

Tertiary Molluscan Faunas from the Southern Wairarapa.

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[Read before the Wellington Philosophical Society, 9th September, 1931; received by the Editor, 6th November, 1931; issued separately, June, 1933.]

INTRODUCTION.

THOUGH detailed descriptions of the faunas of fossil localities in the Southern Wairarapa have not been previously published, Waghorn (1927) has recorded lists of fossils from the Ruakokopatuna Valley, S. Wairarapa, and Marwick has at various times described new species of mollusca from Hurupi Creek, Palliser Bay (N.Z.G.S. Locality 1037). Powell (1929) has also described *Ellicea carinata* from the cliffs east of Lake Ferry, Palliser Bay.

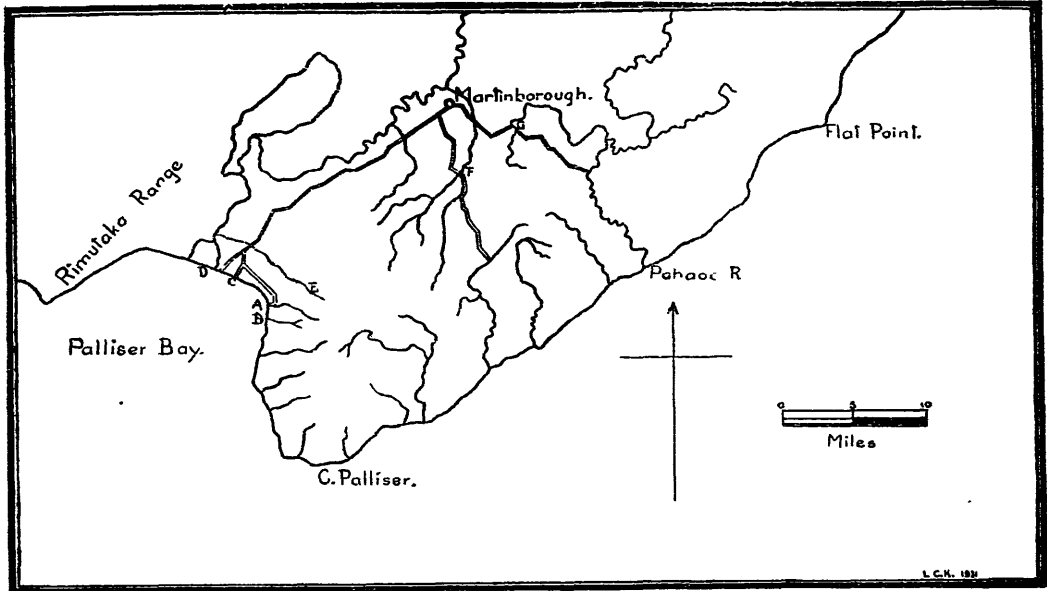
The Tertiary rocks, as mapped by McKay (1879), strike north-east and dip consistently to the west. Along the north-east portion of Palliser Bay, Miocene rocks (Hurupi Creek Beds) overlie the greywacke basement, but, in the Ruakokopatuna Valley to the north-east, greensands and limestones of a somewhat younger (?) age rest directly upon the oldermass (Waghorn 1927, p. 230). Farther to the north-east a more complete sequence of Notocene rocks is present, and the basal members are probably even Cretaceous in age. A feature of this sequence is an immense thickness of unfossiliferous "papa" mudstones which underlie the fossiliferous limestones, brown sands, and mudstones of Pliocene age. Part of these unfossiliferous mudstones is no doubt equivalent in age to the Hurupi Creek beds of Palliser Bay, i.e., they may be correlated with the Tutamoe beds of the Gisborne Subdivision, which are also notably unfossiliferous. This has already been remarked by Henderson (1929, p. 281), who says: "The oldest Miocene rocks definitely identified by means of fossil collections are of Tutamoe age (Awamoan), but some of the underlying mudstones, in which no fossils have as yet been found, are undoubtedly Hutchinsonian."

