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Descriptions of New Species and Notes on Taxonomy of New Zealand Mollusca

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Abstract

THE previously unfigured *Aeneator huttoni* Finlay and *Penion accipitris* (Finlay) are figured and discussed. A new genus and species of Astraeinae and new forms of *Chlamys* (two), *Eumarcia* (two), *Notocallista* (*Striacallista*), *Marama, Pelicaria, Eudolium, Zegalerus, Uttleya, Amalda* (two), *Insolentia,* and *Comitas* are described. *Palliolum fosterianum* Powell is placed in *Delectopecten,* and the taxonomy of some other New Zealand Pectinidae and of New Zealand Ancillinae is discussed. The cypraeid *Notadusta* is recorded in boulders in an Upper Miocene conglomerate in Wairarapa District, and new localities are recorded for several other species.

INTRODUCTION

THE following new taxa of New Zealand Cenozoic Mollusca and notes on poorly known Cenozoic and Recent taxa are based largely on material in the collection of the Geology Department of Victoria University of Wellington. Most of the specimens were collected by the writer and other students and staff of the Geology Department from localities throughout New Zealand, a large proportion by the writer and Dr J. P. Kennett during the latter's investigation of Kapitean sections in Marlborough and Westland. A few specimens were borrowed from the Geology Department of Auckland University and from the New Zealand Geological Survey.

The holotypes and paratypes of most new species described are lodged in the Geology Department of Victoria University of Wellington (numbers prefixed by VM). Some types are lodged in the Geology Department of Auckland University (number prefixed by G), or in the New Zealand Geological Survey (numbers prefixed by TM).

TAXONOMY

Family PECTINIDAE

Genus CHLAMYS Roeding, 1798

1798. *Chlamys* Roeding, Museum Boltenianum (2): 161.

Type species (by subsequent designation, Herrmannsen, 1847): *Pecten islandicus* Mueller, 1776, Recent, North Atlantic.

MacNeil (1967: 2) discussed the concept of generic groupings in the Pectinidae, stating that, unlike many bivalves, the family location of Pectinidae is obvious from

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their external features, and that as there are few morphological possibilities in the family it is likely that similar morphological types evolved frequently. Later (p. 4) he stressed that, because of the frequent evolution of similar morphologies, classification in the family must be based largely on phylogeny. He interpreted *Chlamys* in a broad sense, treating as subgenera many groups that would have been regarded as full genera in recent classifications in Japan and Australasia. In view of the relatively short-lived lines, MacNeil's action is endorsed.

Phialopecten Marwick was originally erected as a full genus, but was soon afterwards reduced to a subgenus of *Chlamys* because of its phylogeny (Marwick, 1931: 62). Since then it has been regarded as a full genus. It is a short lineage evolving from *Chlamys* during the Kapitean (uppermost Miocene) and becoming extinct during the Nukumaruan (lower Pleistocene), and is here treated as a subgenus of *Chlamys*.

Mesopeplum Iredale is similar to some species included in *Chlamys* by MacNeil (e.g., pl. 15), and is similar to *Chlamys* in all features. As interpreted in New Zealand for all *Chlamys*-like shells with prominent radial folds in the shell (e.g., Fleming, 1966a: 21), the "genus" is probably polyphyletic, and it is one of a number of groups that seem best treated as subgenera of *Chlamys*.

Kaparachlamys Boreham is considered by the writer to be polyphyletic. If the "genus" represented a single lineage, the more primitive and *Chlamys*-like member (*K. mariae* Finlay) would be the older of the two members, and the little-inflated, thin-shelled, finely sculptured member (*K. hectori* Hutton) would be the younger. In fact, *K. hectori* is found in the Opoitian (lower Pliocene) of the Chatham Islands, and *K. mariae* is found in the Waitotaran (upper Pliocene) and Nukumaruan (lower Pleistocene) of southern North Island, New Zealand. *K. hectori* was placed by Marwick (1928: 455) in *Placopecten* Verrill and closely resembles the type species (*Placopecten clintonius* (Say) from the Yorktown Miocene of Virginia, U.S.A.) and the Recent eastern American *P. magellanicus* (Gmelin) in all features. Boreham considered that *K. hectori* had evolved from *Chlamys* in the New Zealand region, but though *Placopecten magellanicus* (Gmelin) occurs now in eastern North America, it is possible that *hectori* is related to true *Placopecten* and not to *K. mariae*. Thus *hectori* is placed in *Placopecten*. *Kaparachlamys mariae* apparently evolved from *Chlamys* or from *Mesopeplum* sensu lato, and *Kaparachlamys* is here reduced to a subgenus of *Chlamys*.

The "genera" of the Chlamydinae erected by Iredale (1929), *Mimachlamys*, *Scaeochlamys*, and *Equichlamys*, and many of those erected by Iredale (1939), such as *Coralichlamys*, *Annachlamys*, and *Complicachlamys*, are little removed from *Chlamys* s.str., and seem best regarded as subgenera of *Chlamys*. However, some other groups that are superficially similar to *Chlamys* are generically separable, such as *Decatopecten* Sowerby, which has very prominent cardinal crura.

Subgenus MIMACHLAMYS Iredale, 1929

1929. *Mimachlamys* Iredale, Rec. Aust. Mus. 17: 162.

Type species (by original designation): *Pecten asperrimus* Lamarck, 1822, Recent, Australia.

MacNeil (1967: 13) restricted *Chlamys* s.str. to a small group of Miocene to Recent northern hemisphere species, so that the usage by Iredale (1939: 347) and Powell (e.g., 1962: 118) of *Mimachlamys* Iredale for a large group of small, generalised, southern hemisphere *Chlamys* seems justified. *Mimachlamys* is here used for the small New Zealand species resembling *Chlamys* s.str.

Chlamys (Mimachlamys) araroaensis n.sp. Pl. 1, Fig. 2.

A small but typical *Mimachlamys*, with larger anterior ear than posterior on each valve, and a well-marked notch at the base of the anterior ear of the right valve. Sculpture of

rather high, narrowly rounded radial ribs of narrowly triangular section, with occasional single interstitial riblets that may become as strong as the main ribs over the outer part of the valve. Interspaces about equal to the width of the ribs over the first part of the disc, about three times the width of the ribs over the last quarter of the disc. Interstices crossed by microscopic concentric lamellae that frequently finely nodulate the ribs. About 30 main ribs over the outer part of the disc of the holotype. Anterior ear bearing six ribs more closely spaced than on the disc and with more prominent concentric lamellae; posterior ear bearing three very narrow, widely spaced ribs. Resilifer deep and narrow, oblique, with the apex directed anteriorly.

Dimensions of holotype: Height, 22.8mm; length, 22.3mm.

LOCALITY: Cliffs half a mile east of Te Araroa, near East Cape, A. G. Beu and G. R. Wilson, 1963, holotype and two paratypes.

AGE: Kapitean (uppermost Miocene).

HOLOTYPE (VM346) and two paratypes (VM347 and VM348) in Geology Department, Victoria University of Wellington.

This species is similar to *C. consociata* (Smith) (figured by Dell, 1963: pl. 1, figs. 5–8), differing in the narrower ribs with wider and deeper interstices, the less frequent interstitial ribs, much lower and finer gemmae on the ribs, and the narrower, oblique resilifer.

The holotype is a right valve that has grown in some restricted habitat, so that it is deformed. It is the largest and most complete specimen yet collected.

Subgenus PHIALOPECTEN Marwick, 1928

1928. *Phialopecten* Marwick, Trans. N.Z. Inst. 58: 454.

Type Species (by original designation): *Pecten triphooki* Zittel, 1864, upper Pliocene and lowermost Pleistocene, New Zealand.

The lineage of *Phialopecten* has been the subject of intensive study in recent years, due to its great usefulness in stratigraphy of the Pliocene rocks of New Zealand. A single subspecies can be conveniently recognised in each of the three Pliocene stages, with a rare, small, *Chlamys*-like species in the Kapitean (uppermost Miocene). The forms are as follows:

Chlamys (*P.*) *triphooki triphooki* (Zittel), Waitotaran and basal Nukumaruan;

Chlamys (*P.*) *triphooki marwicki* n.subsp., Waipipian;

Chlamys (*P.*) *triphooki ongleyi* (Marwick), Opoitian;

Chlamys (*P.*) *tolagaensis* Marwick, Kapitean.

Boreham (1963) and Marwick (1965) recently discussed and figured the members of the genus. *C.* (*Phialopecten*) *accrementus* (Hutton) and *C.* (*Phialopecten*) *hilli* (Hutton) seem to be off the main line, and need not be considered here. Marwick (1965) described *P. ongleyi* and noted its relationship to *P. tolagaensis* and *P. triphooki,* but did not consider that the intermediate Waipipian form needed any designation other than *P. ongleyi-triphooki.* The Waipipian form is not only exceedingly useful in stratigraphy, but is also just as morphologically distinct as the others, and is considered to be worthy of recognition as a separate subspecies. The three younger members of the lineage are so similar that they are here accorded only subspecific rank.

Chlamys (Phialopecten) triphooki marwicki n.subsp. Pl. 1, Figs. 1, 6.

1963. *Phialopecten* aff. *triphooki*: Boreham, N.Z. Jl Geol. Geophys. 6(1): 22, figs. 6–8.

1965. *Phialopecten ongleyi-triphooki*: Marwick, Paleont. Bull. N.Z. geol. Surv. 39: 22, 66, 68, pl. 3, fig. 1; pl. 4, fig. 4.

Shell large, thick, little inflated, with no radial folds, right valve less inflated than left. Ears large, anterior a little larger than posterior, right anterior one with a comparatively shallow byssal notch. Sculpture of about 30 major radial ribs, with one rather large interstitial

rib in each interspace; on the right valve, ribs rather low, broad and flat-topped, divided by a narrow groove for most of their length, and secondarily divided by shallower grooves over the outer quarter of the disc, with rather shallow, flat-bottomed interspaces; on the left valve, comparatively high, narrow, and rounded, subdivided by rather wide grooves so that there appear to be four narrow riblets on each rib, and with comparatively deep, rounded interspaces.

	height	length
Dimensions (in mm)		
Holotype, both valves (slightly offset)	103.9	103.6
Paratype, TM4323, right valve	106.7	114.8
Paratype, TM4324, right valve (of two)	113.0	119.3
Paratype, TM4325, right valve	91.8	96.2
Paratype, TM4339, both valves	153	156

LOCALITIES: GS5240, Waihi Beach, Hawera, holotype and one paratype (TM4323); GS1173, Hawera Beach, one paratype (TM4324); GS1172, coast near Waingongoro River mouth, South Taranaki, one paratype (TM4325); GS3617, Upper Waipipi Shellbed, Waverley Beach, west of Wanganui, one paratype (TM4339).

Specimens that are not designated as paratypes have been seen from the following localities: GS4257, Lower Waipipi Shellbed, Waverley Beach; GS52, 53, 57, 1101, and 4249, Waverley Beach; GS2426, 2715, 2716, 2724, 2726, and 2752, Te Aute Formation, Tahoraiti Survey District; GS4970 and 6630, Hickey's Stream, basal limestone of the Te Aute Formation, Te Aute Subdivision; GS78, 709, 1977, and 5308, Black Reef, Cape Kidnappers; GS1541, Te Reinga Falls, Wairoa; GS1314, Limestone Creek, Nuhaka S.D.; GS1530, Tahaenui Road, Nuhaka S.D.; GS1507, limestone, Long Point, Mahia Peninsula; GS9960, limestone overlying the "Opoiti Series", Mangapoike River, northern Hawke's Bay; GS9961, 50ft. below limestone on north side of Kohukohu Road, northern Hawke's Bay.

No attempt has been made to compile an exhaustive list of localities for the subspecies, as it is abundant in Waipipian limestones and shellbeds wherever they occur. No specimens have been seen from Wairarapa district or from the inland part of Wanganui Subdivision.

HOLOTYPE (TM2714) and four paratypes (TM4323–5, TM4339) in New Zealand Geological Survey. The holotype is the specimen figured by Marwick (1965: pl. 3, fig. 1; pl. 4, fig. 4).

TIME RANGE: Waipipian Stage.

The subspecies differs from *C. triphooki ongleyi* (Marwick) in the larger size, more nearly equal ears, broader and higher ribs, and details of the sculpture. The sculpture of the two valves in both *C. tolagaensis* (Marwick, 1931) and *C. triphooki ongleyi* is approximately the same, but as described above, *C. triphooki marwicki* and the later *C. triphooki triphooki* have discrepant sculpture on the two valves. *C. triphooki ongleyi* has relatively lower and narrower flat-topped ribs than those of *C. triphooki marwicki*, divided over the outer half of the disc by a single narrow groove, and has a single narrow rib in each interspace. *C. triphooki marwicki* differs from *C. triphooki triphooki* in the relatively larger byssal notch, less equal ears, lower, broader and more coarsely subdivided radial ribs, and single comparatively large interstitial rib. *C. triphooki triphooki* has the main ribs so much and so finely subdivided that it has four to six fine riblets on the surface of each rib, rather than true subdivision, and a few larger specimens from high in the Waitotaran (named *thomsoni* by Marwick, 1965) develop a further large groove in each main rib over the outer half of the shell. *C. triphooki triphooki* has from one to five interstitial ribs. *C. tolagaensis* differs from small specimens of *C. triphooki ongleyi* in having narrower, undivided, or only weakly subdivided ribs, with no insterstitial ribs on about half the specimens and one interstitial rib in about half the interspaces of other specimens.

