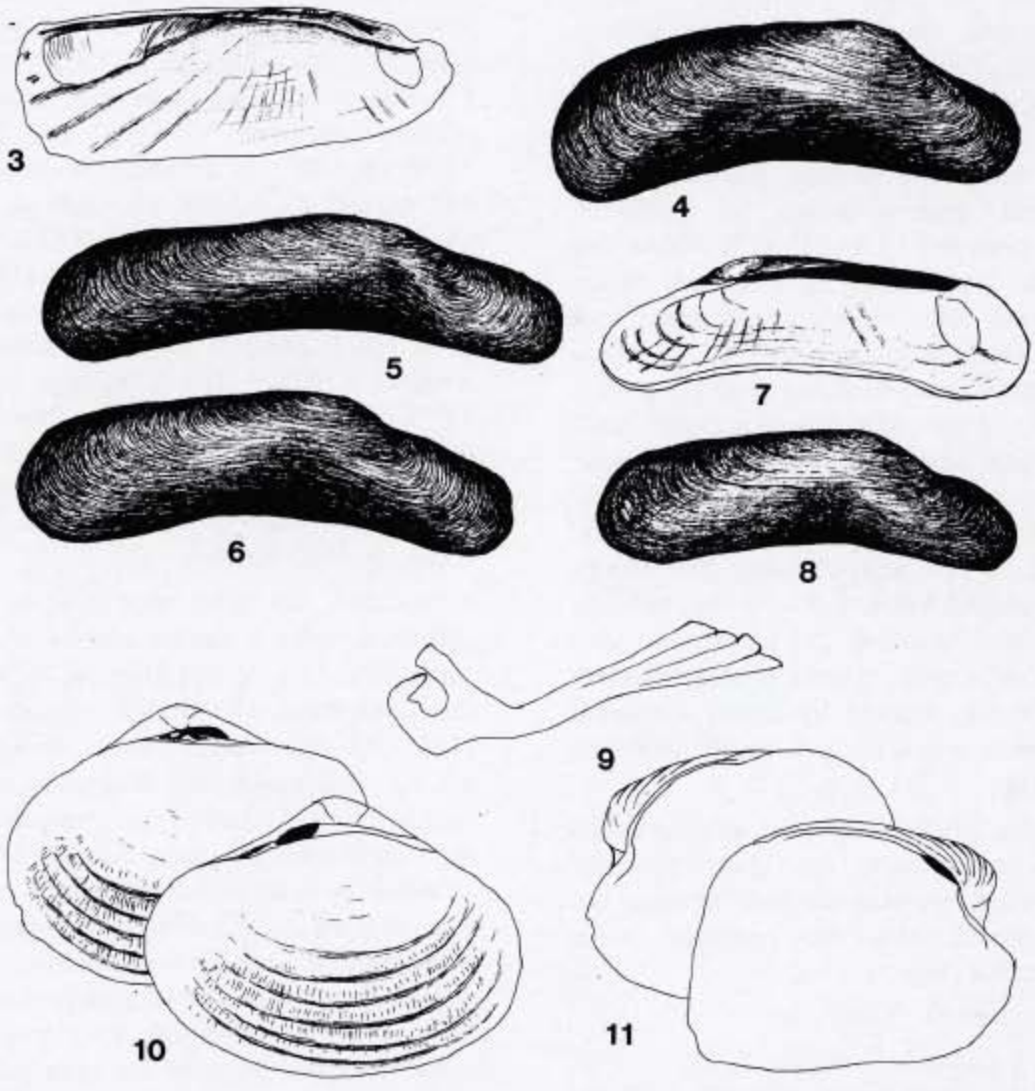


Fig. 3. *Acharax clarificatus* n.sp., holotype, interior of valve showing position and size of muscle scars. Fig. 4. *Adipicola arcuatilis* n.sp., A03/5/86, 27.4 x 8.2 mm. Fig. 5. *Adipicola arcuatilis* n.sp., B01/73/85, paratype 30.6 x 7.2 mm. Fig. 6. *Adipicola arcuatilis* n.sp., B01/73/85, 29.2 x 7.8 mm. Figs 7,8. *Adipicola arcuatilis* n.sp., holotype, 24.8 x 8.4 mm. Fig. 9. *Adipicola arcuatilis* n.sp., B01/73/85, foot and adductor muscles. Fig. 10. *Poromya microsculpta* n.sp., holotype, 16.2 x 12.2 mm. Fig. 11. *Lyonsiella aotearoa* n.sp., holotype, 6.5 x 5.0 mm.

Beaks not very prominent, directed forwards, situated at between anterior fourth and third, anterior margin produced, narrowly rounded, posterior margin more broadly expanded. Prodissoconch minute, 500-600 µm in length, reddish brown, no distinction between Prod I and Prod II visible, but with 2 or 3 irregularly spaced, darker growth lines in many specimens, not consistent from specimen to specimen. External ligament strong, extending along most of the posterodorsal margin. Shell surface sculptured with rather regular growth wrinkles, with very fine irregular radial striae across the posterior disc and with a few irregular tear like radials developed below the beaks towards the posterior sinuation. No periostracal hairs are developed. Interior of shell polished, nacreous, marked by broad concentric growth wrinkles, and broad, indistinct radials.

Foot situated well forward, anterior byssal retractor muscle very short, posterior retractor very long, the pedal retractor not separated from the posterior byssal retractor (Fig. 9).

DIMENSIONS: See Table 1

TYPE MATERIAL: 42°56.2'S, 175°32.6'W, NE of Chatham Islands, 880-882 m, 17 July 1985, *Otago Buccaneer* Stn BOI/73/85, on sunken whale skull, holotype (M.89788) and several hundred paratypes (M.89789) in MONZ: Trawled off Mernoo Bank, Chatham Rise c.900 m, Oct. 1988, *Amantel Explorer*, on whale skull, 400 paratypes (M.100386), in MONZ.

OTHER MATERIAL EXAMINED: 44°07.8'S, 178°31.6'E, Chatham Rise, 937-955 m, 2 Nov. 1986, f.v. *Arrow*, Stn A03/5/86, coll. P. McMillan, on sunken whale skull, several hundred specimens; *Oyang* 7 Stn 22, 44°40.5'S, 174°01'E, off Banks Peninsula, 844 m, coll. C. Roberts, on whale skull; *Oyang 7*, Stn 18, 39°52'S, 167°07'E, to 39°43.5'S, 167°15.9'E, East slope Challenger Plateau, 1116-1120 m, 7 Sept. 1988, coll. P. Sharples, on whale vertebra; *Amantel Explorer* Trip 248, tow 129, 39°53.2'S, 168°01.2'E, Challenger Plateau, 908-912 m, 3 July 1989, on whale bone; 43°51.5'S, 177°51.8'E, Chatham Rise, 572-587 m, *Azuchi Maru*, 27 Oct. 1987, coll. M. Yates, on whale vertebra.

REMARKS: The only other species of *Adipicola* with a similar outline is *A. longissima* (Thiele and Haeckel, 1931) described from off Sumatra. Knudsen (1961: 206) recorded *A. longissima* from off the Philippines, and Horikoshi and Tsuchida (1984) studied specimens from the Sulu Sea and off Japan, illustrated the changes in outline during growth and showed that its usual habitat was probably attached to the sunken fruits of the nipa palm (*Nypa fruticans* Wurmb). Loch (1990: 1-2) recorded *Adipicola longissima* from the fruits of the nipa palm trawled off Queensland, Australia at 1600-2053 m depth, together with *Idasola coppingeri* (Smith).