HURUPI SERIES.

The Hurupi Creek Beds were described by McKay (1878, p. 19), and assigned to the Upper Miocene. Subsequently little descriptive work has been done, but the following authors have made brief reference to the beds:—McKay (1879, p. 81) = Lower Miocene (Pareora); Thomson (1919, p. 7) = Oamaruan, probably Awamoan; Marwick (1927, p. 576) = Mokau (Awamoan); Henderson (1929, p. 281) = Tutamoe (Awamoan); King (1930, p. 506) = Miocene; King (present paper) = Tutamoe (Awamoan).

The beds outcrop along a considerable portion of the north-east coast of Palliser Bay and for about half a mile inland, good exposures being obtainable in the sea-cliffs and the ravines which traverse the ancient marine terrace. As all collections have proved remarkably uniform no zoning upon palaeontological evidence is attempted, and the fauna of the beds outcropping in the Hurupi Creek has been taken as typical of the whole. Apart from this type

locality, the best collections can be obtained from the Putangirua (or Pinnacle) Creek a mile to the south. One or two species not yet recorded from Hurupi Creek, but obtained from the Putangirua Creek, are therefore included in the general fauna. These beds have now been traced to the north-east as far as the Turanganui River. (Locality E.).



SKETCH MAP OF THE SOUTHERN WAIRARAPA, SHOWING FOSSIL LOCALITIES REFERRED TO IN THIS PAPER.

- A. Hurupi Creek.
- B. Putangirua Creek.
- C. Whangaimona.
- D. Lake Ferry.
- E. Marls 1 mile below Turanganui Gorge.
- F. Junction Ruakokopatuna and Makara Streams.
- G. Junction Martinborough, Gladstone, and Hinakura Roads.

FAUNA OF HURUPI SERIES.

Bolma colini King.
Zeacolpus cf. *fyfei* Marwick.
Zeacolpus n. sp.
Pareora striolata (Hutton).
Struthiolaria subspinosa Marwick.
Struthiolaria sp. cf. *praenuntia* Marwick.
Callusaria callosa (Marwick).
Maoricrypta wilckensi Finlay.
Polinices mucronatus (Marwick).

Polinices huttoni v. Ihering.
Melanella tutamoensis Marwick.
Verconella crawfordi (Hutton).
Austrofusus marwicki n. sp.
Zelandiella subnodosa (Hutton).
Acominia hendersoni (Marwick).
Cominista putangirua n. sp.
Antizafra wairarapa n. sp.
Waihaeia rugosa Marwick.
Alcithoe dilatata Marwick.

- Alcithoe hurupiensis* Marwick.
Baryspira cf. tirangiensis (Marwick).
Baryspira subhebera (Marwick).
Comitas abnormis n. sp.
Austrotoma cf. scopalveus Finlay.
Austrotoma sp.
Zeacuminia oryota (Suter).
Dentalium solidum Hutton.
Cadulus cf. teliger Finlay.
Anomia cf. trigonopsis Hutton.
Glycymeris hurupiensis Marwick.
Cucullaea sp. cf. *ponderosa* Hutton.
- Limopsis lawsi* n. sp.
Modiolus altijugatus Marwick.
Pedalion fortissimum n. sp.
Lentipecten hochstetteri (Zittel).
Ostrea sp.
Divaricella notocenica n. sp.
Macoma cf. robini Finlay.
Dosinia cottoni Marwick.
Marama hurupiensis Marwick.
Eumarcia thomsoni Marwick.
Eumarcia crassatelliformis Marwick.
Panope worthingtoni Hutton.

FAUNA FROM HURUPI BEDS 1 MILE BELOW TURANGANUI GORGE, SOUTH
WAIRARAPA.