Thus the *Phialopecten* lineage evolved by increase in size, decrease in discrepancy in the size of the ears, increase in discrepancy in the sculpture of the two valves, increase in discrepancy in the convexity of the two valves, increase in size and subdivision of the major radial ribs, and increase in the number of the interstitial ribs. Specimens from near the boundaries of the Pliocene stages are difficult to place in one subspecies or another, and the actual evolution of these features can be clearly traced. As has been noted by other workers, this evolution was presumably towards filling the niche of large, free-swimming, inequivalve Pectinidae that was filled by *Sectipecten* in the Upper Miocene and by *Pecten* in the late lower Pleistocene to Recent.

Genus DELECTOPECTEN Stewart, 1930

1930. *Delectopecten* Stewart, Acad. Nat. Sci. Philadelphia Spec. Publ. 3: 118.

1939. *Catillopecten* Iredale, Scient. Rep. Gt Barrier Reef Exped. 5(6): 370. Type species (by original designation): *Pecten murrayi* E. A. Smith, 1885, 1,400fms. off Queensland, Australia.

Type species (by orginal designation): *Pecten* (*Peudamusium*) *vancouverensis* Whiteaves, 1893, Recent, western Canada.

Delectopecten was ranked as a subgenus of *Cyclopecten* Verrill, 1897 by Grau (1959: 38), but was treated as a distinct genus by MacNeil (1967: 5). It differs from *Cyclopecten* in having the posterior auricles not marked off from the disc, in having a deep, narrow byssal notch in the right valve, and in having no byssal notch in the left valve, the left anterior auricle being weakly marked off from the disc and having its outline almost tangential to the outline of the disc in most species. A ctenolium is present in all species, but not in all species of *Cyclopecten,* and the shell is always translucent, but is opaque in some species of *Cyclopecten.* The group is highly distinctive, and is here treated as a full genus. The sculpture is usually fine, and consists of weak concentric lamellae and fine radial threads, often with scales at the intersections of the threads and lamellae.

Grau (1959: 38) treated *Arctinula* Thiele as a synonym of *Delectopecten,* but MacNeill (1967: 7) treated it as a distinct genus.

Grau (1959: 39) pointed out that *Catillopecten* Iredale was based on one of the species originally included in *Delectopecten* by Stewart, and that its characters do not differ generically from those of *Pecten vancouverensis* Whiteaves (figured by Grau, 1959: plate 15). He therefore synonymised *Catillopecten* with *Delectopecten;* the writer agrees with this.

Palliolum Monterosato, 1884, differs from *Delectopecten* in its opaque, brightly coloured shell, in its well-marked auricles, and in the low radial folds in the disc. It is similar to *Chlamys* Roeding, 1798, *Pseudamussium* H. and A. Adams, 1858, and *Cyclopecten* Verrill in ear shape and in the clear separation of the ears from the disc.

Delectopecten fosterianus (Powell, 1933)

1933. *Palliolum fosterianum* Powell, Trans. N.Z. Inst. 63: 370, pl. 40, figs. 6, 7.

This species has the peculiarly shaped auricles, translucent shell, and weak radial and concentric sculpture typical of species of *Delectopecten. Pecten murrayi* E. A. Smith, 1885, type species of *Catillopecten* Iredale, is very similar to *D. fosterianus,* but lacks radial sculpture. *Cyclopecten falklandicus* Dell (Dell, 1964: 181) is a closely related but shorter and more finely sculptured species of *Delectopecten.* Powell (1933: 371) compared *fosterianus* with *Pecten kermadecensis* E. A. Smith, 1885, but the well-marked auricles of *P. kermadecensis* show it to be a species of *Cyclopecten.*

Specimens of *Delectopecten fosterianus* in the Dominion Museum have been seen from: deep-sea cable in 600–700fm., 400 miles west of New Plymouth (para-

types); VUZ83, off Palliser Bay, in 550fm., m.v. *Alert,* 17/2/1957; Mernoo Bank, 43° 21′ S, 175° W, in 52fm., N.Z.S. *Matai,* 6/11/1936.

Family VENERIDAE

Genus EUMARCIA Iredale, 1924

1924. *Eumarcia* Iredale, Proc. Linn. Soc. N.S.W. 49: 211.

Type species (by original designation): *Venus fumigata* Sowerby, 1853, Recent, eastern Australia.

Subgenus EUMARCIA s.str.

Eumarcia awateria n.sp. Pl. 2, Fig. 8

Shell elongately oval, smooth and shining. Lunule rather long and narrow, not impressed, bounded by a faint line. Hinge line nearly straight, so that the anterior and posterior dorsal margins descend only slightly. Anterior end rather sharply rounded at about the dorsal third of the height of the shell. Posterior end gently rounded, again high up, curving forward quickly to become the full, regular curve of the ventral margin, which is lowest just behind the umbo. Umbones rather low. Concentric light and dark bands visible within the shell were presumably colour bands in life.

Height, 29.6mm; length, 43.6mm; inflation (two valves), 19.0mm (holotype).

LOCALITY: Concretion in place in siltstone in Upton Brook, half mile above bridge at Richmond Brook Road, Lower Awatere Valley, A. G. Beu and J. P. Kennett, February, 1963.

AGE: Kapitean (uppermost Miocene).

HOLOTYPE (VM300) and single fragmentary paratype (VM301) in Geology Department, Victoria University of Wellington.

The paratype has the two valves slightly offset, so that most of the left hinge is visible. It appears to be as described for *Eumarcia* by Marwick (1927: 625) except that the posterior cardinal tooth is higher than the nymph and separated from it by a slight groove, and the median cardinal is so deeply grooved that there appear to be four cardinal teeth.

The shell is smaller and more elongate than in previously described New Zealand species of *Eumarcia* s.str., and resembles typical species from Australia. It is more elongate than *E. fumigata* and has a somewhat thicker shell, being 1.5mm thick in the centre. Undescribed, older, closely related species are known from New Zealand.

Subgenus *Atamarcia* Marwick, 1927

1927. *Atamarcia* Marwick, Trans. N.Z. Inst. 57: 625.

Type species (by original designation): *Eumarcia* (*Atamarcia*) *sulcifera* Marwick, 1927, Lower Miocene, New Zealand.

Eumarcia (Atamarcia) thomsoni summersae n.subsp. Pl. 1, Figs. 3, 4

Shell of moderate size for the subgenus, ovately triangular, little inflated, with prominent umbones. Lunule impressed, weakly differentiated, bounded by a faint line near the umbo but only by a change in shell shape lower down, relatively large, long and narrow. Posterior dorsal margin lightly curved, steeply descending; anterior dorsal margin straight at first, steeply descending, then curving back sharply to the moderately curved ventral margin, which joins the posterior margin as a comparatively sharp curve. Sculpture of low, broad, weak, flat topped, concentric ridges separated by narrow, shallow grooves, all well defined on the posterior dorsal slope, weakly defined on the anterior and over the ventral part of the central area, but merely forming weak concentric growth lines over most of the central area of the shell, so that the surface of much of the shell is almost smooth and lightly polished. Hinge not seen.

Dimensions: Height, 51.0mm; length, 59.3mm.

LOCALITY: Brown sandstone exposed in head of narrow gully in centre of cliffs of the Ruamahunga River opposite Gladstone Hotel, central Wairarapa; collected and presented by Mrs Y. Summers of the Wairarapa Geological Society.

AGE: Nukumaruan (lower Pleistocene).

HOLOTYPE (VM409) in Geology Department, Victoria University of Wellington.

The writer has previously collected both *Eumarcia* (s.str.) *plana* Marwick and *Eumarcia* (*Atamarcia*) *benhami* Marwick at the type locality of *E. thomsoni summersae*. The new subspecies differs from the rare Kapitean to Nukumaruan *benhami* in its taller and more triangular form and very much weaker concentric sculpture. *Eumarcia thomsoni summersae* is closely related to and probably descended from the Tongaporutuan *E. thomsoni thomsoni* Marwick, from which it differs in the less inflated and more prominent umbones, the straighter posterior dorsal outline, and the slightly weaker concentric sculpture. It is so similar to *E. thomsoni* that it is treated as its subspecies. Members of this lineage do not appear to have been reported above the Tongaporutuan before.

Genus PLURIGENS Finlay, 1930

1930. *Plurigens* Finlay, Trans. N.Z. Inst. 61: 245.

Type species (by original designation): *Plurigens phenax* Finlay, 1930, Recent, New Zealand.

Plurigens fusidens n.sp. Pl. 2, Figs. 11, 12

Shell large, thick and solid, with inflated umbo and vaguely defined escutcheon. Sculpture as in *P. phenax* but adult ribs narrower, with broader interstitial spaces, and lacking the fine radial striations of *P. phenax*. Hinge plate sinuate but straighter than in *phenax*. Teeth very similar to those of *phenax* except that the posterior cardinal is fused to the nymph and separated from it by a very narrow groove only, not completely separate as in *P. phenax*, and the denticle representing the anterior lateral tooth is larger and closer to the anterior cardinal tooth than in *phenax*. Lunule as in *phenax*. Lunular margin finely crenulate, rest of margin broken away.

Height, 43mm; length, 45mm; inflation (one valve), 17mm (holotype, estimated).

LOCALITIES: Shellbed at river level (the lowest of three), north bank, corner where Sales Stream turns from east-west to north-south, about one mile east of Waterfalls Road, Lower Awatere Valley (holotype and small paratype); same shellbed, south side of stream (large, worn paratype and small, fragmentary paratype); middle shellbed, 10ft. above the second locality (several fragments); A. G. Beu and J. P. Kennett, February, 1963.

AGE: Opoitian (lower Pliocene).

HOLOTYPE (VM302) and paratypes (VM303 to VM306) in Geology Department, Victoria University of Wellington.

This species is similar to the Recent *P. phenax*, but seems to have had slightly different sculpture. It is readily distinguished from *phenax* by having the posterior cardinal tooth of the left valve fused to the nymph, rather than widely separated from it, and by having a markedly larger anterior lateral denticle. The only other described species of *Plurigens*, *P. carri* (Marwick) from the Tongaporutuan of Taranaki, has much broader and higher ribs than either *P. phenax* or *P. fusidens*.

Genus NOTOCALLISTA Iredale, 1924

1924. *Notocallista* Iredale, Proc. Linn. Soc. N.S.W. 49: 210.

Type species (by original designation): *Cytherea kingi* Gray, 1827, Recent, south-eastern Australia.

Subgenus STRIACALLISTA Marwick, 1938

1938. *Striacallista* Marwick, Trans. R. Soc. N.Z. 68:68.

Type species (by original designation): *Cytherea multistriata* Sowerby, 1851, Pliocene to Recent, New Zealand.

Notocallista (Striacallista) kapitea n.sp. Pl. 1, Figs. 5, 7

1966. *Notocallista* n.sp. aff. *multistriata* Kennett, Trans. R. Soc. N.Z., geol. 4(1): 26, pl. 16, figs. 226, 227.

Shell small, high, and well inflated, thick and solid, with prominent umbones. Shape roundly trigonal, with a short but rounded anterior end but unusually straight lower margin and rather sharp posterior ventral angle. Escutcheon shallow. Lunule short and broad, bordered by a groove, arched over the anterior lateral tooth of the hinge. Hinge plate sinuous, very short and broad for the genus, so that the anterior teeth are as long as those of a specimen of *multistriata* twice the size of *kapitea*. Left posterior cardinal tooth short and very narrow, fused to the short nymph and marked off from it by a faint groove. Left median cardinal massive and triangular, not grooved, rather close to the thin anterior cardinal. Left anterior lateral tooth massively buttressed, short and rounded, prominent. Muscle scars deeply impressed. Pedal retractor scar separate from, but close to, the anterior adductor scar. Pallial sinus typical of the subgenus but comparatively large, extending relatively further into the shell than usual because of the shortness of the shell. External sculpture of rather strong concentric folds, 1–2mm apart, with fine interstitial grooves over the anterior third of the shell. Posterior area usually smooth, but sometimes having interstitial grooves as on the anterior.

Height, 13.9mm; length, 16.8mm; inflation (one valve), 5.9mm (holotype, a left valve); height, 15.3mm; length, 17.8mm; inflation (one valve), 7.6mm (largest paratype, VM352, a left valve).

LOCALITY: S51/661, Eight Mile Formation, 30ft. above the Callaghan's Greensand, in artificial sludge channel of Callaghan's Creek, north Westland (grid ref. S51/694625), collected J. P. Kennett and Prof. H. W. Wellman, 1962. The outcrops in Callaghan's Creek are a standard section for the Kapitean Stage, and Kapitea Creek, type locality of the Kapitean, is just to the north of Callaghan's Creek (see Kennett, 1966).