In also recording *A. longissima* from a coconut collected off New South Wales in 990-1022 m, Loch was able to confirm that the fruits both of the nipa and the coconut palms are used as substrates by this species. The new species differs from

A. longissima in having a much longer and less attenuate shell anterior to the beaks and a much less expanded posterior end.

Although the sinuate ventral margin allows large numbers of specimens to attach themselves close together on a substrate, it seems that the shape of the shell is not determined by a response to the habitat since half grown shells, and adults attached singly all develop the arcuate shape. Although no observations of live specimens has been possible, it is most probable that these deep-sea mussels can shift their position. The specimens studied occurred in very large numbers on seven sunken whale bone samples all trawled to the east of central New Zealand.

There is some variation amongst populations and between populations in shell proportions (Table 1). The specimens from BOI/73/85 are relatively consistent amongst themselves with narrow shells and an elongate anterior projection, height/length ratios ranging from 24-34 (mean 28) and position of the beaks/length ratios ranging from 29-36 (mean 31). Those from A03/5/86 are similar in height/length ratios which range from 27-30 (mean 29) but tend to have a shorter anterior extension, position of beaks/length ratios ranging from 24-34 (mean 29). Those from *Oyang 7* Stn 22 have a rather deeper shell, height/length ratios ranging from 31-36 (mean 33) but the position of beaks/length ratios which range from 29-34 (mean 32) are comparable with those for the other two populations. There is, however, considerable overlap in the proportions of the shell between the populations and all would appear to represent the same species.

Although very large numbers of specimens have been obtained, they have all come from a limited number of examples of whale bone. Material from additional samples will allow the significance of the variation noted between samples to be better assessed. In all populations the prodissoconchs fall within the same size range. Amongst the material were examples of prodissoconchs which had settled before any adult shell substance was formed.

If as seems most probable, populations living on such small, scattered and ephemeral substrates are recruited from opportunistic settling from large numbers of larvae, a greater homogeneity between adjacent populations such as this would be expected. Many of the species of a wide range of molluscs and other organisms found on these restricted substrates occur in enormous numbers, indicative of a rich food supply.

Dispersal between such scattered small habitat "islands" requires a free-living larval stage. The development of very large numbers of the same organism on a substrate with a limited life requires a large number of larvae to be available for colonisation. Given these postulates, it is therefore difficult to accept that differences between populations of mussels from such a small area could be genetically controlled even if a percentage

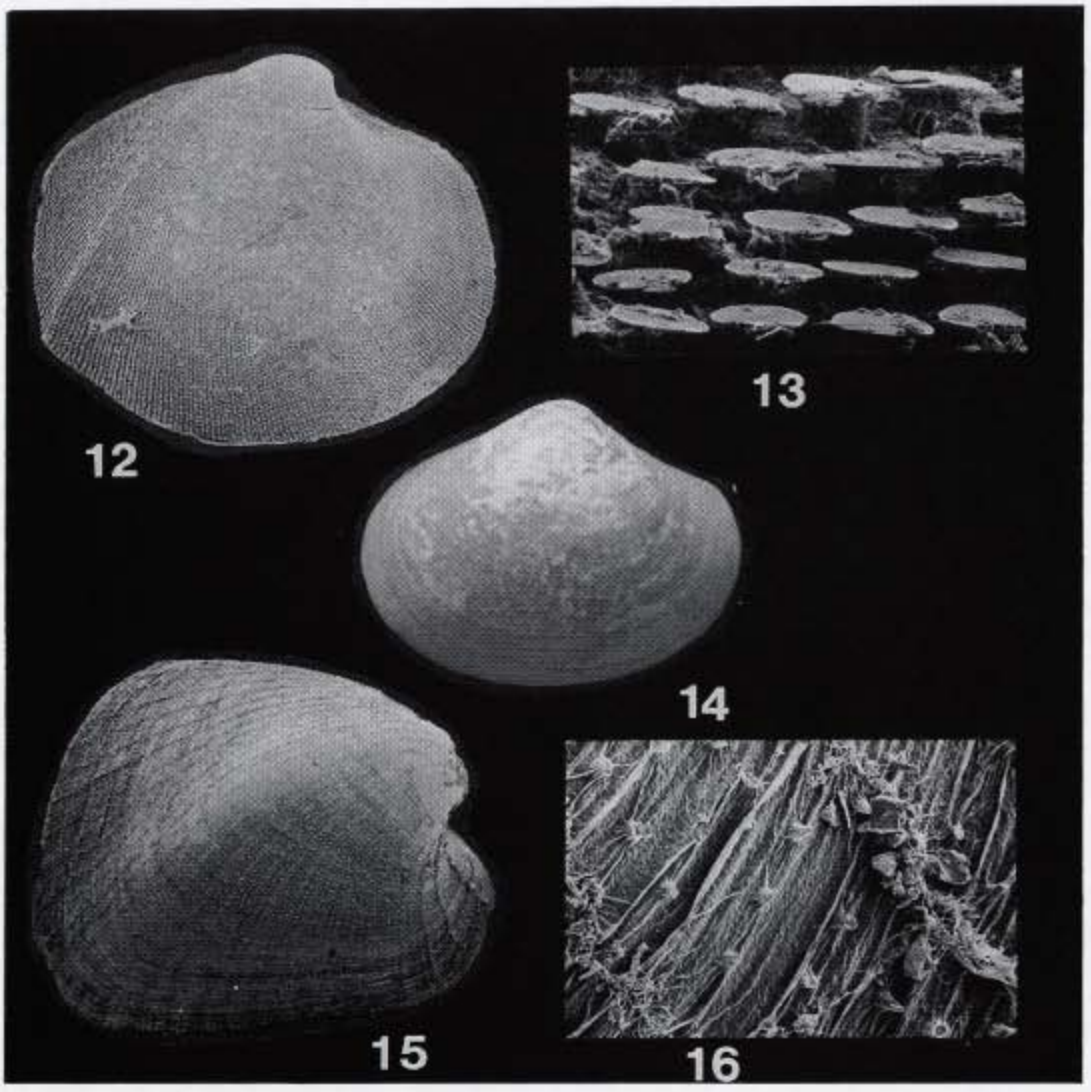


Fig. 12. ***Poromya undosa*** **Hedley and Petterd, BS 741, 5.8 x 5.0 mm. Fig. 13.** ***Poromya undosa*** **Hedley and Petterd, BS 741, detail of oblique microsculpture under SEM. Fig. 14.** ***Poromya microsculpta*** **n.sp., holotype, 16.2 x 12.2 mm. Fig. 15.** ***Lyonsiella aotearoa*** **n.sp., holotype, 6.5 x 5.0 mm. Fig. 16.** ***Lyonsiella aotearoa*** **n.sp., holotype, details of sculpture on two radials on anterior portion of shell disc under SEM.**

of the population present on any single substrate is self-recruiting.

Family VERTICORDIIDAE Stoliczka, 1871

Genus *Lyonsiella* (M. Sars, 1869) Friele, 1879

Type species (subsequent designation Soot-Ryen, 1966) *Lyonsiella abyssicola* M. Sars, 1869 = *Pecchiolia abyssicola* (M. Sars) G.O. Sars, 1872, Recent, Norwegian Sea.