- Zeacolpus cf. fyfei* Marwick.
Zeacolpus n. sp.
Callusaria callosa (Marwick).
Maoricrypta wilckensi Finlay.
Austrofusus marwicki n. sp.
Baryspira sp.
Comitas imperfecta n. sp.
- Cucullaea* sp. cf. *ponderosa* Hutton.
Limopsis lawsi n. sp.
Modiolus altijugatus Marwick.
Limatula sp.
Macoma cf. robini Finlay.
Dosinia cottoni Marwick.
Marama hurupiensis Marwick.

ONOKE SERIES.

The Pliocene rocks outcrop as a strip margining the Hurupi Series to the west. No doubt several stages are represented (from Waitotaran upwards), but only one has been found, as yet, to be fossiliferous, namely a stage equivalent to the Nukumaruan. Collections have been made from the following localities:—Palliser Bay, sea cliffs between Lake Ferry and Whangaimona; Turanganui River, marls to the west of the Miocene (= Hurupi Creek) marls; Junction of the Ruakokopatuna and Makara Streams, East Coast Road, 5 miles east of Martinborough; Te Awaite Cutting,* $\frac{1}{2}$ mile east of the above stream junction; the Junction of the Martinborough, Gladstone, and Hinakura Roads; and $1\frac{1}{2}$ to 3 miles up the Ruakokopatuna Road, Ruakokopatuna Valley.

In the natural section exposed in Palliser Bay a great thickness of unfossiliferous mudstones occurs between the Tutamoe rocks of Hurupi Creek and the Nukumaruan mudstones of Whangaimona. These mudstones may be taken as Waitotaran in age. In the lower portion of the sequence a slight disconformity may be present, but the exposure is not very clear. Between Whangaimona and Lake Ferry the fossiliferous mudstones of Nukumaruan age outcrop along

* By some error the locality is marked on lithos. as Twaite Cutting, and was introduced to palaeontologists as Twaite's Cutting (Thomson, 1919, p. 7). As this portion of the country is known as Te Awaite, and the Cutting is always referred to locally as Te Awaite Cutting, it seems best, in view of the fact that little work has been done upon it, to revert to the correct form.

the coast. To the west of Lake Onoke, as far as the Rimutaka fault at the north-west corner of the bay, the mudstone series (passing upward into coarser beds) continues, but no evidence as to its age was discovered.

FAUNA FROM THE SEA CLIFFS EAST OF LAKE FERRY, PALLISER BAY.

- | | |
|---------------------------------------------------------|---------------------------------------------|
| <i>Zethalia zelandica</i> (H. & J.). | <i>Pachymelon callaghani</i> King. |
| <i>Stiracolpus symmetricus</i> (Hutton). | <i>Alcithoe exigua</i> Marwick. |
| <i>Maoricolpus proroseus</i> Marwick. | <i>Alcithoe subgracilis</i> Marwick. |
| <i>Pelicaria acuminata</i> (Marwick). | <i>Iredalina finlayi</i> n. sp. |
| <i>Pelicaria</i> cf. <i>acuminata</i> (Marwick). | <i>Baryspira mucronata</i> (Sowerby). |
| <i>Pelicaria media</i> (Marwick). | <i>Awateria retiolata</i> n. sp. |
| <i>Cochlis australis</i> (Hutton). | <i>Awateria</i> n. subsp. |
| <i>Cochlis denticulifera</i> (Marwick). | <i>Bathytoma murdochi</i> Finlay. |
| <i>Cochlis</i> cf. <i>planisuturalis</i> (Marwick). | <i>Austrodrillia alpha</i> n. sp. |
| <i>Cymatium jobbernsi</i> n. sp. | <i>Austrodrillia beta</i> n. sp. |
| <i>Austromitra planata</i> (Hutton). | <i>Austrodrillia gamma</i> n. sp. |
| <i>Verconella</i> sp. | <i>Splendrillia</i> sp. |
| <i>Aeneator</i> cf. <i>marshalli</i> (Murdoch). | <i>Insolentia solitaria</i> n. sp. |
| <i>Aeneator imperator</i> n. sp. | <i>Filodrillia studiosorum</i> n. sp. |
| <i>Ellicea orbita</i> (Hutton). | <i>Comitas onokeana</i> n. sp. |
| <i>Ellicea carinata</i> Powell. | <i>Dentalium</i> cf. <i>nanum</i> (Hutton). |
| <i>Austrofusus claviculus</i> n. sp. | <i>Neilo australis</i> (Q. & G.). |
| <i>Austrofusus incertus</i> n. sp. | <i>Chlamys radiata</i> (Hutton). |
| <i>Caminula hamiltoni</i> (Hutton). | <i>Chlamys delicatula</i> (Hutton). |
| <i>Zephus onokeana</i> n. sp. | <i>Pleuromeris zelandica</i> (Desh.). |
| <i>Poirieria zelandica</i> (Q. & G.). | <i>Paradione multistriata</i> (Sowerby). |
| <i>Zeatrophon</i> n. sp. aff. <i>waitemataensis</i> . | <i>Marama murdochi</i> Marwick. |
| <i>Bonellitia fundata</i> Marwick. | <i>Nemocardium pulchellum</i> (Gray). |
| <i>Zemitrella</i> n. sp. aff. <i>pseudo-marginata</i> . | |