HOLOTYPE (VM351) and five paratypes (VM352 to VM356) in Geology Department, Victoria University of Wellington; two paratypes from GS5223, siltstone, Callaghan's Creek (probably the same locality as above) in New Zealand Geological Survey (TM4326–7).

Specimens that are probably referable to the species, but are poorly preserved, have been examined from GS2954, Waikoau River, Southland (Kapitean); GS153 and 5024, Callaghan's Greensand, Callaghan's Creek (Tongaporutuan).

AGE: Kapitean, and possibly Tongaporutuan (Upper Miocene).

The hinge of a paratype right valve (VM353) of *kapitea* shows large sockets corresponding to the massive teeth of the left valve. The cardinal teeth are rather thin, and are weakly grooved medially. The species has all the characters of *Striacallista,* but is much shorter, higher, and more inflated than other species of the subgenus. It is the earliest species yet recognised as *Striacallista* in New Zealand, and does not seem to be related to other New Zealand forms.

The writer and J. P. Kennett collected several specimens of a probable new species of *Notocallista* from concretions in Upton Brook, Lower Awatere Valley, from Kapitean sandstones and siltstones. They are intermediate in shape between *N. makoensis* Marwick and *N. multistriata* (Sowerby), and seem to indicate the ancestry of the Waipipian to Recent *N. multistriata.* The writer has seen no specimens of *Notocallista* from Opoitian rocks, and interiors of the Tongaporutuan *N. makoensis* and the probable new species from the Awatere Valley have not been seen. Thus the details of the evolution of the early forms of *Striacallista* in New Zealand are very obscure. From external morphological similarity, however, it appears that *N. makoensis* should be placed in *Striacallista* rather than in *Fossacallista;* this possibility was also realised by Marwick (1938: 76). It seems likely that *Striacallista* evolved from *Fossacallista,* but it is also possible that New Zealand species of *Striacallista,* and in particular *N.* (*S.*) *kapitea,* migrated here from Australia.

Genus MARAMA Marwick, 1927

1927. *Marama* Marwick, Trans. N.Z. Inst. 57: 601.

Type species (by original designation): *Marama murdochi* Marwick, 1927, middle Pliocene to lower Pleistocene, New Zealand.

Marama murdochi marwicki n.subsp. Pl. 2, Figs. 9, 10, 13

Shell large, strongly inflated, rather thick. Beaks rather prominent, well rounded, at about the anterior sixth of the shell length. Lunule extremely large, broad and short, with two together making a heart shape, pouting strongly above the dorsal margin, descending to about 2mm before the anterior end of large specimens, bounded by a deeply incised line and with sculpture of the shell continuing across it. Sculpture of rather irregular, low, thin, concentric lamellae spaced about 1mm apart over most of the shell, with many very fine concentric grooves and ridges in each interspace, the latter becoming the dominant sculpture over the last quarter of adult shells. Shape rather quadrately oval, with straight dorsal margin, squarely rounded posterior margin, lightly curved ventral margin, and anterior margin curved back rather sharply and very high up.

Dimensions of various subspecies of *Marama* are given in Table I.

LOCALITIES: V1175, fine sandy siltstone about half a mile above road bridge on Richmond Brook Road, Upton Brook, Lower Awatere Valley, holotype and many paratypes; also many other localities in Upton Brook, down to the mouth, at the Awatere River; collected J. P. Kennett and A. G. Beu, February, 1963; GS2864, Awatere River, one mile below Black Birch Creek, Lower Awatere Valley, two paratypes (TM4331–2); GS5507, mouth of Upton Brook, Lower Awatere Valley, one paratype (TM4330).

AGE: Kapitean (uppermost Miocene) and lower part of the Opoitian (lowermost Pliocene; specimens from Black Birch Creek and mouth of Upton Brook).

HOLOTYPE (VM277) and 15 paratypes (VM278 to VM292) in Geology Department, Victoria University of Wellington; three paratypes (TM4330–2) in New Zealand Geological Survey.

TABLE I.—Dimensions of subspecies of *Marama murdochi* Marwick.

	height	length	inflation, 2 valves	length/ height
M. murdochi hurupiensis Marwick; Lr. Tt:				
Holotype, Hurupi Stream	44.0	53.0	30.7	1.73
Hurupi Stream, VM294	46.4	58.9	31.0	1.90
Hurupi Stream, VM295	44.5	56.4	32.9	1.71
Blind River, Awatere, VM357	39.6	49.5	27.6	1.76
Hurupiensis x *marwicki*, Upton Brook, Up. Tt (incomplete), VM293	39.9	46.2	29.0	1.59
M. murdochi marwicki n.subsp.				
Holotype, Kapitean	40.7	50.4	32.2	1.57
Paratype, V1175, Upton Brook, VM278	36.4	48.5	30.6	1.58
Largest paratype, Upton Brook, VM286	49.5	60.8	39.3	1.55
Paratype, Upton Brook, VM282	37.2	46.6	30.0	1.55
Paratype, GS2864, Opoitian, TM4331	41.3	49.0	31.7	1.55
Paratype, GS5507, Opoitian, TM4330	45	55	34.4	1.59
Marwicki x *murdochi*:				
GS1541, Te Reinga Falls (Waipipian)	36.8	48.6	31.0	1.57
GS3009, Waimea S.D. (Opoitian)	43.0	50.8	34.7	1.49
M. murdochi murdochi Marwick:				
Holotype (Waipipian)	38.1	42.7	32.0	1.33
GS2610, Makara River, South Wairarapa (Nukumaruan)	41.0	47.9	42.2	1.14

The new form is intermediate between *M. hurupiensis* Marwick and *M. murdochi* Marwick, and the three form a perfect evolutionary lineage. The differences between the three are gradational with time, and they seem best treated as subspecies of *M. murdochi*. The new subspecies is more inflated than *M. murdochi hurupiensis* and has more nearly parallel dorsal and ventral margins and a squarer posterior outline. It is longer, less inflated, and squarer in outline than *M. murdochi murdochi*. The relative differences in inflation are shown clearly in the accompanying table of dimensions of subspecies of *Marama* (Table I). A further distinction

is in the shape of the lunule, which is narrower in *M. murdochi hurupiensis* and broader in *M. murdochi murdochi* than it is in *M. murdochi marwicki.* There are also minor sculptural differences between the three subspecies, *M. murdochi hurupiensis* being coarsely sculptured, *M. murdochi murdochi* finely sculptured, and *M. murdochi marwicki* between these extremes. As is usual with *Marama,* only closed articulated individuals of the new subspecies have been seen, and the hinge details are unknown. However, the large lunule and the resemblance to *M. murdochi hurupiensis* and *M. murdochi murdochi* leave no doubt of the generic assignment.

M. murdochi hurupiensis Marwick is common at and around Hurupi Stream, Palliser Bay, and has also been collected from several localities from the Hurupi Formation farther north in the southern and eastern central Wairarapa Valley, and from Blind River, Lower Awatere Valley. All narrow, narrowly lunulate specimens conforming to the diagnosis of *hurupiensis* are of Lower Tongaporutuan age. No specimens have been seen from the Middle Tongaporutuan. An Upper Tongaporutuan specimen from near the base of the section in Upton Brook, Lower Awatere Valley, is rather incomplete, and although it is clearly intermediate between *M. murdochi hurupiensis* and *M. murdochi marwicki* this does not show well from the dimensions given in Table I. A specimen from GS1451, Te Reinga Falls, Wairoa (Waipipian) has sculpture as in *M. murdochi murdochi* Marwick but is shaped more like *M. murdochi marwicki* (see Table I), and a specimen from GS3009, Waimea S.D., Westland (Kapitean or Opoitian) has the coarser sculpture of *M. murdochi marwicki* but a shape intermediate between that of *marwicki* and that of *murdochi.* Such specimens are rare, and a practical discontinuity exists between the two subspecies.

M. murdochi murdochi Marwick is rare in the Waipipian rocks on the coast north-west of Wanganui, the type locality being Waihi Beach, Hawera, and is not uncommon in the Waitotaran to upper Nukumaruan bathyal to mid-neritic siltstones of Wairarapa and Hawke's Bay. Topotypes of *murdochi* are more elongate and more finely sculptured than the common Nukumaruan form of Hawke's Bay and Wairarapa, but the differences are slight and do not seem worth taxonomic recognition at present.

The supposedly Kapitean *M. elegans* (Hutton) from Kanieri, Westland, is known only by the holotype, a small, imperfect, narrow specimen with widely spaced, high, concentric lamellae, resembling *M. murdochi hurupiensis* in most respects. Until more specimens are collected from clearly defined localities the relationships of *M. elegans* to the members of the lineage outlined above must remain unknown. Other species of *Marama* s.str. are known from Lower Miocene and older rocks, and are comparatively rare. They are probably ancestral to *M. murdochi,* but evidence of relationship is not yet available.

As with *Phialopecten,* discussed above, the subspecies of *Marama* in the Upper Miocene to lower Pleistocene are extremely useful in stratigraphic paleontology. Also as with *Phialopecten,* it is a pleasure to name the new subspecies for Dr J. Marwick, who named both genera and has contributed much to the knowledge of all their species and their use in stratigraphy.

Family FISSURELLIDAE

Genus EMARGINULA Lamarck, 1801

1801. *Emarginula* Laramrck, Syst. Anim. s. Vert.: 69.

Type species (by monotypy): *E. conica* Lamarck, 1801, Recent, England.

Emarginula haweraensis Powell, 1931. Pl. 5, Fig. 43

1931. *Emarginula haweraensis* Powell, Rec. Auckland Inst. Mus. 1(2): 96, pl. 11, fig. 17.

1966. *Emarginula haweraensis*: Fleming, Bull. N.Z. Dept. scient. Ind. Res. 173: 36.

This large species is not uncommon at Waihi Beach, Hawera (Waipipian, mid-Pliocene), the type locality. Fleming (1966a: 36) gave the time-range as Waipipian to Nukumaruan, but the specimen from near Gladstone, central Wairarapa, on which the Nukumaruan record was based, cannot be traced in the collections of the New Zealand Geological Survey. The writer and Mr P. A. Maxwell recently collected a large, well-preserved specimen of *E. haweraensis* from the siltstone in Mangatahi River near its junction with Okauawa Stream, on the Maraekakaho-Kereru Road, central Hawke's Bay, confirming the range to the Nukumaruan. Other smaller specimens in Geological Survey collections from Mangatahi River are probably young specimens of *E. haweraensis,* but are difficult to distinguish from large specimens of *E. striatula* (Quoy and Gaimard).

The adult from Mangatahi River is lodged in the collection of the Geology Department, Victoria University of Wellington (VM297). It is 39.2mm long, 31.9mm wide, and 19.8mm high.

Family TURBINIDAE

Subfamily ASTRAEINAE

Genus FRACTOPELLA n. gen.

Type species: *Fractopella megapex* n.sp.

Spire moderately tall, with straight outlines. Broad smooth callus covering umblical region. Sculpture of one row of small, round nodules above the suture, or above the periphery of the body whorl, one row of small, round nodules immediately below the suture, and a row of about 13 large, triangular, downward-directed nodules around the edge of the base. Protoconch relatively very large, turbinate, of two and a half smooth, rounded whorls.

The new genus is rendered very distinct by its large, turbinate protoconch. In other features it resembles *Opella* Finlay most closely, particularly in the row of triangular, downward-directed nodules around the base. The combination of sculptural features is not yet known in *Opella,* but is not unlike that of *Opella hendersoni* Marwick. The large inflated protoconch is unique in the Astraeinae, as far as I am aware.

Fractopella megapex n.sp. Pl. 5, Figs. 45–47

Shell of moderate size, with a moderately tall spire and a straight-sided outline. Base almost flat, smooth, at a rather steep angle to the axis of the shell, with a slightly indented callus pad occupying the central region and extending over a little more than half the width of the base, with a single row of triangular, pointed nodules around its outer rim. Eight nodules present on incomplete holotype; probably 12 or 13 on complete specimens. Sculpture of a row of about 20 small, rounded nodules immediately below the suture, intercalated between the similar nodules in a row just above the suture on spire whorls and about a fifth of the whorl height above the periphery on the body whorl, becoming very small and numerous over the body whorl. Growth lines between these nodules weak, curved and strongly prosocline, indicating that the outer lip of the aperture sloped strongly downward and backward. Aperture narrowly elliptical, with the long axis parallel to the radius of the base.

Height, 32.3mm; diameter, 36.2mm (incomplete unique holotype).

LOCALITY: Tuffaceous sandstone in road cutting half-way down south side of hill between Awatere River and Te Araroa, East Cape; A. G. Beu and P. A. Maxwell, November, 1966.

AGE: Kapitean (?).

HOLOTYPE (VM322) in Geology Department, Victoria University of Wellington.

The unique holotype is fractured and incomplete, but shows its distinctive features clearly. Several other fragmentary specimens were seen in the exposure, but could not be extracted because of the crumbly matrix.

Family CALYPTRAEIDAE

Genus ZEGALERUS Finlay, 1927

1927. *Zegalerus* Finlay, Trans. N.Z. Inst. 57: 392.

Type species (by original designation): *Clypeola tenuis* Gray, 1867, Pleistocene and Recent, New Zealand.