Soot-Ryen (1966, p.25) discussed the question of the authorship of *Lyonsiella* and the proper citation of the type species. He also listed the five species he believed should be retained in the genus; *Pecchiolia abyssicola* (M. Sars) G.O. Sars, 1872, *Pecchiolia subquadrata* Jeffreys, 1881, *Lyonsiella planulata* Thiele, 1912, *Lyonsiella quadrata* Hedley, 1907, and *Lyonsiella magnifica* Dall, 1913. Allen and Turner (1974) have added two additional species, *L. frielei* and *L. perplexa* from the Atlantic abyssal.

***Lyonsiella aotearoa* n.sp.**

Figs. 11, 15, 16

DESCRIPTION: Shell of medium size for the genus, subquadrangular, inequilateral, beaks situated close to the anterior margin, covered by a thin, light brown epidermis. Beaks prominent, strongly incurved, pointing forwards, leaving little anterodorsal margin. Posterodorsal margin long, slightly and evenly concave, meeting the almost obliquely slanting posterior margin abruptly. Ventral margin almost straight with a median sinuation in the left valve. Anterior margin narrowly, but evenly rounded. Sculptured by some 28 rather irregular major radial ribs set with very fine prickly granules. Interstices with 2 to 3 rows of fine prickles arranged radially. Commarginal sculpture consists of growth lines and fine, raised ridges most prominent on posterodorsal shell surface. Hinge edentulous, ligament supported by a fairly solid lithodesma. External ligament long.

Length 6.5 mm, height 5.0 mm (holotype).

TYPE MATERIAL: BS 670, 42°00.8'S, 174°41.0E, eastern approaches to Cook Strait, 939-1019 m, r.v. *Tangaroa* (NZOI Stn R.28) 14 Jan. 1979 (Holotype in MONZ, M.60447).

REMARKS: Examination of the shell surface of species of this genus under the Scanning Electron Microscope will undoubtedly reveal structures of systematic importance. Members of the genus are well known for attaching sand grains to the shell surface. At high magnification *L. aotearoa* (Fig. 16) exhibits two types of radial sculptural elements. A complicated series of hair-like processes is developed along each major radial rib, and these processes entrap sand grains. Complicated commarginal sculpture is developed between these radials, the major commarginals bearing 3 small complex pustules in each radial interspace.

From the other known forms, the new species differs in not having the dorsal and ventral margins parallel. The nearest species geographically is *Lyonsiella quadrata* Hedley, 1907 from off New

South Wales, a species for which Iredale erected the genus *Proagorina*. Soot-Ryen (1966: 25) included *L. quadrata* in *Lyonsiella* without comment and in our present state of knowledge of the group, there seems little need for Iredale's genus. The new species differs from *L. quadrata* not only in outline but in its much more pronounced radial sculpture.

Family POROMYIDAE Dall, 1886

Genus *Poromya* Forbes, 1844

Type species (monotypy) *Poromya anatinoides* Forbes, 1844 = *Corbula granulata* Nyst and Westendorp, 1839, Recent, Atlantic.

***Poromya undosa* Hedley and Petterd, 1906** Figs 12, 13

Poromya undosa Hedley and Petterd, 1906: 224, pl. 38, figs 16, 17.

Questimya undosa: Iredale, 1930: 388; Iredale and McMichael, 1962: 16.

MATERIAL EXAMINED: BS 741, 37°20.6'S, 176°28.0'E, east of Mayor Island, 482-550 m, r.v. *Tangaroa* (NZOI Stn R.99), 22 Jan. 1979.

REMARKS: The basic sculpture consist of extremely fine flat-topped pustules arranged in radial and excentric commarginal rows, the pustules supported above the basic shell suface on single small pillars (Fig. 13).

Described from 23 miles, due east of South Head, Port Jackson, Sydney in 457 and in 548 metres, *P. undosa* does not appear to have been recollected in Australian waters. The New Zealand specimen matches Hedley and Petterd's figure and specimens exactly. The depths of occurrence in both countries are strictly comparable.

Iredale (1930, p.388) erected the genus *Questimya* for *undosa* but gave no reasons for separating his new genus, and Keen (1969, N.852) included *Questimya* as a synonym of *Poromya*. The question of generic or subgeneric division of forms grouped in *Poromya* cannot be decided until much more material of these deep-water species is available. In the meantime *undosa* seems best retained in *Poromya*.

Of the four species of *Poromya* now known from New Zealand Waters, *P. undosa* and *P. laevis* Smith, 1885 also occur in Australia.

***Poromya microsculpta* n.sp.**

Figs 10,14

DESCRIPTION: Shell of medium size for the genus, inequilateral, fragile, beaks prominent, incurved, situated a little closer to the posterior than the middle of the valve. Dorsal margins sloping rather rapidly from the beaks at first, the posterodorsal margins broadly and evenly rounded, posterior outline slightly restricted. Sculpture of very fine, sharp granules arranged in close-spaced radial rows, much more sparsely represented across the anterodorsal segments of the valve and becoming closer packed and more prominent posteriorly, about 8 or 9 radial rows per millimetre along mid ventral margin. Granules worn off over early portion of the valve leaving irregular growth lines as the major sculptural element. Valves gaping at the posterior end. A single small, very obliquely set

cardinal tooth in the right valve. Interior of valve, nacreous, marked by fine radial lines. Ligament posterior, relatively long.

Length 16.2 mm, height 12.2 mm (holotype).

TYPE MATERIAL: BS 670, 42°00.8'S, 174°41.1'E Cook Strait, 939-1019 m, r.v. *Tangaroa* (NZOI Stn R.28) 14 Jan. 1979 (holotype, in MONZ, M.60423).

In addition to the holotype, which consists of an articulated but empty specimen, several broken shells were obtained at the same station. The new species differs from *P. neozelanica* (Dell, 1956) in its much greater size, different outline, its more central position of the beaks, its concave posterodorsal margin, its finer granulation and its less prominent, single cardinal tooth. *P. australis* Smith, 1885 is a much deeper shell in proportion. The new form resembles the type species of the genus, *P. granulata* (Nyst and Westendorp, 1839) but differs in its more attenuate posterior outline and in lacking any sign of a posterior ridge. Of the South African species it seems closest to *P. striata* Sowerby, 1904 but differs in the much finer granulation.

Family TROCHIDAE Rafinesque, 1815

Genus *Antimargarita* Powell, 1951

Type species (original designation) *Valvatella dulcis* Smith, 1907, Recent, Ross Sea, Antarctica.