FAUNA FROM THE RUAKOKOPATUNA VALLEY, 1½ TO 3 MILES ABOVE THE JUNCTION OF THE RUAKOKOPATUNA AND MAKARA STREAMS, SOUTH WAIRARAPA.

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|---------------------------------------------------|-------------------------------------------------|
| <i>Microlenchus tenebrosus</i> (A. Adams). | <i>Acteon praestitus</i> Finlay. |
| <i>Antisolarium egenum</i> (Gould). | <i>Dentalium nanum</i> Hutton. |
| <i>Zethalia zelandica</i> (H. & J.). | <i>Nucula castanea</i> (A. Adams). |
| <i>Zeacumantus lutulentus</i> (Kiener). | <i>Nuculana bellula</i> (A. Adams). |
| <i>Zeacolpus</i> cf. <i>vittatus</i> (Hutton). | <i>Glycymeris shrimptoni</i> Marwick. |
| <i>Stiracolpus symmetricus</i> (Hutton). | <i>Ohlamys</i> sp. |
| <i>Zegalerus tenuis</i> (Lesson). | <i>Talabrica senecta</i> Powell. |
| <i>Zeacrypta monoxylla</i> (Lesson). | <i>Pleuromeris zelandica</i> (Desh.). |
| <i>Cochlis</i> cf. <i>planisuturalis</i> Marwick. | <i>Venericardia purpurata</i> (Deshayes). |
| <i>Odostomia georgiana</i> Hutton. | <i>Venericardia marshalli</i> Marwick. |
| <i>Coluzea espinosa</i> Finlay. | <i>Divaricella</i> cf. <i>notocenica</i> n. sp. |
| <i>Aeneator</i> cf. <i>marshalli</i> Murdoch. | <i>Myllitella finlayi</i> Marwick. |
| <i>Austrofusus</i> cf. <i>glans</i> (Bolten). | <i>Scalpomactra scalpellum</i> (Reeve). |
| <i>Poirieria zelandica</i> (Q. & G.). | <i>Paradione multistriata</i> (Sowerby). |
| <i>Xymene</i> cf. <i>drewi</i> (Hutton). | <i>Tawera spissa</i> (Deshayes). |
| <i>Alcithoe gracilis</i> (Swainson). | <i>Bassina parva</i> Marwick. |
| <i>Alcithoe swainsoni</i> Marwick. | <i>Chione stutchburyi</i> (Gray). |
| <i>Baryspira mucronata</i> (Sowerby). | <i>Gari lineolata</i> (Gray). |
| <i>Awateria retiolata</i> n. sp. | <i>Aloidis zelandica</i> (Q. & G.). |
| <i>Austrodrillia</i> cf. <i>gamma</i> n. sp. | <i>Myadora kai-iwiensis</i> Powell. |
| <i>Phenatoma novae-zelandiae</i> (Reeve). | |

FAUNA FROM THE JUNCTION OF THE RUAKOKOPATUNA AND MAKARA
STREAMS, SOUTH WAIRARAPA.