Zegalerus giganteus n.sp. Pl. 2, Figs. 15, 18

Shell very large, rather thick, strongly inflated and comparatively tall. Apex subcentral. Adults with at least three strongly convex whorls, with deeply impressed sutures. Sculpture of prominent, very strongly prosocline growth lines, in conformity with the outer lip, and with irregular faint radial malleations. Apex broken away, septum not visible.

Dimensions (in mm):

	height	diameter
Holotype	24.5	38.2
Paratype VM337, Hurupi Stream	22+	46.5
Paratype VM335, Hurupi Stream	23+	37.5
Paratype VM340, Ngakonui Stream	23+	39.5
Paratype VM339, Ngakonui Stream	25+	46.5

LOCALITIES: Concretionary boulders in Hurupi Stream, Palliser Bay, A. G. Beu, 1963, holotype and many paratypes; V1297, boulders in Ngakonui Stream, near Hinakura, central Wairarapa (see discussion on *Notadusta* below), P. Vella, T. Kotaka, and A. G. Beu, 1963, two paratypes.

AGE: Waiauan and Lower Tongaporutuan (Middle and Upper Miocene).

HOLOTYPE (VM334) and six paratypes (VM335 to VM340) in Geology Department, Victorial University of Wellington.

The species is not uncommon in the basal zone of the Hurupi Formation in Wairarapa District. It differs from *Z. peramplus* Bartrum and Powell in its larger number of considerably more convex whorls and in its more deeply impressed sutures and taller form. It is also similar to the Recent *Z. tumens* Finlay, differing in its much larger size and more convex whorls. The three species may belong in one lineage. Boshier (1963: 393) showed that *Z. peramplus* had a false umbilicus and placed it in *Sigapatella,* but this may merely mean that *peramplus* is a very early form of *Zegalerus,* only just branched off from *Sigapatella.* The septal features of the new species are not known, but it seems best to place it in *Zegalerus* until they are, because of its subcentral apex and resemblance to *Z. tumens.*

Family STRUTHIOLARIIDAE

Genus PELICARIA Gray, 1857

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

Type species (by monotypy): *Pelicaria vernis* (sic) (= *Buccinum vermis* Martyn, 1784, validated I.C.Z.N. Opinion 479), Pleistocene and Recent, New Zealand.

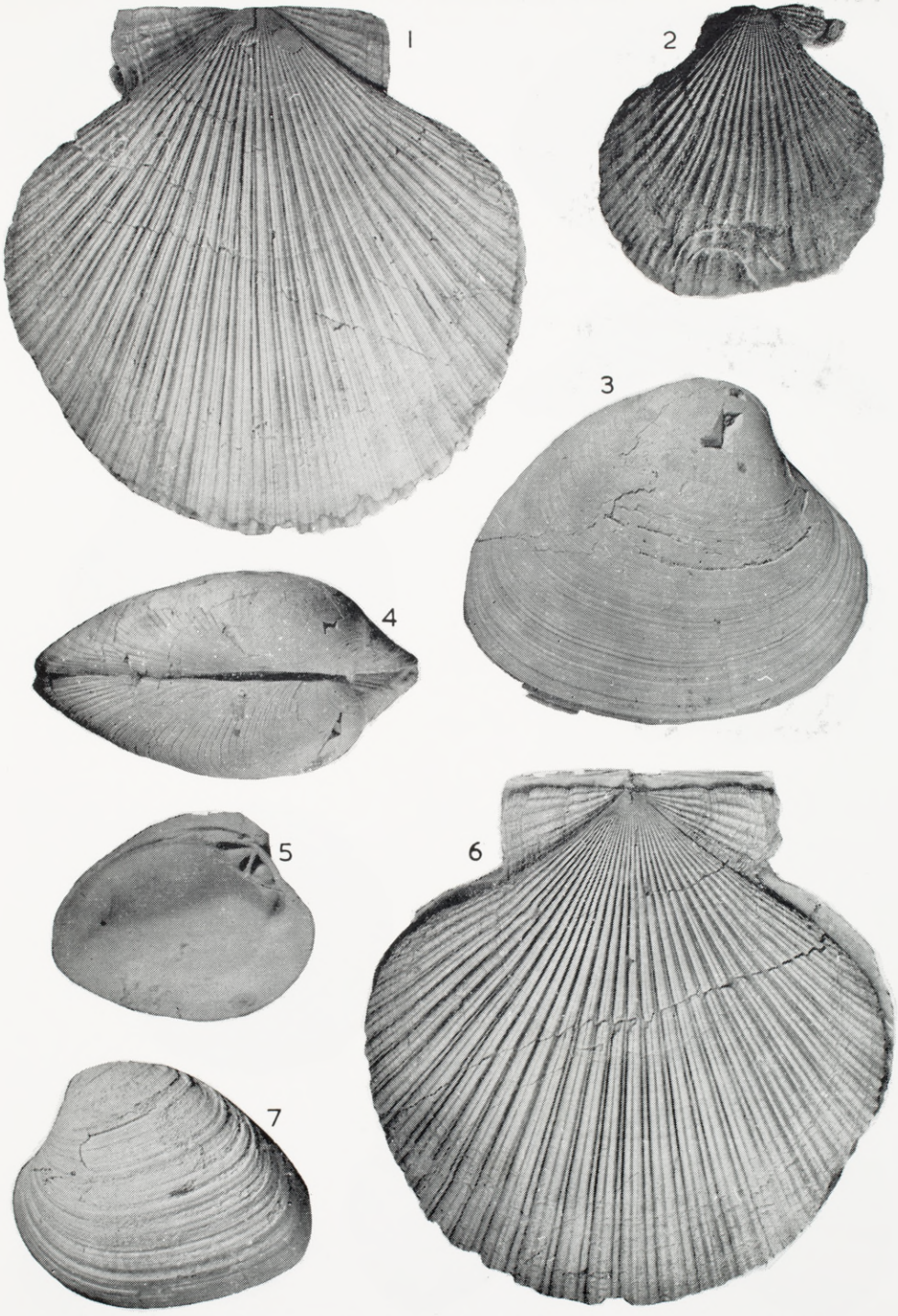
Pelicaria procanalis n.sp. Pl. 2, Figs. 14, 16, 17

Shell small, with short spire, lightly convex whorls with a weak angulation around the base, and a moderately wide and deep sutural channel. Sculpture of four broad, flat-topped cinguli on sides of body whorl, with shallow, lightly concave interspaces of about one-quarter of the width of the cinguli between the upper three, and a deeper, flat-bottomed interspace as wide as a cingulum between the third and fourth cinguli. About four low, narrow cinguli on the base. Wider interspace corresponds with position of suture on earlier whorls, so that it forms the inner side of the sutural channel and there are three cinguli on the sides of spire whorls. Apex, outer lip and tip of the base broken away from all available specimens.

Dimensions (in mm; all specimens incomplete):

	height	diameter
Holotype	22.5	17.8
Figured paratype, VM311	27.0	26.0
Paratype, VM313	27.8	22.8
Paratype, VM312	23.7	20.5

LOCALITIES: Fine blue-grey sandstone at the mouth of Upton Brook, Awatere River, Lower Awatere Valley, holotype and four paratypes (VM311 to VM314), A. G. Beu and J. P. Kennett, February, 1963; upper shellbed, 30ft. above river level, large bend about one mile down Sales Stream from Waterfalls Road, Lower



FIGS. 1, 6.—*Chlamys* (*Phialopecten*) *triphooki marwicki* n.subsp., holotype, GS5240, Waihi Beach, Hawera (Waipipian); N.Z. Geological Survey (TM2714); 103.9 × 103.6mm. Fig. 2.—*Chlamys* (*Mimachlamys*) *araroaensis* n.sp., holotype, cliffs east of Te Araroa, East Cape (Kapitean); Victoria University Geology Department (VM346); 22.8 × 22.3mm. Figs. 3, 4.—*Eumarcia* (*Atamarcia*) *thomsoni summersae* n.subsp., holotype, cliffs of Ruamahunga River opposite Gladestone Hotel, Wairarapa (Nukumaruan); Victoria University Geology Department (VM409); 51.0 × 59.3mm. Figs. 5, 7.—*Notocallista* (*Striacallista*) *kapitea* n.sp., holotype, S51/661, Callaghan's Creek, near Greymouth, Westland (Kapitean); Victoria University Geology Department (VM351); 13.9 × 26.8mm.