***Antimargarita maoria* n.sp.**

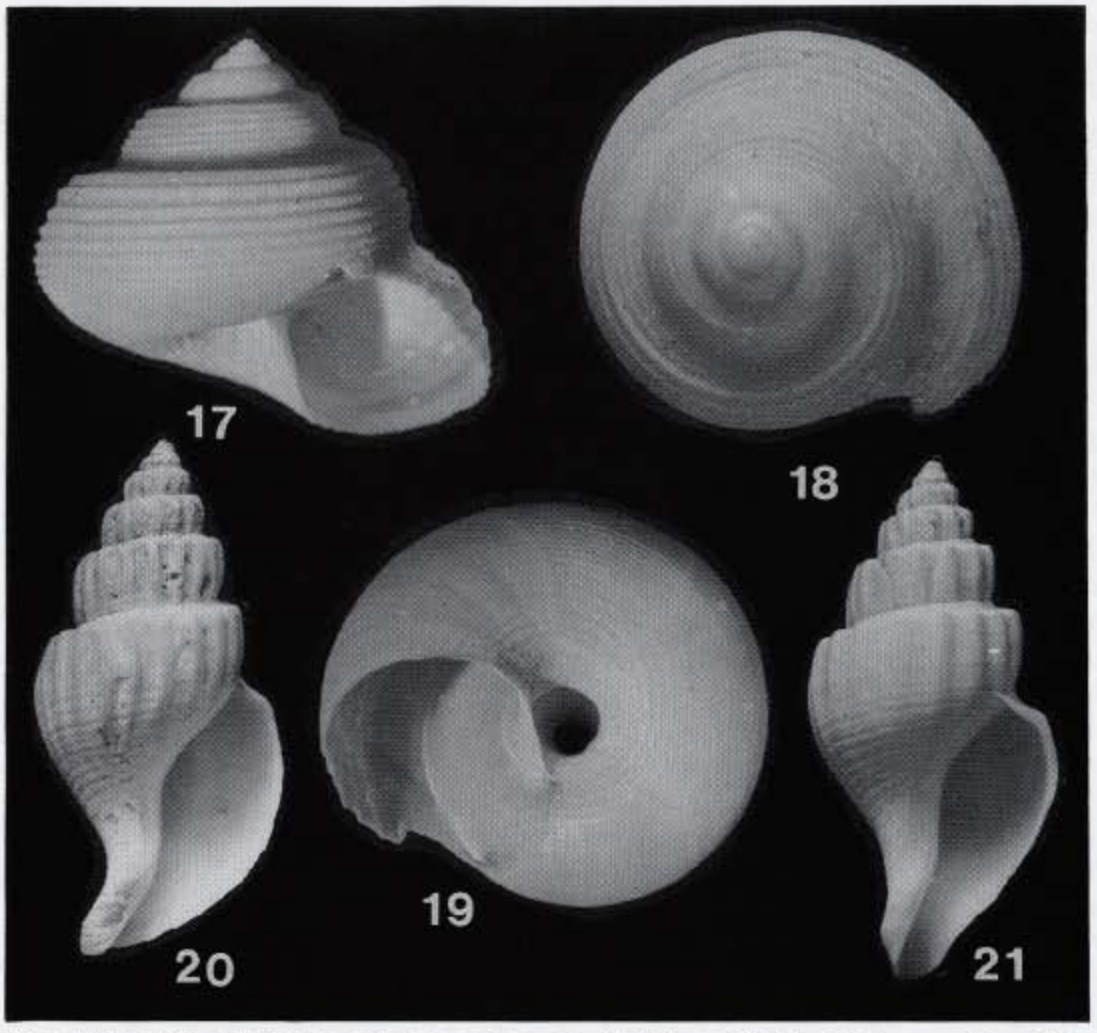
Figs 17-19

DESCRIPTION: Shell of medium size, depressed turbinate, solid, iridescent, umbilicate. Whorls 7, including a protoconch of a single smooth, shining whorl. Teleoconch whorls sculptured with raised spiral cords, 3 of lesser strength on shoulder and 5 or 6 below. Last whorl with 7 spirals on shoulder, and 26 across rest of whorl and base. Spiral cords and interstices crossed by fine, oblique axials which render the spirals minutely nodulous. Shoulder gently concave, remainder of whorls gently rounded. Aperture oval, outer lip thin, crenulated by spirals. Columella straight, slightly oblique, columellar lip slightly reflected into umbilicus. Umbilicus wide, perspective, spiral sculpture ceasing just within umbilical boundary.

Height 12.6 mm, diameter 14.3 mm (holotype); height 13.5 mm, diameter 14.7 mm (paratype), the height/diameter ratios in 5 specimens ranging from 82-95.

TYPE MATERIAL: NZOI Stn A730, 49°40.3'S, 178°53.3'E, off Antipodes Islands, 307 m, 7 Nov. 1962 (holotype H.552 and paratype, P.761 in NZOI); *Eltanin* Stn 1851, 49°40'S, 178°53'E, off Antipodes Islands, 540-476 m (seven paratypes in USNMNH, USNM 860154, and three in MONZ, M.89792).

REMARKS: At first sight this new species would appear to be related to *Solariella,* but the radula shows that it does not belong to this genus. Powell (1951: p.100) commented on the similarities in shell characters between *Falsimargarita, Antimargarita* and *Solariella,* but showed that they were widely separated on radular characters. The radula of *A. maoria* agrees well with that figured by Eales (1923: 7, fig.4) for *A. dulcis* (Smith,



Figs 17,18,19. *Antimargarita maoria* n.sp., holotype 13.5 x 14.7 mm. Fig. 20. *Metzgeria shirleyi* (Cernohorsky), off Aldermen Islands, 380-420 m, 50.3 x 22.6mm. Fig. 21. *Metzgeria shirleyi* (Cernohorsky), BS 761, 38.1 x 18.4 mm.

1907), and *maoria* should therefore be placed in *Antimargarita*.

Examination of the radula shows that the Antarctic *Minolia thielei* Hedley, 1916 should be placed in the genus *Falsimargarita*. The only species to be retained in *Antimargarita* are therefore the type species (*T. dulcis* Smith) and *A. smithiana* (Hedley, 1916,) together with the new species. The proportions of the shell in *A. maoria* are rather variable as the measurements show and the range encompasses the proportions of both *A. dulcis* and *A. smithiana*. In sculpture the new species is closer to *A. dulcis*, differing in the considerably greater size, its greater

number of spiral cords, its more inflated spire whorls, and the presence of spirals on the shoulder. Both *A. dulcis* and *A. smithiana* are restricted to Antarctic waters, but the presence of the genus in deep water off southern New Zealand is not surprising.

Family CASSIDAE Swainson, 1832

Genus *Galeodea* Link, 1807

Type species (monotypy) *Buccinum echinophorum* Linnaeus, 1758, Recent, Mediterranean.

***Galeodea triganceae* Dell, 1953**

Galeodea triganceae Dell, 1953b: 51, figs 1-4; Dell, 1956: 85, figs 116-118; Dell, 1963: 210; Beu, 1979: 91, Powell, 1979: 161, pl.33, fig.13.

MATERIAL EXAMINED: *Eltanin* Stn 1403, 41°42'S, 175°29'E Cook Strait, 946-951 m; *Eltanin* Stn 1712, 38°24'S off East Cape, 178°53'E, 1345-1995 m; *Eltanin* Stn 2144, 49°07'S, 172°00'E Campbell Plateau, 399-384 m.

REMARKS: The *Eltanin* collections and additional material in MONZ indicate that the range of this variable species is from at least 35°50'S on the east coast of the North Island out to a position at 38°24'S, 178°53'E, and then southwards off the east coast of both North and South Islands, along the Chatham Rise and off the Chatham Islands and extending as far south as 51°20'S, off the Auckland Islands. Over this range it has been recorded in depths from 110 to 1995 m but is commoner below 400 m.

Family BUCCINIDAE Rafinesque, 1815

Genus *Penion* Fischer, 1884

Type species (monotypy) *Fusus dilatatus* Quoy and Gaimard, 1835 = *Fusus sulcatus* Lamarck, 1816, Recent, New Zealand.