- Parvacmea nukumaruensis* Oliver.
Micrelenchus tenebrosus (A. Adams).
Venustas hodgei (Hutton).
Antisolarium egenum (Gould).
Zethalia zelandica (H. & J.).
Haurakia (?) sp.
Lironoba charassa Finlay.
Estea sp.
Zeaumantus lutulentus (Kiener).
Zeaolpus cf. *vittatus* (Hutton).
Stiraolpus symmetricus (Hutton).
Maoricolpus roseus (Q. & G.).
Struthiolaria tasmani n. sp.
Pellicaria acuminata (Marwick).
Pellicaria cf. *acuminata* (Marwick).
Pellicaria media (Marwick).
Pellicaria cf. *fossa* (Marwick).
Pellicaria rugosa (Marwick).
Zegalerus crater Finlay.
Zegalerus tenuis (Lesson).
Zeaocrypta monoxyla (Lesson).
Tanea zelandica (Q. & G.).
Cochlis australis (Hutton).
Cochlis cf. *planisuturalis* (Marwick).
Syrnola sp.
Odostomia georgiana Hutton.
Turbonilla sp.
Coluzea espinosa Finlay.
Verconella accipitris Finlay.
Verconella rex Finlay.
Aeneator imperator n. sp.
Aeneator cf. *marshalli* (Murdoch).
Austrofuscus cottoni n. sp.
Austrofuscus cf. *glans* (Bolten).
Austrofuscus pagoda Finlay.
Austrofuscus marshalli n. sp.
Austrofuscus sp.
Eucominia exoriata Finlay.
Cominula hamiltoni (Hutton).
Zephus onokeana n. sp.
Poirieria zelandica (Q. & G.).
Zeatrophon ambiguus (Phil.).
Xymene plebejus (Hutton).
Xymene drevi (Hutton).
Lepsithais cf. *lacunosa* (Brug.).
Bonellitia fundata Marwick.
Pachymelon bartrumi n. sp.
Alcithoe exigua Marwick.
Alcithoe cf. *swainsoni* Marwick.
Alcithoe gracilis (Swainson).
Alcithoe subgracilis Marwick.
Alcithoe gatesi Marwick.
Baryspira depressa (Sowerby).
Baryspira mucronata (Sowerby).
Austrodrillia cf. *alpha* n. sp.
Austrodrillia beta n. sp.
Austrodrillia cf. *gamma* n. sp.
Bathytoma murdochi Finlay.
Filodrillia studiosorum n. sp.
Phenatoma zelandica (Smith).
Phenatoma novaezelandiae (Reeve).
Pervicacia tristis (Deshayes).
Acteon praestitus Finlay.
Dentalium nanum Hutton.
Dentalium cf. *zelandicum* Sowerby.
Cadulus sp.
Nucula castanea (A. Adams).
Nuculana bellula (A. Adams).
Anomia trigonopsis (Hutton).
Glycymeris cf. *laticostata* (Q. & G.).
Glycymeris shrimptoni Marwick.
Glycymeris modesta (Angas).
Limopsis zelandica Hutton.
Perrierina bensoni n. sp.
Aulacomya maoriana (Iredale).
Modiolus areolatus (Gould).
Chlamys radiata (Hutton).
Chlamys delicatula (Hutton).
Limatula maoria Finlay.
Ostrea sp.
Talabrica senecta Powell.
Pleuromeris zelandica (Desh.).
Venericardia cf. *purpurata* (Desh.).
Pteromyrtaea dispar (Hutton).
Divaricella notocenicia n. sp.
Myllitella finlayi Marwick.
Macoma spenceri Suter.
Barytellina anomalodonta Finlay.
Amphidesma subtriangulata (Gray).
Paphies cf. *australis* (Gmelin).
Maetra ovata (Gray).
Longimactra elongata (Q. & G.).
Zenatia acinaces (Q. & G.).
Dosinia greyi Zittel.
Dosinia subrosea (Gray).
Dosinia cf. *kaawaensis* Marwick.
Paradione multistriata (Sowerby).
Tawera subsulcata (Suter).
Tawera assimilis (Hutton).
Bassina parva Marwick.
Bassina cf. *yatei* (Gray).
Chione cf. *stutchburyi* (Gray).
Chione crassitesta Finlay.
Paphirus largillierti (Philippi).
Nemocardium pulchellum (Gray).
Gari stangeri (Gray).
Offadesma angasi (C. & F.).
Myadora cf. *striata* (Q. & G.).
Myadora cf. *antipodum* E. A. Smith.