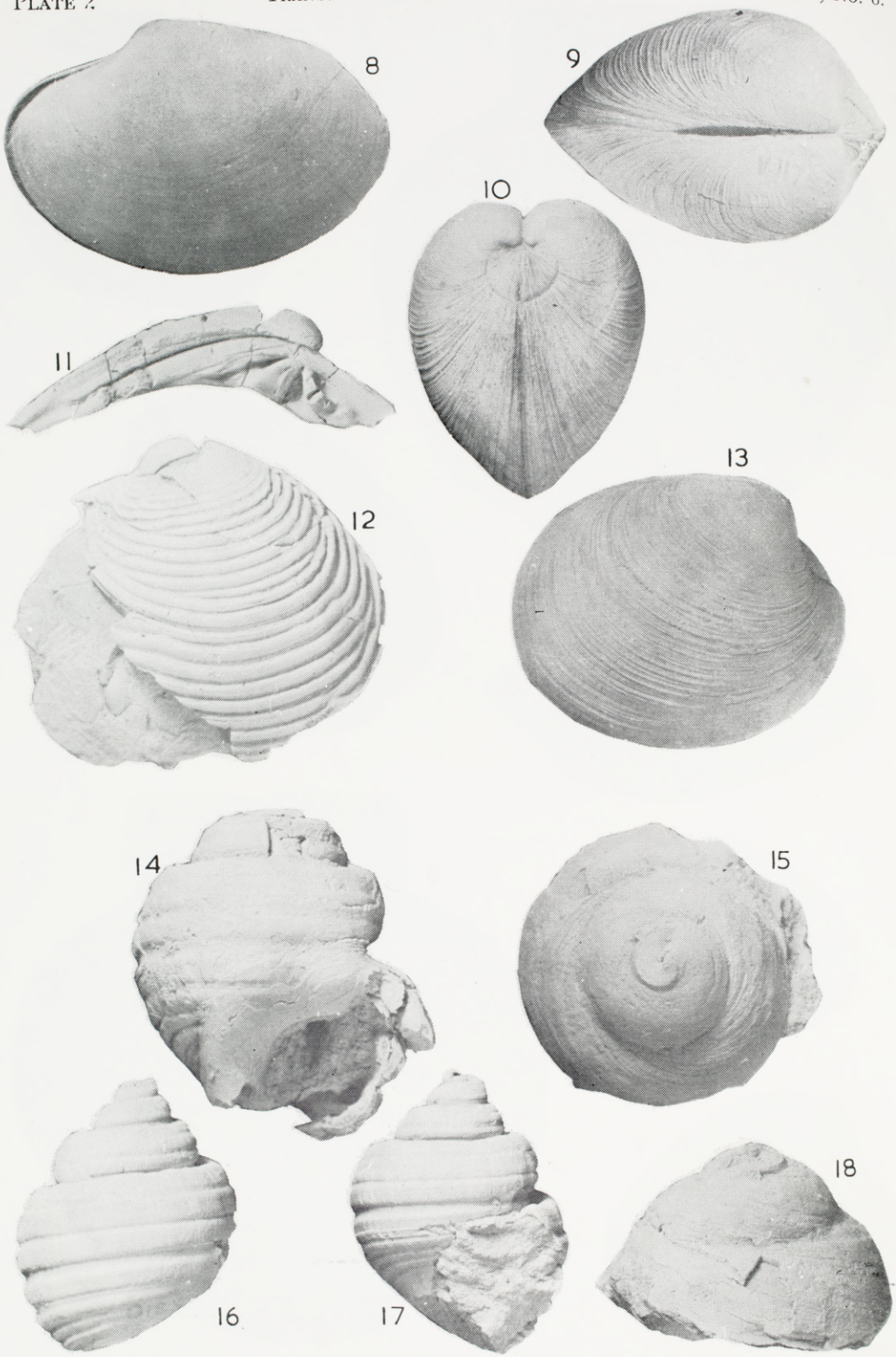
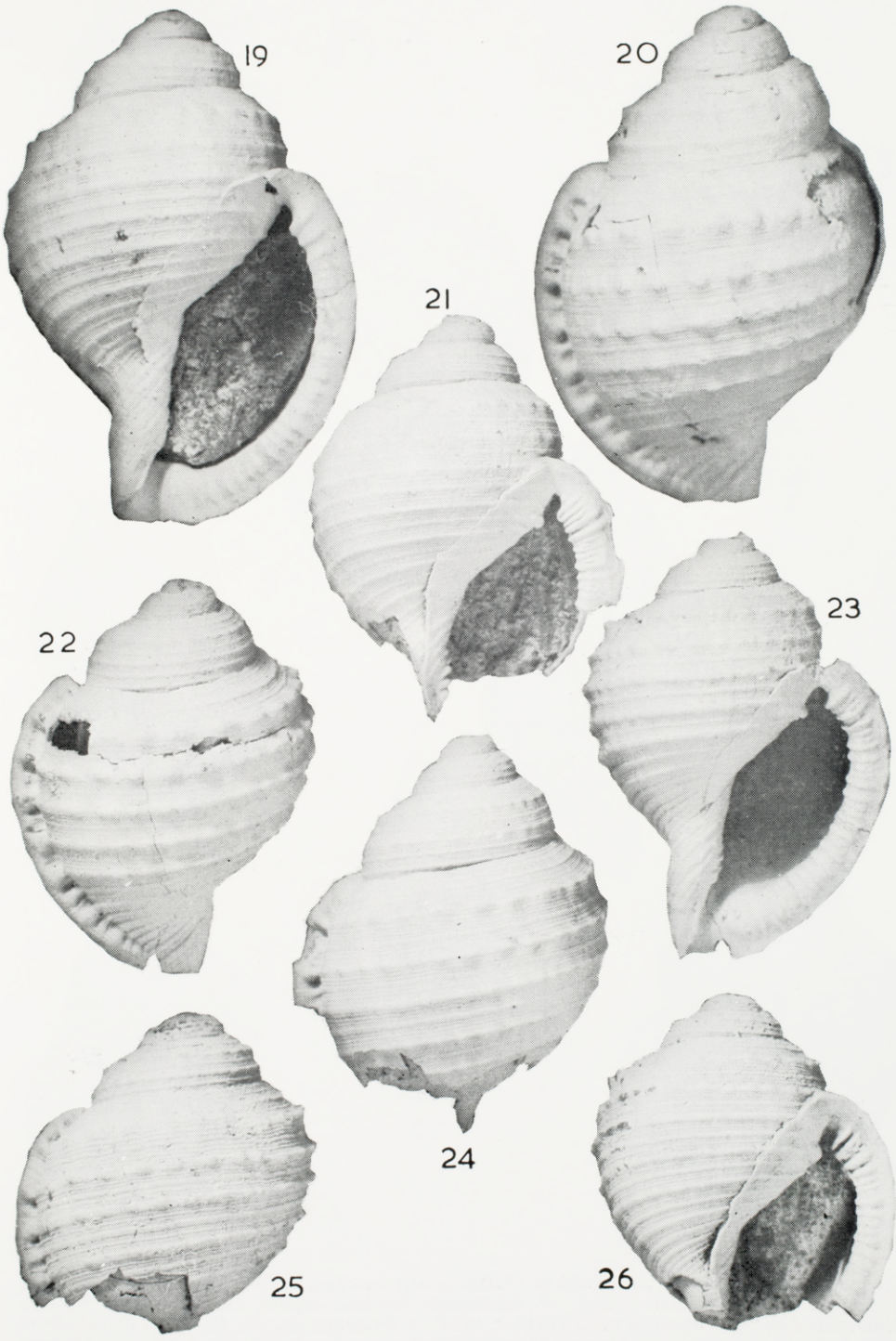
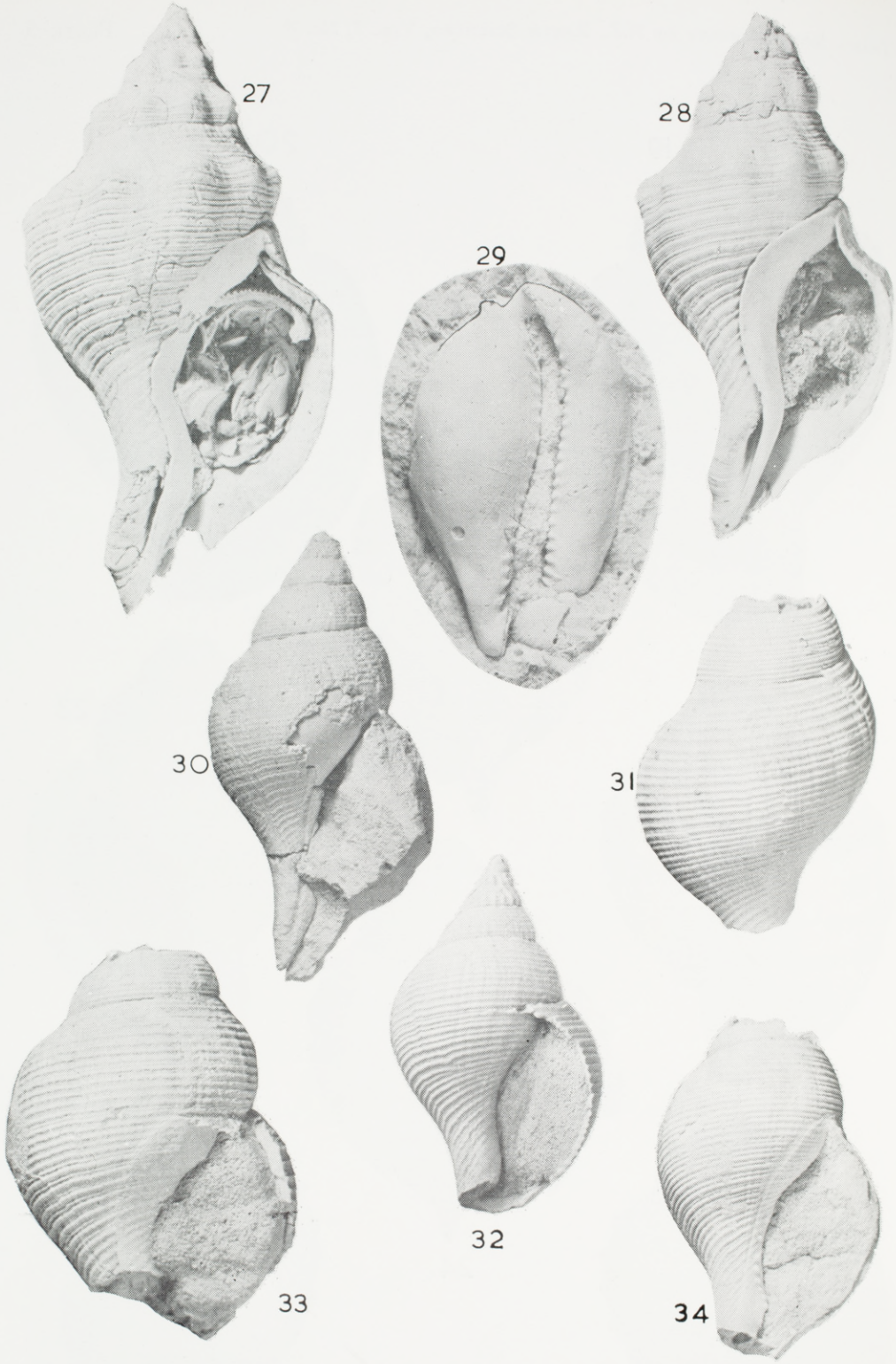


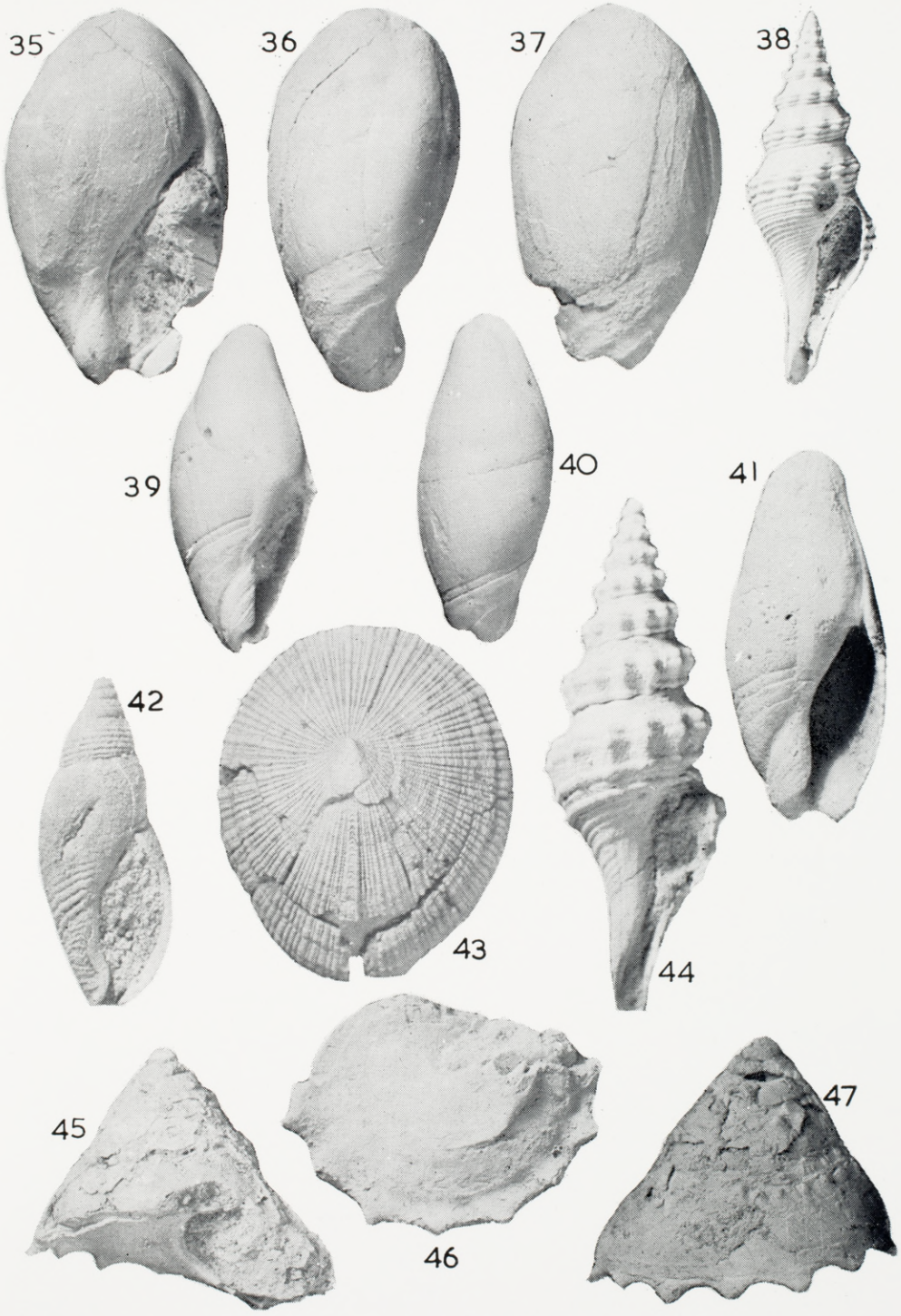
FIG. 8.—*Eumarcia* (s.str.) *awateria* n.sp., holotype, Upton Brook half mile above Richmond Brook Road, Lower Awatere Valley (Kapitean); Victoria University Geology Department (VM300); 29.6 × 43.6mm. Figs. 9, 10, 13.—*Marama murdochi marwicki* n.subsp., holotype, V1175, Upton Brook half mile above Richmond Brook Road, Lower Awatere Valley (Kapitean); Victoria University Geology Department (VM277); 40.7 × 50.4mm. Figs. 11, 12.—*Plurigens fusidens* n.sp., holotype, Sales Stream, Lower Awatere Valley (Opoitian); Victoria University Geology Department (VM302); 43 × 45mm (estimated complete dimensions). Figs. 14, 16, 17.—*Pelicaria procanalis* n.sp., mouth of Upton Brook, Lower Awatere Valley (Opoitian); Victoria University Geology Department. Fig. 14, paratype, VM311, 27.0 × 26.0mm. Figs. 16, 17, holotype, VM310, 22.5 × 17.8mm. Figs. 15, 18.—*Zegalerus giganteus* n.sp., holotype, concretion in Hurupi Stream, Palliser Bay, Wairarapa (Tongaporutuan); Victoria University Geology Department (VM334); 24.5 × 38.2mm.



Eudolium autoeanum n.sp., Kaipara Harbour, Northland (Hutchinsonian). Figs. 19, 20, holotype, Auckland University Geology Department (G5447), 100 yards north of Pakaurangi Point, 38.9 × 27.1mm; figs. 21, 24, paratype, Victoria University Geology Department (VM296), Coates' Bay, Pakaurangi Point, 28.9 × 22.8mm; figs. 22, 23, paratype, Auckland University Geology Department (G5448), Coates' Bay, Pakaurangi Point, 29.8 × 21.7mm; figs. 25, 26, paratype, N.Z. Geological Survey (TM3950), Coral Point, 23.6 × 21.7mm.



FIGS. 27, 28.—*Penion adustus accipitris* (Finlay), Nukumaruan, central Hawke's Bay. Fig. 27, Jacobson's property, near mouth of Kikowhero Stream, central Hawke's Bay; Victoria University Geology Department (VM345); 107.0 × 54.2mm; fig. 28, topotype, *Struthiolaria frazeri* shellbed in Okauawa Stream, Maraekakaho-Kereru Road; Victoria University Geology Department (VM344); 89.2 × 45.8mm. Fig. 29.—*?Notadusta* n.sp., V1297, Ngakonui Stream, Hinakura, central Wairarapa (Waiauan?); Victoria University Geology Department (VM358); 38.5 × 23.8mm. Rubber latex cast of natural external mould of the base. Figs. 30–34.—*Aeneator huttoni* Finlay. Figs. 30, 31, 33, 34, Upton Brook, Lower Awatere Valley (Kapitean), Victoria University Geology Department; fig. 30, VM343, 33.8 × 17.7mm; figs. 31, 34, VM341, 26.8 × 18.8mm; fig. 33, VM342, 30.0 × 22.2mm. Fig. 32, Holotype, "Kanieri" (Kapitean); New Zealand Geological Survey (TM4322), 29.9 × 18.8mm.