***Penion benthicolus* Dell, 1956 (Figs 23-25, 33 Table 2)**

Penion benthicola Dell, 1956: 96, figs 125, 130, 131; Beu, 1979: 91, figs 4, 8.

Penion benthicola delli Powell, 1971: 222, fig. 24; Powell, 1979: 201.

MATERIAL EXAMINED: BS 804, 34°40.5'S, 171°55.3'E, west of Cape Maria van Diemen, 1024-1088 m, r.v. *Tangaroa* (NZOI Stn 0.548) 10 Jan. 1981; BS 805, 34°48'S, 172°05.0'E, WSW of Cape Maria van Diemen, 776-836 m, r.v. *Tangaroa* (NZOI Stn 0.549) 11 Jan. 1981; BS 559, 43°14'S, 173°39'E, Pegasus Canyon, Kaikoura, 1006-512 m, R.V. *Acheron,* 27 Sept. 1976 (juvenile); BS 605, 42°38.2'S, 176°10.5'E, northern Mernoo Slope, Chatham Rise, 999-984 m, r.v. *Tangaroa* (NZOI Stn R.8); BS 660, 42°41.7'S, 174°28.0'E, north-west Mernoo Slope, 1723-1549 m, r.v. *Tangaroa* (NZOI Stn R.23) 14 Jan. 1979; BS 670, 42°00.8'S, 174°41.0'E, 939-1019 m, r.v. *Tangaroa* (NZOI Stn R.28) 14 Jan. 1979; BS 949, 42°33.2'S, 176°09.9'E, northern Mernoo Slope, 1262 m, r.v. *Tangaroa* (NZOI Stn R.7) 11 Jan. 1977; *James Cook* Stn J01/012/77, 51'20'S, 166°34'E, Cathedral Banks, 646-670 m, 19 Jan. 1977; *James Cook* Stn J01/022/77, 48°10'S, 168°13'E, Snares Shelf, 700-706 m, 23 Jan. 1977; *Eltanin* Stn 1850, 49°40'S, 178°53'E, off

Antipodes Islands, 540-476 m; Eltanin Stn 2141, 49°40'S, 178°52'E, off Antipodes Islands, 86-95 m.

REMARKS: Powell described *P. benthicola delli* from ENE of the Poor Knights in 366 to 475 m. He compared his material with the few specimens then known of *P. benthicolus* and differentiated the northern form on the basis of the wide, steeply descending shoulder slope produced by a weak angulation to the whorls below middle height, the many fewer spiral cords, the less convex whorl outline, and the less twisted anterior canal. The much more extensive collections now available show that the species is extremely variable over its whole range. On some 17 shells with well preserved surface sculpture collected south of Cook Strait the number of spiral cords per centimetre on the penultimate whorl ranged from 11 to 31, while the number of axials on the penultimate whorls of 21 specimens ranged from 13 to 26. Relative diameter/height ratios varied from 39 to 48 (Table 2). In the holotype of *P. benthicolus* the ratio is 37 and in both the holotype and paratype of *P. b. delli* it is 38. Some of the southern shells match the illustration of *delli* exactly. Four shells from off Cape Maria van Diemen have a diameter/height ratio between 37 and 39, but in all other respects fall within the range of southern shells. It would appear, therefore, that *P. benthicolus* is as variable as the other species of *Penion* and that there are no grounds for differentiating a northern subspecies.

All the examples trawled by the *Eltanin* off the Antipodes Islands are smaller than the type of *P. benthicolus*, ranging from 50 to 58 mm in length. The orange colour within the aperture is very bright, the axials are more numerous and the canal is proportionately shorter. Although these specimens come from considerably shallower water than the more typical specimens of *P. benthicolus* it seems best to consider them as a variant of this species until more extensive collections are available. The radulae of these Antipodes specimens (Fig. 33) agree with that described and figured for *P. benthicolus* (Dell, 1956, fig. B.17) with four cusps on the lateral teeth (an otherwise anomalous feature in species of *Penion*).

Penion benthicolus was described from the Chatham Rise in depths between 402 and 512 metres. Its range is now know to be at least from off Cape Maria van Diemen and off the east coast of New Zealand to as far south as 51°S, in depths between 360 and 1723 metres. Off the Antipodes Islands a form of the species occurs in from 86 to 540 metres. The bright yellow to orange colour inside the aperture seems characteristic of living shells.

Beu (1979) recorded *P. benthicolus* as a not uncommon Nukumaruan (late Pliocene) fossil at Oaro, southern Marlborough.

Genus *Antarctodomus* Dell, 1972

Type species (original designation). *Bathydomus thielei* Powell, 1958, Recent, Antarctica.