FAUNA FROM TE AWAITE CUTTING, EAST COAST ROAD, 5 MILES SOUTH-EAST OF MARTINBOROUGH.

<i>Stiracolpus symmetricus</i> (Hutton).	<i>Poirieria zelandica</i> (Q. & G.).
<i>Zeacolpus vittatus</i> (Hutton).	<i>Alcithoe subgracilis</i> Marwick.
<i>Pellicaria acuminata</i> (Marwick).	<i>Baryspira mucronata</i> (Sowerby).
<i>Pellicaria</i> cf. <i>acuminata</i> (Marwick).	<i>Comitas onokeana</i> n. sp.
<i>Pellicaria rugosa</i> (Marwick).	<i>Bathytoma murdochi</i> Finlay.
<i>Verconella accipitris</i> Finlay.	<i>Chlamys delicatula</i> (Hutton).
<i>Aeneator imperator</i> n. sp.	<i>Tawera subsulcata</i> (Suter).
<i>Buccinulum</i> sp.	

FAUNA FROM THE JUNCTION OF THE GLADSTONE, MARTINBOROUGH AND HINAKURA ROADS, SOUTH WAIRARAPA.

<i>Stiracolpus symmetricus</i> (Hutton).	<i>Baryspira mucronata</i> (Sowerby).
<i>Zeacolpus</i> sp.	<i>Austrodrillia</i> cf. <i>gamma</i> n. sp.
<i>Struthiolaria tasmani</i> n. sp.	<i>Glycymeris modesta</i> (Angas).
<i>Pellicaria fossa</i> (Marwick).	<i>Pteromyrtea dispar</i> (Hutton).
<i>Pellicaria media</i> (Marwick).	<i>Zemysia zelandica</i> (Gray).
<i>Austrofusus</i> sp.	<i>Paradione multistriata</i> (Sowerby).
<i>Xymene plebejus</i> (Hutton).	<i>Bassina parva</i> Marwick.
<i>Poirieria zelandica</i> (Q. & G.).	<i>Panope zelandica</i> (Q. & G.).
<i>Alcithoe subgracilis</i> Marwick.	

The lists of fossils from the Ruakokopatuna Valley, published by Waghorn (1927), agree very well with those described herein from localities of Nukumaruan age. *Glycymeris waipipiensis* Marwick is the only fossil which might indicate a slightly earlier age, and as Waghorn's estimate of a Waitotaran age was based purely on a 55 percentage of Recent species, it seems very probable that his faunas would be better correlated with those listed herein from Nukumaruan localities. That beds of Waitotaran age are present in the Southern Wairarapa seems undoubted, but in all other localities in the area they have proved, as yet, unfossiliferous, and bearing in mind the close relationship of the Ruakokopatuna fossils with those from Nukumaruan localities very near at hand, it seems best to regard his faunas as equivalent to those at the Junction of the Ruakokopatuna and Makara Streams and at Whangaimona, Palliser Bay.