FIGS. 35–37.—*Amalda* (*Baryspira*) *ovalis* n.sp., holotype, V674, Kaiwhata River near Ngahape, central Wairarapa (Altonian?); Victoria University Geology Department (VM315); 25.7 × 15.2mm. Fig. 38.—*Insolentia powelli* n.sp., holotype, V582, Slip Point, Clifden, Southland (Clifdenian); Victoria University Geology Department (VM298); 21.9 × 7.4mm. Figs. 39–41.—*Amalda* (*Gracilispira*) *olsoni* n.sp., upper mudstone at Devil's Elbow, Hawke's Bay (Nukumaruan), Victoria University Department. Figs. 39, 40, holotype, VM316, 20.5 × 9.2mm; fig. 41, paratype, VM317, 27.7 × 12.3mm. Fig. 42.—*Uttleya paucispiralis* n.sp., holotype, Kaimatira Pumice Sand, Mowhanau Beach, Wanganui (Castlecliffian); Victoria University Geology Department (VM299); 7.85 × 2.80mm. Fig. 43.—*Emarginula haweraensis* Powell, junction of Okauawa Stream with Mangatahi River, Hawke's Bay (Nukumaruan); Victoria University Geology Department (VM297); 39.2 × 31.9mm. Fig. 44.—*Comitas kennetti* n.sp., holotype, "Giant's Tooth", Cape Foulwind, Westland (Kapitean); Victoria University Geology Department (VM333); 28.9 × 10.1mm. Figs. 45–47.—*Fractopella megapex* n.gen., n.sp., holotype, road cutting on south side of hill between Awatere River and Te Araroa, East Cape (Kapitean?); Victoria University Geology Department (VM322); 32.3 × 36.2mm.

Awatere Valley, one paratype (VM308), same collectors and date; GS4896, junction of mid and left branches of Upton Brook, just above road bridge on Richmond Brook Road, Lower Awatere Valley, coll. H. J. Harrington, one paratype (TM4493); GS5507, mouth of Upton Brook, Lower Awatere Valley, two paratypes (TM4491–2), H. W. Wellman and P. Olson, 31/1/1952 (= type locality).

HOLOTYPE (VM310) and five paratypes (VM308, VM311–4) in Geology Department, Victoria University of Wellington; three paratypes (TM4491–3) in New Zealand Geological Survey.

AGE: Kapitean (GS4896) and Opoitian.

This species is similar to and probably ancestral to *Pelicaria canaliculata* (Zittel), which was described from and is common in Waipipian rocks in the same area. It differs from *P. canaliculata* in having markedly narrower and shallower interspaces between the cinguli, and in having the third interspace wider than the others. A specimen from the Ormond Formation of Gisborne District (? Opoitian) figured by Marwick (1931: pl. 8, fig. 136) appears to be closely related to *P. procanalis*. The available specimens are very incomplete but quite well preserved. They seem to have been broken before fossilisation, and it is doubtful that better material will be collected. The species is therefore described from poor material to extend knowledge of the evolution of this predominantly Pleistocene and upper Pliocene genus.

Family CYPRAEIDAE

Genus NOTADUSTA Schilder, 1935

1935. *Notadusta* Schilder, Proc. malac. Soc. Lond. 21: 350.

Type species (by original designation): *Notadusta victoriana* Schilder, 1935, Miocene, Australia.

?Notadusta n.sp. Pl. 4, Fig. 29

A natural internal mould and the external mould of the base of a medium-sized cypraeid were collected from VM1997, boulders in Ngakonui Stream, a tributary of the Pahaoa River near Hinakura, central Wairarapa, by Professor P. Vella, Dr T. Kotaka and the writer in 1963. As the specimen is incomplete it is difficult to be sure of its relationships, but in the shape and dentition it appears to be conspecific with several slightly smaller complete specimens of a new species collected at Long Beach, Clifden (Altonian), by Geological Survey paleontologists. Mr T. A. Darragh (pers. comm.) recently identified the Clifden specimens as a new species of *Notadusta,* so that the Wairarapa specimen is tentatively referred there. The Clifden shells agree in all essential features with the type species of *Notadusta,* figured by Schilder (1935: 355, figs. 47, 48); they show the well-marked posterior apertural outlet distinguishing *Notadusta* from *Notoluponia* Schilder, 1935, and have slightly projecting spires.

DIMENSIONS: A latex mould made from the natural external mould of the base is 38.5mm long and 23.8mm wide.

Ngakonui Stream is close to Adams Stream, the type locality of *Tortoflabellum flemingi* Squires. *Tortoflabellum* is common in the boulders in Ngakonui Stream, along with abundant badly leached Mollusca, of which the most common is *Polinices*. The source of the boulders is not certain, but they are apparently weathering out of the basal conglomerate of the Hurupi Formation (Lower Tongaporutuan), which is widespread in the area.

Among other molluscs in the boulders were several specimens of a new species of *Conus* sensu lato having a short, stepped spire and three or four narrow, smooth threads on the shoulder. Other fossils from the boulders are of interest also and, being useful in determining the age, are listed here:

Saccella aff. *falcigera* Marwick, *Barbatia novaezelandiae* (Smith), *Trichomya huttoni* (Cossman), *Lima* aff. *becki* Fleming, *Ostrea* sp., *Anomia* sensu lato sp., *Dosinia lambata* Gould, *?Dosinia magna* Hutton, *Maorimactra* sp., *Trochus* (*Coelotrochus*) aff. *huttoni* Cossman, *Zeacolpus* sp., *Tropicolpus milleri* Marwick, *Ataxocerithium* sp., *Sigapatella* sp., *Maoricrypta radiata* (Hutton), *Zegalerus giganteus* n.sp. (paratypes), *Polinices huttoni* (Ihering), *?Notodusta* n.sp., *?Echinophoria* sp., *Antizafra wairarapa* (King), *Zelandiella fatua* Finlay, *Amalda* (*Alocospira*) *subhebera* (Marwick), *?Mauithoe dilatata* (Marwick), *Alcithoe hurupiensis* Marwick, *Conus* sensu lato n.sp., *Austrotoma obsoleta* Finlay, *Cylichnania* aff. *bartrumi* Marwick, *Tegulorynchia nigricans* (Sowerby), *Tortoflabellum flemingi* Squires, *Platyhelia distans* Tenison-Woods.

Zegalerus giganteus, Antizafra wairarapa, Mauithoe dilatata and *Alcithoe hurupiensis* are otherwise known only from the Hurupi Formation, and would seem to indicate that the rocks are of Lower Tongaporutuan age. However, fossils older than Tongaporutuan are poorly known in Wairarapa District, and these species may well have longer ranges than our present knowledge would suggest. *Zelandiella fatua* Finlay and *Austrotoma obsoleta* Finlay are common in the Waiauan of North Canterbury, but *Z. fatua* is also known elsewhere in the Wairarapa in the Hurupi Formation. The fauna is of shallow-water facies and contains many rare rock-dwelling forms such as *Barbatia, Trichomya* and *Coelotrochus,* but contains few key fossils. As the boulders are weathering out of a basal Tongaporutuan conglomerate, and as *Austrotoma obsoleta* appears to be a restricted Waiauan form, the fossils are thought to be of Waiauan age. A minimum age of Waiauan is also strongly suggested by the fact that the basal part of the Hurupi Formation is known to be locally as old as Waiauan (S. Bunopas, pers. comm.) and is suspected to be Waiauan over much of its extent.

The occurrence of *Trichomya* in the boulders is of considerable interest, as Fleming (1959: 176) did not record the genus above the Altonian in New Zealand. This indicates the difficulty of establishing reliable time ranges for littoral molluscs.

Family CASSIDIDAE

Genus GALEOOCORYS Kuroda and Habe, 1957

1957. *Galeoocorys* Kuroda and Habe, Publ. Seto Marine Biol. Lab. 6(1): 27.

Type species (by original designation): *Galeodea leucodoma* Dall, 1907, Recent, deep water off Japan.

Galeoocorys sulcata (Hutton, 1873)

1873. *Cassidaria sulcata* Hutton, Catalogue Tertiary Mollusca and Echinodermata N.Z.: 8

1966. *Galeoocorys sulcata*: Fleming, N.Z. Jl Geol. Geophys. 9(4): 430, figs. 1–7 (with further synonymy).

A single small, slightly crushed specimen closely comparable with those figured by Fleming (1966b) was collected by the writer and J. P. Kennett from the uppermost shellbed, 30ft. above river level, on the south bank of the large bend of Sales Stream about one mile below Waterfalls Road, Lower Awatere Valley (Opoitian). The species has previously been recorded only from the Kapitean to Waipipian of Westland. The specimen is in the Geology Department, Victoria University of Wellington (VM307).

An incomplete large specimen of the same species, in the collection of Mr F. D. Chambers, Opunake, was collected at Ohawe Beach, Hawera (Waipipian).

Family TONNIDAE

Genus EUDOLIUM Dall, 1889

1872. *Doliopsis* Monterosato, Notozie intorno alle conchiglie Mediterranee, Palermo: 49 (non Vogt, 1852, nec Conrad, 1865).

1889. *Eudolium* Dall, Bull. Mus. compar. Zool. Harvard College 18: 20.

Type species (by monotypy): *Dolium crosseanum* Monterosato, 1869; Tertiary, Italy; Recent, throughout the Mediterranean and the eastern and western Atlantic Ocean, as far south as South Africa (Turner, 1948: 179, 180).

Eudolium aoteanum n.sp. Pl. 3, Figs. 19–26

Shell small for the genus, with thin shell and comparatively prominent sculpture. Spire moderately tall, with rounded, moderately sloping shoulders margined by uppermost nodular spiral cord. Body whorl moderately elongate, with a rather long neck and a short canal. Aperture narrowly elongate, with a thickened and reflected outer lip buttressed by the spiral cords and bearing about 30 prominent, rather irregular plicae; inner lip thin, covering but not hiding the spiral cords, bearing one or two prominent nodules high up that mark off the narrow posterior canal, and bearing four or five high, irregular plicae at the top of the anterior canal. Major spiral sculpture of three or four narrow, sharply crested cords on spire whorls and about 20 on body whorl, neck and canal, the main two of which on spire whorls and main five of which on the body whorl are more prominent than others and bear nodules. Many fine spiral threads cover the whole shell surface. Axial sculpture of about 20 to 30 comparatively large, sharp, vertically compressed nodules per whorl on the major spiral cords, not aligned to form distinct costae, the whole crossed by fine, closely spaced axial threads that cancellate the fine spiral threads.

Dimensions (in mm):

	height	diameter
Holotype	38.9	27.1
Paratype, G5448	29.8	21.7
Paratype, TM3950, incomplete	23.6	21.7
Paratype, VM296, incomplete	28.9	22.8

LOCALITIES: N28/873, grid ref. 815346, 100 yards north of Pakaurangi Point on east coast of the point, Kaipara Harbour, B. Jones, 1966 (holotype, G5447); N28/860, grid ref. 805350, 750 yards east of farmhouse, Coates' Bay, Pakaurangi Point, Kaipara Harbour, B. Jones, 1966 (figured paratype, G5448); grid ref. N28/807350, 850 yards east of farmhouse, in small bay, Coates' Bay, Pakaurangi Point, Kaipara Harbour, A. G. Beu, 1965 (figured paratype, VM296); GS3256, Coral Point, Kaipara Harbour, C. A. Fleming, 1942 (figured paratype, TM3950).

AGE: Hutchinsonian (Lower Miocene).

HOLOTYPE (G5447) and figured paratype (G5448) in Geology Department, University of Auckland; figured paratype (VM296) in Geology Department, Victoria University of Wellington; figured paratype (TM3950) in New Zealand Geological Survey.

Turner (1948: 179) described *Eudolium crosseanum* as follows: "*E. crosseanum* is readily distinguished from others in the genus by its light weight, and characteristic sculpture which consists of spiral ridges alternating with thin spiral cords, being crossed by very fine axial threads giving the shell a fine irregular reticulated appearance when examined with a 10 × lens." It is apparent that *E. aoteanum* is closely related to *E. crosseanum,* having a light-weight shell, a similar strongly reflected and buttressed outer lip and very similar spiral and axial sculpture. *E. aoteanum* differs from *E. crosseanum* in having a considerably smaller number of spiral cords and a smaller number of relatively larger nodules on the cords. It also reaches a smaller adult size, as *E. crosseanum* reaches 81mm in height (Turner, 1948: 179).