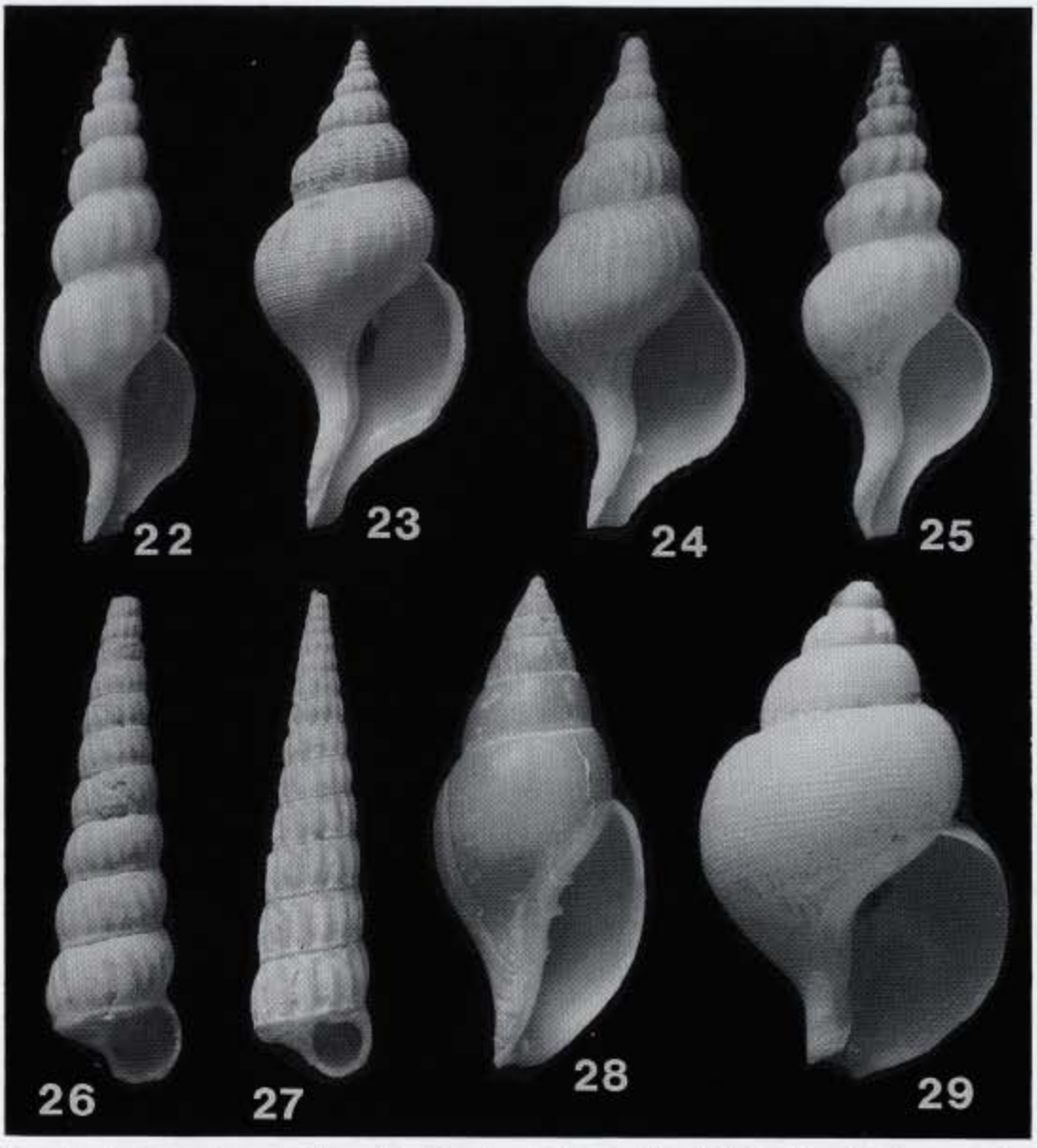


Fig. 22. ***Latiromitra problematica*** **Ponder, *Eltanin* Stn 1851, 44.5 x 13.7 mm. Fig. 23.** ***Penion benthicolus*** **Dell, JOI/012/77, 107.8 x 44.3 mm. Fig. 24.** ***Penion benthicolus*** **Dell, *Eltanin* Stn 1851, 58.5 x 24.7 mm. Fig. 25.** ***Penion benthicolus*** **Dell, BS 805, 96.7 x 35.3 mm. Fig. 26.** ***Claviscala kuroharai*** **Kuroda in Habe, *Eltanin* Stn 1718, 83.0 x 22.4 mm. Fig. 27.** ***Claviscala kuroharai*** **Kuroda in Habe, NZOI Stn E840, 57.8 x 13.9 mm. Fig. 28.** ***Volutomitra banksii*** **(Dell), BS 549, 40.4 x 16.3 mm. Fig. 29.** ***Antarctodomus powelli*** **n.sp., holotype, 34.7 x 20.6 mm.**

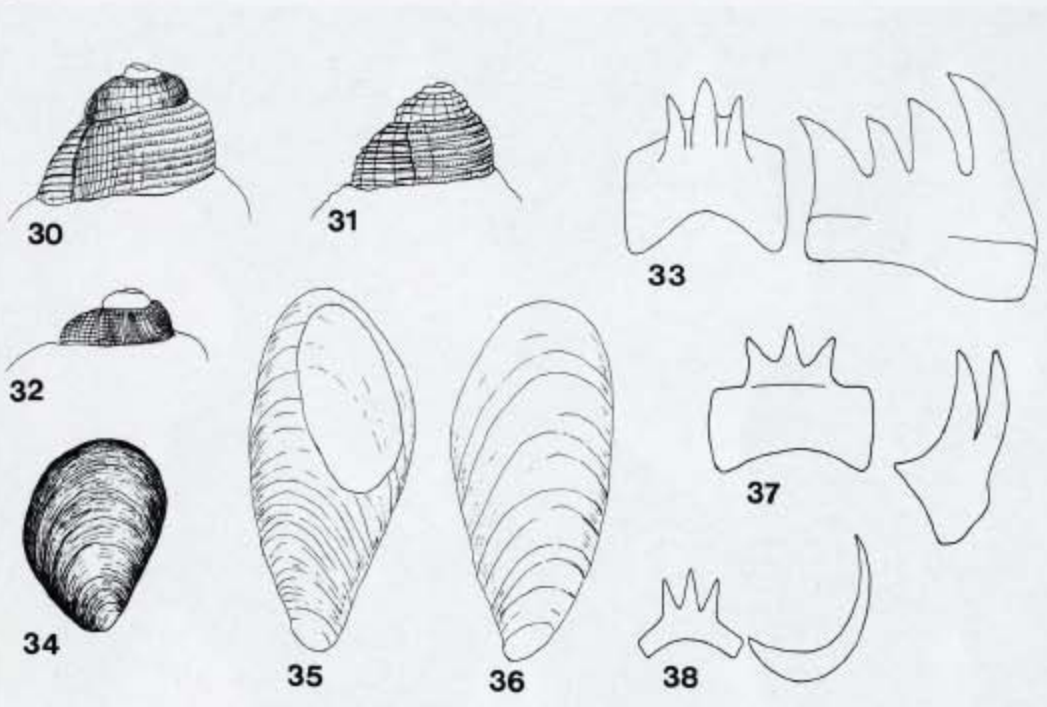


Fig. 30. *Antarctodomus powelli* n.sp., protoconch of holotype. Fig. 31. *Antarctodomus thieli* (Powell), *Eltanin* Stn 2092, protoconch. Fig. 32. *Parficulina problematica* Dell, *Eltanin* Stn 557, protoconch. Fig. 33. *Penion benthicolus* Dell, *Eltanin* Stn 1850, radula. Fig. 34. *Antarctodomus powelli* n.sp., holotype, operculum, 7.5 x 5.0 mm. Figs 35, 36. *Metzgeria shirleyi* (Cernohorsky), BS 761, operculum, 11.7 x 5.2 mm. Fig. 37. *Antarctodomus powelli*, n.sp., holotype, radula. Fig. 38. *Metzgeria shirleyi* (Cernohorsky), BS 761, radula.

Antarctodomus powelli **n.sp.**

Figs 29,30,37

DESCRIPTION: Shell of medium size, thin, fragile, bucciniform. Whorls 6, including a protoconch of 2 whorls. Protoconch not clearly marked off from teleoconch, smooth, dome-shaped, first whorl flat-topped. First whorl of teleoconch with narrow spiral threads gradually developing together with close spaced axial threads between the spirals, faint at first but becoming well marked within half a whorl, 9 fine spiral cords developed at close of first whorl of teleoconch. A break in the growth around this stage in the three shells available indicates a possibility that the newly hatched embryo consists of these three whorls, or they even represent the true protoconch. Whorls rather inflated, suture impressed.

Sculpture of rest of teleoconch of more or less regularly spaced spiral grooves, shallower and wider spaced on shoulder, leaving low, rather flat spiral cords, some 20 (including two on the shoulder) on the penultimate whorl, base and fasciole. Axial sculpture confined to axial threads, mainly developed in grooves, together with irregular growth lines. Aperture ovate, outer lip thin, columella straight, culminating in a thin, lamella-like edge, inner lip a thin callus on parietal wall. Fasciole weak, mainly delineated by rather wavy spiral sculpture. Periostracum very thin. Operculum thin, horny, pyriform, nucleus terminal. Radula (Fig 37) with tricuspid centrals, laterals with two close-spaced cusps, subequal in development.

Length 34.7 mm, diameter 20.6 mm (holotype).

TYPE MATERIAL: BS 648, 42°49.2'S, 176°06.3'E, northern Mernoo Slope, 1568m, r.v. *Tangaroa* (NZOI Stn R6) 11 Jan. 1979 (live-collected holotype in MONZ, M.59536).