Eudolium biornatum (Tate) from Fyansford and Muddy Creek, Victoria, Australia (Tate, 1893: 173, pl. 10, fig. 5) is not closely related, having much finer sculpture and a narrower form. It seems more closely related to some of the Recent Indo-Pacific species of *Eudolium.*

As *E. crosseanum* now occurs in South Africa, its close relative in the Lower Miocene of New Zealand may indicate migration from South Africa during the Lower Miocene, by means of transport of veliger larvae by the west-wind drift.

Family ARCHITECTONICIDAE

Genus PHILIPPIA Gray, 1847

1847. *Philippia* J. E. Gray, Proc. zool. Soc. Lond. 1847: 146.

Type species (by original designation): *Solarium luteum* Lamarck, 1822, Recent, Australia and northern New Zealand.

Philippia lutea (Lamarck, 1822)

1822. *Solarium luteum* Lamarck, Animaux sans Vertèbres 7: 5.
1878. *Philippia lutea*: Hutton, J. Conch. Paris 26: 24.
1880. *Philippia lutea*: Hutton, Manual N.Z. Mollusca: 70.
1899. *Solarium* (*Philippia*) *luteum*: Cooper, Trans. N.Z. Inst. 31: 137.
1904. *Solarium luteum*: Hutton, Index Faunae Novae Zelandiae: 79.
1913. *Architectonica* (*Philippia*) *lutea*: Suter, Manual N.Z. Mollusca: 316, pl. 46, fig. 4.
1924. *Architectonica lutea*: Bucknill, Sea Shells of N.Z.: 56, pl. 7, fig. 20.
1962. *Philippia lutea*: Powell, Shells of N.Z., ed. 4: 89, pl. 9, fig. 35.
1962. *Philippia lutea*: MacPherson and Gabriel, Marine Molluscs of Victoria: 100, fig. 126.

The above synonymy includes New Zealand records only, apart from the last item which is included because of the clear figure.

Philippia lutea is a rare shell in northern New Zealand; the best locality for it seems to be Ocean Beach, Whangarei Heads. Mr T. A. Darragh and the writer collected a single excellently preserved specimen from the siltstone in Mangatahi River near its junction with Okauawa Stream, on the Maraekakaho-Kereru road, central Hawke's Bay (Nukumaruan) in March, 1968. This is the first record of fossil *Philippia* in New Zealand. *Lorica haurakiensis* Mestayer has previously been reported from the same locality (Beu, 1967: 478), and the occurrence of these species helps confirm the warm-water nature of the fauna of the Petane Group of Hawke's Bay, already suggested by the occurrence of *Maoricolpus roseus* (Q. and G.) forma *finlayi* Powell, *Glaphyrina marwicki* Beu (aff. *plicatula* Powell), *Arca* aff. *cottoni* Waghorn, *Ellatrivia zealandica* (Kirk), and perhaps by unusual species such as *Struthiolaria frazeri* Hutton and *Pelicaria convexa fossa* (Marwick).

Family MURICIDAE

Genus UTTLEYA Marwick, 1934

1934. *Uttleya* Marwick, Proc. malac. Soc. London 21(1): 19.

Type species (by original designation): *Uttleya arcana* Marwick, 1934, lower Pleistocene, New Zealand.

Uttleya paucispiralis n.sp. Pl. 5, Fig. 42

Shell small, elongate-fusiform, with a tall spire, prominent low fasciole and short, weakly notched anterior canal. Protoconch turbinate, of about four smooth whorls. Aperture elongate and narrowly oval, with a narrow, smooth inner lip and a strongly descending, smooth, thin outer lip with a broad shallow posterior sinus. Sculpture of seven narrow, flat-topped, widely spaced spiral cords on spire whorls, the upper two rather weak; cords gradually becoming very faint and dying out at end of penultimate whorl, so that the body whorl bears only seven low, broad, rounded closely spaced threads above the fasciole and a few weak grooves higher up. Surface crossed by many very fine growth lines, sinuate in conformity with the sinus.

Dimensions: Height, 7.85mm; diameter, 2.80mm.

LOCALITY: Kaimatira Pumice Sand at beach level, between Mowhanau and Kai Iwi Streams, Wanganui Coast, A. G. Beu, November, 1965, unique holotype.

AGE: Castlecliffian (Okehuan Substage), lower Pleistocene.

HOLOTYPE (VM299) in Geology Department, Victoria University of Wellington.

The species differs from most other members of the genus in its obsolete spiral sculpture. The holotype of *U. marwicki* Powell has spiral sculpture all over, but is a young specimen; the large specimen figured by Marwick (1934: pl. 2, fig. 13; see also Fleming 1966a: pl. 103, fig. 1257) was included in *U. marwicki* by Powell

(1952: 179), and, if conspecific, shows that *U. marwicki* has even fewer spirals on the body whorl than does *U. paucispiralis*. However, the large specimen of *U. marwicki* is broken and worn. The other Castlecliffian species, *U. arcana* Marwick, has closely spaced spiral cords over the entire surface.

Family BUCCINIDAE

Genus AENEATOR Finlay, 1927

1927. *Aeneator* Finlay, Trans. N.Z. Inst. 57: 414.

Type species (by original designation): *Verconella marshalli* Murdoch, 1924, lower Pleistocene, New Zealand.

Aeneator huttoni Finlay, 1930. Pl. 4, Figs. 30–34

1873. *Buccinum inflatum* Hutton, Catalogue Tertiary Mollusca N.Z.: 6 (non Shaw, 1811, nec Lamarck, 1822).
1887. *Cominella inflata*: Hutton, Proc. Linn. Soc. N.S.W. 2(1): 209.
1914. *Cominella inflata*: Suter, Paleont. Bull. N.Z. geol. Surv. 2: 3 (not *Cominella inflata* Suter, Paleont. Bull. N.Z. geol. Surv. 2: 25, pl. 2, fig. 6a, 6b).
1924. *Verconella inflata*: Finlay, Proc. malac. Soc. London 16(2): 103.
1927. *Verconella inflata*: Finlay, Trans. N.Z. Inst. 57: 412.
1930. *Aeneator huttoni* Finlay, Trans. N.Z. Inst. 61: 42.
1966. *Aeneator huttoni*: Fleming, Bull. N.Z. Dept. scient. ind. Res. 173: 59.

This species is very poorly known, and has not been figured. The type locality is Kanieri, Westland (Kapitean), a locality recently discussed by Fleming (1966b). The holotype (in the New Zealand Geological Survey, TM4322) is unusually short and broad, and exactly comparable specimens have not been seen. A form that is a little more elongate than the holotype, but is considered to be conspecific with it, is common in fine sandstones exposed in Upton Brook, Lower Awatere Valley (Kapitean and Opoitian). It has many narrow, low, closely spaced spiral cords, and is intermediate in shape between species of *Buccinulum* and younger, larger, more elongate species of *Aeneator*. It appears to be the earliest known species of *Aeneator,* and seems to indicate that the genus evolved from *Buccinulum*. The holotype and three specimens from Upton Brook are figured here, to aid in future identification of the species.

Genus PENION Fischer, 1884

1884. *Penion* Fischer, Manuel de Conchyliologie (6): 625.
1914. *Verconella* Iredale, Proc. malac. Soc. London 11: 175. Type species (by original designation): *Fusus dilatatus* Quoy and Gaimard, 1835.

Type species (by monotypy): *Siphonalia dilatata* (Q. and G.) (= *Fusus dilatatus* Quoy and Gaimard, 1835), Recent, New Zealand.

Penion adustus accipitris (Finlay, 1930). Pl. 4, Figs. 27, 28

1930. *Verconella accipitris* Finlay, Trans. N.Z. Inst. 61: 68.
1965. *Penion accipitris*: Beu, Trans. R. Soc. N.Z., geol. 3(9): 144.
1966. *Penion accipitris*: Fleming, Bull. N.Z. Dept. scient. ind. Res. 173: 60.

This poorly known, unfigured form was discussed by the writer (Beu, 1965: 144) but at that time the available specimens were not good enough to figure and the holotype had not been seen. Since then the writer has examined the holotype in the Auckland Museum, through the courtesy of Dr A. W. B. Powell, and found that the form is the one common in the *Struthiolaria frazeri* shellbed in Okauawa Stream, near Maraekakaho, central Hawke's Bay (Nukumaruan), and topotypes have now been collected. An excellent specimen was recently collected from cliffs on Mr Jacobson's property, near the mouth of Kikowhero Stream, Ngaruroro River, central Hawke's Bay (also Nukumaruan) by Mr R. Henderson and Mr W. M. Briggs of Victoria University, and this and the best available topotype are figured herein.

The form differs from the Recent *P. adustus* (Philippi) in having somewhat lower spiral threads, more rounded nodules, and a slightly more concave shoulder. The two forms are so similar that *accipitris* cannot be regarded as more than a chronosubspecies of *P. adustus*.

Family OLIVIDAE

Subfamily ANCILLINAE

Genus AMALDA H. and A. Adams, 1853

1853. *Amalda* H. and A. Adams, Genera of Recent Mollusca, 1: 148.

Type species (by subsequent designation, Vokes, 1939): *Ancillaria tankervillei* Swainson, 1825, Recent, South America.

Ponder (1968) ranked *Baryspira* Fischer and *Gracilispira* Olson as subgenera of *Amalda* H. and A. Adams, and synonymised *Pinguispira* Finlay with *Baryspira* Fischer. He also synonymised *Alocospira* "Cossmann" of New Zealand authors, supposedly not of Cossmann, and *Austrancilla* Habe, with *Gracilispira* Olson, thereby placing all New Zealand Tertiary species of "*Alocospira*" in *Gracilispira*. He regarded *Alocospira* Cossmann as containing the Australian Tertiary species and the large Recent south-eastern Australian *Amalda marginata* (Lamarck), *A. fusiformis* (Petterd), *A. monilifera* (Reeve), and other species with strongly spirally sculptured spires.

Ancillinae are notoriously difficult to assess taxonomically, and it is likely that there are several distinct, but as yet unrecognised, groups among the Australasian Ancillinae of the *Alocospira* type, with spirally sculptured spires. The recognition by Ponder (1968) that "*Austrancilla*" *edithae* (Pritchard and Gatliff) has the same radula and operculum as *Gracilispira novaezelandiae* (Sowerby), but differs markedly in these features from "*Alocospira*" of the *marginata* group, was a great step forward in the analysis of this complex group, and showed the difficulties that can arise from the use of shell morphology as a sole taxonomic criterion. Nevertheless, Ponder has not demonstrated that the Recent *Amalda marginata* group is closely related to the Australian Tertiary species of *Alocospira*. Australian fossil species of *Alocospira* and New Zealand fossil species previously placed in *Alocospira* are so similar that it is here considered that they are consubgeneric. In particular, *Amalda hebera* (Hutton) is so similar to the group of *A. papillata* (Tate) that there can be little doubt that they are closely related. Marwick (1924: 319) showed that *A. tatei* (Marwick), from the lower beds at Muddy Creek (Lower Miocene), is extremely similar to the New Zealand *A. hebera*. In the writer's opinion Australian and New Zealand fossils of this type are more closely related to each other than are the Australian fossils to the species of the *Amalda marginata* group, and New Zealand fossils are here retained in *Alocospira*. The Australian Recent species may require a new subgenus. Further radular examination of Australian species will help clarify the matter, but analysis of lineages of Australian fossil Ancillinae may be necessary before relationships become clear.

Ponder did not consider the status of other New Zealand Tertiary "subgenera" of *Baryspira*. *Spinaspira* Olson (Olson, 1956: 17) seems worth recognition as a subgenus of *Amalda* for species with a broad, flat spire and a keel around the edge of the spire callus. Olson regarded the apical spine as the most fundamental feature of the subgenus, and therefore placed *Baryspira tholiculus* Marwick in it; however, the spine is a minor feature that varies greatly, and the shape of the spire callus is here considered to be more fundamental. *Baryspira tholiculus* belongs in the group Olson called *Gemaspira* (Olson, 1956: 14).

The status of *Gemaspira* is more doubtful. In all morphological features it intergrades completely with *Baryspira* s.str., and the *tholiculus* group of "*Gemaspira*" seems to have been the ancestor of the *mucronata* group of *Baryspira* s.str.

Thus on both morphological and phylogenetic grounds *Gemaspira* seems best regarded as a synonym of *Baryspira,* and is so treated here.