OTHER MATERIAL EXAMINED: NZOI Stn S153, 45°21.2'S, 173°35.8'E, Bounty Trough, 1386 m, r.v. *Tangaroa,* 27 Nov. 1979 (3 dead juveniles); NZOI Stn S154, 45°24.2'S, 173°59.8'E, Bounty Trough, r.v. *Tangaroa* 27)ct. 1979 (1 dead juvenile); NZOI Stn S204, 42°10.5'S, 175°59.4'E, Hikurangi Trench, 2677-2602 m r.v. *Tangaroa,* 3 Nov. 1979 (2 dead juveniles).

REMARKS: The new species agrees with *Antarctodomus thielei* in the structure of the radula, especially the lateral teeth, the form of the operculum, the type of columella and in the general structure of the protoconch. It differs from *A. thielei* (the only other known species) in the more inflated whorls, and the suppression of axial sculpture.

The only other buccinid with similar teeth known to the writer is *Parficulina problematica* (Powell) which, however, has a relatively small operculum with spiral growth and a different style of protoconch. Powell described the protoconch of *Parficulina problematica* as dome-shaped and smooth. However, well preserved apices of *P. problematica* from *Eltanin* Station 557, off the Falkland Islands (close to the type locality) show that the two-whorled protoconch is sculptured with microscopic spiral threads and axial ridges, both becoming more prominent over the last half-whorl. The protoconch of *problematica* is minute compared with that of the two species of *Antarctodomus*.

If the structure of the lateral tooth of the radula expresses phylogenetic relationship, *Antarctodomus* and *Parficulina* must be closely related.

Family TURBINELLIDAE Swainson, 1840

Subfamily PTYCHOTRACTINAE Stimpson, 1865

Genus *Metzgeria* Norman, 1879

nom.nov. for *Meyeria* Dunker and Metzger, 1874 (*non* McCoy, 1849).

Type species (monotypy) *Lathyrus albellus* Dunker and Metzger, 1874 (= *Latirus albus* Jeffreys, 1873).

***Metzgeria shirleyi* (Cernohorsky, 1980)**
Figs 20,21,35,36,38

Boreotrophon shirleyi Cernohorsky, 1980: 107, figs 2-5.

MATERIAL EXAMINED: BS 761, 37°22.0'S, 176°40'E, 37 km east of Mayor Island, 616-666 m, r.v. *Tangaroa* (NZOI Stn R.119) 24 Jan. 1979; 22 km east of Aldermen Islands to 15 km north of Mayor Island, 380-420 m, *f.v. Trinity*, Nov. 1987.

REMARKS: The live-taken specimen from BS 761 agrees with Cernohorsky's description and figures of the shell of *Boreotrophon shirleyi*, and the radula agrees with his description and figures. The operculum (Figs. 35,36) is, however, much more elongate than Cernohorsky's figure indicates. The other specimen has a twisted columella which appears to be an individual variation.

Cernohorsky described *Boreotrophon shirleyi* from the Bay of Plenty in 357-622 m, with a very minute radula ribbon bearing a central tooth with three cusps and a simple sickle-shaped lateral. Examination of additional material confirms the structure of the radula but bears out the impression that the shell is not trophonid. The radula is certainly anomalous for any member of the Muricidae. The radula of *B. clathratus* (Linnaeus), the type species of *Boreotrophon* has the typical trophonid central tooth with 5 cusps (Radwin and d'Attilio, 1976: 180, fig. 121).

The radula of *B. shirleyi* is, however, characteristic of the subfamily Ptychotractinae of the family Turbinellidae as interpreted by Rehder (1967) and Cernohorsky (1973), and is strictly comparable with the radulae of *Ptychotractus ligatus* (Mighels and Adams, 1842), *Surculina cortezi* (Dall, 1908), *Surculina expeditionis* (Dell, 1956) and *Metgeria alba* (Jeffreys, in Thomson, 1873) as figured by Cernohorsky (1973, figs 1-6) and Sars (1878, pl. 9, fig. 13).

Most members of the Turbinellidae develop obvious columellar plaits, but *Metgeria alba*, as figured by Sars (1878, pl. 13, fig. 8) and by Bouchet and Warén (1985, figs 677, 678) bears two rudimentary folds high on the columella. There is no sign of folds or plaits in the available material of *shirleyi* and the species is referred to *Metzgeria* with some hesitation. Of the three Atlantic species figured by Bouchet and Warén it is certainly closest to *M. alba*. The form of the radula does not appear to be generically diagnostic within the subfamily since it is essentially similar in *Ptychotractus, Benthovoluta, Surculina* and *Metzgeria*.

The only differences in shell characters between *M. shirleyi* and the described species of *Metzgeria* are the shorter canal, the higher shoulder angulation and the complete lack of plaits. It may prove generically separable when the group is better known but seems best placed in *Metzgeria* at present. There is a superficial resemblance between *M. shirleyi* and the fossil turrid genera *Marshallena* Allan, 1927 and *Marshallaria* Finlay and Marwick, 1937, but *M. shirleyi* differs from these genera

in having a subsutural angulation and in lacking any sign of a sinus on the shoulder.

Genus *Latiromitra* Locard, 1897

Type species (monotypy) *Latiromitra specialis* Locard, 1897 = *Mitra cryptodon* Fischer, 1882, Recent Atlantic.

***Latiromitra problematica* (Ponder, 1968)** Fig. 22

Vexillum (Latiromitra) problematicum Ponder, 1968: 45, pl. 4, figs 55, 56.

Volutomitra (Latiromitra) problematica: Cernohorsky, 1970: 102, pl. 13, fig. 8, Powell, 1979: 214.

MATERIAL EXAMINED: BS 582, 45°46'S, 171°03'E, Papanui Canyon, 660 m, r.v. *Munida*, 1 Sept. 1976; *Eltanin* Stn 1850, 49°40'S, 178°53'E, off Antipodes Islands, 540-476 m; *Eltanin* Stn 2141, 49°40'S, 178°52'E, off Antipodes Islands, 109 m; *Eltanin* Stn 2142, 49°39'S, 178°55'E, off Antipodes Islands, 109 m.

REMARKS: Some 14 specimens, all dead shells were collected from the *Eltanin* stations off the Antipodes Islands. In this material the axials on the body whorl range from 10 to 12 (10 on the holotype). These specimens are all about the same size as the holotype so that Cernohorsky's remark that the type is immature seems incorrect. In all these additional specimens there are only three columellar folds, the first posterior fold of the holotype being missing.

Although occurring in relatively shallow water (86 to 540 metres) this species has so far been collected only from two widely separated areas, off east Otago and from off the Antipodes Islands. Beu (1979) recorded a very similar species as a Nukumaruan (late Pliocene) fossil at Oaro, Marlborough.

Family VOLUTOMITRIDAE Gray, 1854

Genus *Volutomitra* H.& A. Adams, 1853

Type species (subsequent designation Fisher, 1884) *Volutomitra groenlandica* Beck = *Mitra groenlandica* Beck, in Moeller, 1842, Recent, Arctic Sea.

***Volutomitra banksi* (Dell, 1951) Fig. 28**

Proximitra banksi Dell, 1951: 54, pl. 1, fig. 7; Dell, 1956: 88, fig. 170; Beu, 1967: 110, pl. 2, fig. 6; Beu, 1970: 225.

Volutomitra banksi; Cernohorsky, 1970: 100, pl. 13, fig. 6: Powell, 1979: 214, pl. 43, fig. 13.

MATERIAL EXAMINED: BS 201, 44°45.6'S, 171°05'E, off Taiaroa Head, c.549 m, r.v. *Alert*, 23 Jan. 1957; BS 478, 16 to 20 miles off Wairau River, 677-704 m, r.v. *Acheron* 21 Feb. 1976; BS 544, 42°28.5'S 173°47.5'E, 786 m, r.v. *Acheron*, 18 Mar. 1976; BS 546, 42°55'S, 173°43'E, 549-586 m, r.v. *Acheron*, 18 Mar. 1976; BS 549 45°38.5'S, 171°05'E, head of Karitane Canyon, 530-585 m, r.v. *Acheron* 19 Mar. 1976; BS 559, 43°14'S, 173°39'E, Pegasus Canyon, 1006-512 m, r.v. *Acheron*, 27 Sept. 1976; BS 582, 45°46'S, 171°03'E, Papanui Canyon, 660 m, r.v. *Munida*, 1 Sept. 1976; Taiaroa Trench, Otago, 722-768 m, r.v. *Acheron*, 11 Aug. 1974; *Eltanin* Stn

1403, 41°42'S, 175°29'E, 946-951 m; *Eltanin* Stn 1989, 53°29'S, 169°48'E, off Campbell Island, 589-594 m.

REMARKS: This species appears to have a typically southern distribution being known from about 42°S off the east coast of the South Island to as far south as 53°S and to the east to the Chatham Islands in depths from 146 to 951 metres. The shallower records are mostly based upon dead shells.

Family EPITONIIDAE Berry, 1910

Genus *Claviscala* Boury, 1961

Type species (monotypy) *Scala richardi* Dautzenberg and Boury, 1897, Recent, Atlantic.

***Claviscala kuroharai* Kuroda in Habe, 1961** Figs 26,27

Claviscala kuroharai Kuroda in Habe, 1961: 33, pl. 14, fig.29; Habe, 1964: 50, pl. 14, fig. 29.

MATERIAL EXAMINED: *Eltanin* Stn 1718, 38°27'S, 168°07'W, 531-659 m; NZOI Stn E.840, 33°52'S, 172°16'E, north east of Three Kings Islands, 757-729 m; NZOI Stn I.97, 32°22.9'S, 167°28.2'E, off Norfolk Island, 540 m.

REMARKS: The *Eltanin* material consists of 11 dead and somewhat worn shells. The single shell from NZOI Stn E.840 is in similar condition. This material seems indistinguishable from *Claviscala kuroharai* which Habe (1964) recorded from Tosa Bay, Shikoku, Japan in 200-300 m. The New Zealand specimens are considerably larger than the Japanese specimens known. The broken section of the spire whorls of the specimen from NZOI Stn I.97 off Norfolk Island seems conspecific with the New Zealand dead shells and has the exact colour pattern of the colour illustrations of the Japanese form.

The writer was unable to trace the original publication of *Claviscala kuroharai* which Habe (1961) attributed to Kuroda. Dr Habe has kindly informed me that this species had been provisionally named by Kuroda but that it did not appear to have been formally described. The introduction of the name should apparently date from Habe (1961) although it was there introduced as little more than a caption to a coloured illustration. As Habe (1961) clearly attributed the species name to Kuroda, authorship should be attributed to "Kuroda in Habe, 1961".

The other described species of *Claviscala* are all obviously closely similar. *Claviscala* aff. *terebraliodes* Kilburn, 1975, from off southern Mozambique in about 275 metres is comparable in size but has flatter whorls, a less incised suture, and fewer axial costae. The type species of the genus, *C. richardi* Dautzenberg and Boury, 1897 from the Atlantic in 867-1385 m is again of comparable size but has fewer axials and has a network of minute axial and spiral striae between the main axials instead of the significantly stronger spiral striae of the New Zealand form. *C. midwayensis* Habe and Kosuge, 1970 from off Midway Island (no depth given) has much more swollen whorls with a deeply impressed suture and many fewer axials.

Order POLYCHAETA

"*Dentalium tiwhana*" Dell, 1953a: 48, figs 17, 22; Dell, 1957: 564, pl. 39, figs 6,7, text figs 17-19.

Having seen additional live-taken material, the writer has been aware for some time that this form, described as a scaphopod, is in fact the tube of a polychaete worm. This has been confirmed by Mr H. Zibrowius of the Marine Station of Endoume, Marseilles, who has examined specimens. He has identified the specimens as a species of *Serpula* (s.l.). The writer, therefore joins the list of malacologists who have misidentified tube worms as scaphopods.

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Table 1. Measurements and shell ratios of specimens of* Adipicola arcuatilis. *B = distance from anterior end of shell to beak; H/L = height expressed as a percentage of the length; B/L = distance from anterior end of shell to beak expressed as a percentage of the length.

	Length mm	Height mm	B mm	H/L	B/L
Holotype B01/73/85	24.8	8.4	8.8	34	35
Paratype (B01/73/85	29.2	7.8	9.3	27	32
"	30.6	7.3	10.0	24	33
"	28.2	7.5	8.1	26	29
"	28.7	8.7	9.5	30	33
A03/5/86	28.3	8.6	8.1	30	28
"	27.0	9.1	6.7	34	25
"	25.4	7.8	8.6	27	34
"	24.7	6.7	8.5	27	34
"	23.7	7.0	7.6	29	32
"	27.4	8.2	6.8	30	25
Oyang 7, Stn 22	22.8	8.3	8.0	36	35
"	23.6	7.4	8.0	31	34
"	20.1	6.9	5.9	34	29
"	19.4	6.5	5.6	33	29

Table 2. ***Measurements and proportions of*** **Penion benthicolus.**

	Height mm	Diameter mm	Spirals per 1 cm	Axials penultimate	D/H x 100
J01/022/77	96.8	40.0	11	14	41
J01/012/77	107.8	44.3	11	20	41
BS 660	77.0	33.0	25	20	41
BS 660	77.5	36.1	-	18	47
BS 660	75.0	35.0	31	17	47
BS 660	81.3	37.2	19	17	46
BS 660	69.8	30.2	26	19	43
BS 665	91.0	36.1	21	17	39
BS 665	79.8	34.7	-	15	43
BS 665	80.7	33.2	28	14	41
BS 665	71.1	32.8	28	15	46
BS 665	78.5	32.5	30	16	41
BS 670	71.4	28.7	26	16	40
BS 670	69.8	28.4	16	13	41
BS 670	65.3	29.3	25	14	45
BS 804	81.7	31.8	26	18	39
BS 805	96.7	35.3	16	16	36
BS 805	87.5	33.2	21	14	38
BS 805	85.0	31.6	23	14	37
Eltanin Stn 1851	58.5	24.7	25	26	42
Eltanin Stn 1850	50.5	23.7	-	24	47
Eltanin Stn 1850	45.9	22.2	-	24	48

Table 3: ***Comparison of species of*** **Claviscala.**

	Height mm	Diameter mm	Axials on Body Whorl
C. kuroharai N.Z.	83.0	22.4	20
C. kuroharai N.Z.	76.0	17.6	20
C. kuroharai N.Z.	74.8	17.6	20
C. richardi	47.0	16.8	18
C. terebralioides	71.0	16.8	18
C. midwayensis	64.7	13.8	8

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