The status of some minor taxa recognised by Olson calls for comment. *Spinaspira stortha* var. *irrisa* Olson is no more than a phenotypic variant of *stortha,* occurring in the same beds, and cannot be recognised in a modern classification (but see Fleming, 1966a: 65). *Spinaspira cincta* Marshall is a perplexing form; it seems likely to be no more than an aberrant individual of the species Olson named *S. pakaurangiensis.*

So many changes have recently been proposed in the classification of New Zealand Ancillinae that a synopsis of their present status is presented here:

Genus *Amalda* H. and A. Adams, 1853

Subgenus *Baryspira* Fischer, 1883
(= *Pinguispira* Finlay, 1927 = *Gemaspira* Olson, 1956)
australis australis (Sowerby, 1830)
australis epacra (Olson, 1956)
bathami (Dell, 1956)
depressa depressa (Sowerby, 1859)
depressa opima (Marwick, 1924)
gulosa (Fleming, 1943)
macbeathi (Vella, 1954)
mucronata mucronata (Sowerby, 1830)
mucronata erica (Olson, 1956) (= *gladiolaria* Olson, 1956)
oraria (Olson, 1956)
ovalis n.sp.
pristina (Olson, 1956)
platycephala (Powell and Bartrum, 1929)
robusta (Marwick, 1924)
southlandica (Fleming, 1948)
tirangiensis (Marwick, 1926)
tholiculus (Marwick, 1931)
waikaiaensis (Finlay, 1926)

Subgenus *Alocospira* Cossmann, 1899
cuppedia (Olson, 1956)
electa (Marwick, 1929)
hebera (Hutton, 1873)
paeroa (Fleming, 1943)
subhebera (Marwick, 1926)

Subgenus *Gracilispira* Olson, 1956
(= *Austrancilla* Habe, 1959)
allani (Olson, 1956)
brevicula (Marwick, 1931)
exsputa (Bartrum and Powell, 1928)
gigartoides (Olson, 1956)
morgani (Allan, 1926)
novaezelandiae novaezelandiae (Sowerby, 1859) (= *crystallina* Brookes, 1926 = *firthi* Olson, 1956)
novaezelandiae benthicola (Dell, 1956)
olsoni n.sp.
rimuensis (Olson, 1956)
wairarapaensis (Olson, 1956)

Subgenus *Spinaspira* Olson, 1956
cincta (Marshall, 1918)
cingulata (Olson, 1956)
pakaurangiensis (Olson, 1956)
spinigera (Marshall, 1918)
stortha (Olson, 1956) (= *irissa* Olson, 1956).

Powell (1967: 198) described a Recent species of *Spinaspira* from the Kermadec Islands, thus indicating that the subgenus is a warm-water element in our fauna (as would be expected from the time and geographic ranges of *Spinaspira* in New Zealand).

Subgenus BARYSPIRA Fischer, 1883

1883. *Baryspira* Fischer, Manuel de Conchyliologie (4): 600.

1956. *Gemaspira* Olson, Paleont. Bull. N.Z. geol. Surv. 24: 14. Type species (by original designation): *Ancilla* (*Baryspira*) *robusta* Marwick, 1924, Oligocene and Lower Miocene, New Zealand.

Type species (by subsequent designation, Cossmann, 1899): *Ancillaria australis* Sowerby, 1830, Pliocene to Recent, New Zealand.

Amalda (Baryspira) ovalis n.sp. Pl. 5, Figs. 35–37

Shell of moderate size for the genus, of oval, inflated shape, with a short, rounded spire. Posterior siphonal groove well-marked, extending half way up the spire. Spire well rounded, with a thick callus. Parietal callus long, high and narrowly oval, extending alongside the inner lip to the base of the basal fasciolar band, giving the shell a unique oval form. In dorsal view, spire callus occupying a little over a third of the height of the shell, broad band occupying a third of the height, and four lower bands occupying a little under a third of the height. Four lower bands all of about equal width, so that the depressed band is slightly wider than usual and the top fasciolar band is slightly narrower than is usual in the genus. Basal groove prominent, columellar plaits weakly developed. Columella strongly excavated.

Dimensions of holotype: Height, 25.7mm; diameter, 15.2mm.

LOCALITY: V674, concretion in siltstone in Kaiwhata River, one mile south of Ngahape, central Wairarapa, A. G. Beu and P. Wellman, 1964, unique holotype.

AGE: Altonian ?(Middle Miocene).

HOLOTYPE (VM315) in Geology Department, Victoria University of Wellington.

The large elongate parietal callus extending to the base of the basal fasciolar band and the oval form caused by this callus render the species highly distinct from all other New Zealand species. The species occurs with *A.* (*Baryspira*) cf. *robusta* (Marwick), *A.* (*Spinaspira*) *stortha* Olson and *A.* (*Alocospira*) *hebera* (Hutton).

Subgenus GRACILISPIRA Olson, 1956

1956. *Gracilispira* Olson, Paleont. Bull. N.Z. geol. Surv. 24: 23.

Type species (by original designation): *Ancillaria novaezelandiae* Sowerby, 1859, Pliocene to Recent, New Zealand.

Amalda (Gracilispira) novaezelandiae (Sowerby, 1859)

1859. *Ancillaria novaezelandiae* Sowerby, Thesaurus Conch. 3: 65.
1956. *Baryspira* (*Gracilispira*) *novaezelandiae*: Olson, Paleont. Bull. N.Z. geol. Surv. 24: 24, pl. 6, figs. 1–4 (with full synonymy).
1956. *Baryspira* (*Gracilispira*) *firthi* Olson, Paleont. Bull. N.Z. geol. Surv. 24: 26, pl. 6, figs. 15–18.
1968. *Amalda* (*Gracilispira*) *novaezelandiae*: Ponder, Rec. Dom. Mus., Wellington 6(4): 44, pl. 2, figs. 24, 25; pl. 4, figs. 52a, 52b, 52c; pl. 5, fig. 62.

The holotype of *A. firthi* (in the New Zealand Geological Survey) shows no features by which it can be distinguished from *novaezelandiae*. Thus *firthi* must be synonymised with *novaezelandiae*. The pecular specimens from Devil's Elbow, Hawke's Bay, recorded by the writer (Beu, 1965: 147) belong to the following new species.

Amalda (Gracilispira) olsoni n.sp. Pl. 5, Figs. 39–41

1965. *Baryspira* (*Gracilispira*) *firthi* Beu, Trans. R. Soc. N.Z., geol. 3(9): 147 (not of Olson, 1956).

Shell large for the subgenus, elongately oval, with lightly concave sides to the spire and a bluntly rounded apex. Aperture occupying only slightly more than half the height of the shell, with strongly excavated columella. Posterior siphonal groove well marked, extending almost to the apex. Parietal callus very thick for the subgenus, with a strongly sinuous margin, greatly thickened near the apex and projecting above it at several points so that a slight groove runs across the apex of the shell. Spire callus extending down for half the height of the shell. Broad band narrower than usual in the subgenus, lower bands as in *A. novaezelandiae*. Basal groove very deep, columellar plaits weak.

Dimensions (in mm):

	height	diameter
Holotype	20.5	9.2
Paratype, VM319	24.8	–
Paratype, VM320	24.3	–
Paratype, VM318	24.0	–
Largest paratype, VM317	27.7	12.3

LOCALITIES: N142/555, mudstone below the top limestone on the north face of Devil's Elbow, Napier–Wairoa Road, A. G. Beu, 1963 (holotype and four paratypes); N142/556, mudstone below the second limestone from the top of the sequence, Devil's Elbow, A. G. Beu, 1963 (paratype, VM321).

AGE: Nukumaruan (lower Pleistocene).

HOLOTYPE (VM316) and five paratypes (VM317 to VM321) in collection of Geology Department, Victoria University of Wellington.

Small specimens of *A. novaezelandiae* are common in the same mudstone bands at Devil's Elbow as the new species was collected from. They are distinguished by their smaller size, relatively taller aperture and broad band and relatively shorter spire, much less strongly sinuous margin of the parietal callus, and by the parietal callus being much thinner and only just reaching the apex of the spire, which thus has a lightly convex outline and is sharply pointed. The new species has only been found at Devil's Elbow, despite extensive collecting at many other localities in the Petane Group of Hawke's Bay.

Family TURRIDAE

Genus INSOLENTIA Finlay, 1926

1926. *Insolentia* Finlay, Trans. N.Z. Inst. 56: 256.

Type species (by original designation): *Pleurotoma pareoraensis* Suter, 1907, Lower Miocene, New Zealand.

Insolentia powelli n.sp. Pl. 5, Fig. 38.

Shell of moderately large size for the genus, tall and narrowly fusiform, strongly sculptured. Protoconch polygyrate, conic, of three smooth whorls followed by a quarter-whorl bearing three large, arcuate, axial riblets; typical of the genus. Teleoconch whorls seven and a quarter, prominently angled at the mid-point, with a steeply sloping slightly concave shoulder that is smooth except for a broad, weak, flat-topped spiral thread submargining the suture and a single weak thread just above the periphery. Subperipheral spiral cords numbering four on spire whorls and about 30 on the body whorl and canal, with one to four threads in interspaces on the body whorl. Axial folds high and rather narrow, with rounded crests, strongly oblique, extending a short way on to the shoulder and down over the three uppermost peripheral spirals only, 11 on spire and penultimate whorls and 12 on the body whorl. Sinus moderately deep, semicircular, occupying the full width of the smooth area of the shoulder, swinging up sharply to the suture. Canal long, bent slightly to the left, slightly incomplete.

Dimensions: Height, 21.9mm; diameter, 7.4mm.

LOCALITY: VM582, Slip Point, Clifden, Southland, collected by J. P. Kennett, J. V. Eade and P. P. Vella, 1961.

AGE: Clifdenian (Middle Miocene).

HOLOTYPE (VM298) in Geology Department, Victoria University of Wellington.

Insolentia was not reported by Powell (1942: 63) to range above the Awamoan in New Zealand, but the holotypes of *I. famelica* Marwick and *I. inequalis* Marwick, from GS1236, Muddy Creek, Gisborne District, are now known to be of Clifdenian age (Fleming, 1966a: 364). The new species is closely related to *I. inequalis,* but has 11 axials on spire whorls and 12 on the body whorl, whereas *I. inequalis* has nine axials on early spire whorls only, the axials becoming obsolete on the penultimate and body whorls. Also, *I. powelli* has four spiral cords on spire whorls whereas *I. inequalis* has only three. The holotype of *I. inequalis* is smaller than that of *I. powelli,* measuring 14.2 by 4.8mm, but is probably immature.

Genus COMITAS Finlay, 1926

1926. *Comitas* Finlay, Trans. N.Z. Inst. 56: 251.

Type species (by original designation): *Surcula oamarutica* Suter, 1917 (= *Drillia fusiformis* Hutton, 1877), Lower Miocene, New Zealand.

Comitas kennetti n.sp. Pl. 5, Fig. 44

Shell of moderate size for the genus, elongate-fusiform, with a tall spire, long anterior canal and strongly angled whorls. Shoulder gently inclined, strongly concave, smooth except for faint growth lines that are sinuous in conformity with a normal sinus for the genus. Spiral sculpture of two closely spaced, rounded cords around the periphery, one just above suture on spire whorls, two strong ones part of the way down the body whorl separated from each other by one weak cord and from the peripheral cords by four faint threads, and about 20 alternating weak and moderately strong cords over the neck and canal. Axial sculpture of 16 narrow, sharply crested, retrocline folds on the body whorl and about 14 on spire whorls, extending from just above the periphery to the uppermost of the two strong spiral cords partway down the body whorl, and to the lower suture on spire whorls, raised into sharp, vertically elongated nodules where they cross the two peripheral spiral cords. Protoconch worn, apparent typical of the genus.

Dimensions of holotype: Height, 28.9mm; diameter 10.1mm.

LOCALITIES: "Giant's Tooth", Cape Foulwind, Westland, J. P. Kennett, holotype; GS4588, Goldsborough–Kumara Road, Westland, paratype (TM4328); GS3013, Waimea Creek, Waimea S.D., Westland, paratype (TM4329).

AGE: Kapitean (holotype and TM4328), ?Opoitian (TM4329), Upper Miocene and lower Pliocene.

HOLOTYPE (VM333) in Geology Department, Victoria University of Wellington; two juvenile paratypes in New Zealand Geological Survey.

Paratype TM4329, Waimea Creek, has slightly more prominent axials and closer spiral cords than the holotype, and paratyye TM4328 has three peripheral spirals and considerably longer axials than the holotype. The species is similar to *C. bilix* Marwick, 1931, from the Opoitian of Hawke's Bay, differing in the taller spire, more strongly angled whorls, considerably sharper peripheral nodules, and presence of spiral cords around the periphery and below the two strong cords partway down the body whorl.

Genus NEOGURALEUS Powell, 1939

1939. *Neoguraleus* Powell, Rec. Auckland Inst. Mus. 2(4): 236.

Type species (by original designation): *Drillia sinclairi* Gillies, 1882, Recent, New Zealand.

Subgenus FUSIGURALEUS Powell, 1942

1942. *Fusiguraleus* Powell, Bull. Auckland Inst. Mus. 2: 139.

Type species (by original designation): *Clathurella leptosoma* Hutton, 1885, Miocene, New Zealand.

Neoguraleus (Fusiguraleus) satanicus Beu, 1965

1965. *Neoguraleus* (*Fusiguraleus*) *satanicus* Beu, Trans. R. Soc. N.Z. Geol. 3(9): 147, pl. 2, figs. 13, 16.

Five specimens of this form have now been collected from V1196 and V1197, Nukumaruan (lower Pleistocene) localities in Te Ahitaitai Stream, Whangaehu Valley, South Wairarapa, and the species is represented in New Zealand Geological Survey collections from several localities in the Petane Group (Nukumaruan) of Hawke's Bay. Some of the Geological Survey specimens were identified as *Neoguraleus protensa* (Hutton, 1885), but examination of the holotype and topotypes of *protensa* showed it be a smaller, narrower, and more finely sculptured species, perhaps also referable to *Fusiguraleus*.

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