Acknowledgments:

In collecting the material upon which this paper is based, the writer has, from time to time, been ably assisted by several kind friends. To them, one and all, his thanks are here extended for their efforts on his behalf. In addition, the writer here expresses his gratitude to Mr Colin Campbell and Mr K. J. McNaught, whose enthusiasm has led them to forward several excellent collections from Palliser Bay and Ruakokopatuna respectively. To Dr Marwick, of the Geological Survey, the writer is indebted also for much invaluable advice and helpful criticism.

The *Holotypes* of all species described in this paper have been presented to the collection of the New Zealand Geological Survey.

SYSTEMATIC PALAEOONTOLOGY.

Family RISSOIDAE.

The rissoids obtained from the cleanings of larger shells are for the most part worn and corroded, so that details of sculpture are completely effaced. *Haurakia* sp. is but doubtfully referable to the genus. *Estea* sp. may be *E. rugosa* (Hutton).

Genus ZEACOLPUS Finlay, 1926.

Zeacolpus n. sp.

Though no specimens sufficiently well preserved to warrant description were obtained, comparison with other material indicates that the Palliser Bay species is very close to a new species from Mount Harris, South Canterbury, and should be re-examined when the southern shell is described.

Locality: Putangirua Creek, Palliser Bay.

Genus STRUTHIOLARIA Lamarck, 1816.

Struthiolaria tasmani n. sp. (Fig. 30).

A new species of *Struthiolaria* intermediate between *S. papulosa* and *S. frazeri* though much nearer to *papulosa*. A shell of this type was figured by Marwick (1924; Pl. 12, Fig. 4) from N.Z.G.S. Locality 1094, Mangatahi River, Hawke's Bay. As the specimens from the Southern Wairarapa are all damaged the shell already figured is taken as type.*

Localities: Junction of Ruakokopatuna and Makara Streams; Junction of the Gladstone, Hinakura, and Martinborough Roads.

Genus PELICARIA Gray, 1857.

Pellicaria acuminata (Marwick). *Trans. N.Z. Inst.*, vol. 55, 1924, p. 185 (Fig. 28).

Many specimens from Te Awaite Cutting have the spire lower than the typical *acuminata*, and the topmost spiral cord, even in the early stages, is distinctly nodulous. The spiral threads on the base vary in number and in strength, being usually fewer and stronger the more nearly the shell approaches *acuminata*. They thus appear to grade towards *P. media* (Marwick). Another variety of *P. acuminata* occurs at the Junction of the Ruakokopatuna and Makara Streams. It has the same tendency towards a lowering of the spire, but the cingulae tend to become much weaker, and nodules do not appear on the uppermost spiral cord. Also in place of heavy spiral cingulae the ornamentation, on the earlier whorls especially, takes the form of fine spiral cords with equal interstices. Thus these shells appear to grade more towards *P. fossa* (Marwick) than to *P. media*. Probably the whole assemblage represents a hybrid swarm.

* Since the above account was written Mr K. J. McNaught has re-collected from the Junction of the Ruakokopatuna and Makara Streams, and has obtained several unbroken specimens, one of which is figured here (Fig. 30).

In addition to the normal high-spined *acuminata*, several specimens of a low-spined variety were obtained from the cliffs between Lake Ferry and Whangaimona, Palliser Bay.

Genus COCHLIS Bolten, 1798.

Cochlis australis (Hutton). *Journ. d. Conch.*, vol. 26, 1878, p. 23.

The specimens obtained from the cliffs between Lake Ferry and Whangaimona, Palliser Bay, show considerable variation both in the size of the shell and in the size and shape of the parietal callus.

Genus CYMATIUM Bolten, 1798.

Cymatium jobbernsi n. sp. (Fig. 1).

Shell of medium size, fusiform, of more than 5 whorls. Protoconch lost. Sculpture of regular axial ribs, about 14 per whorl, reaching from suture to suture, and continuing on the body-whorl though absent on the base. Interrupted at intervals by strong varices, 3 in two whorls. The shape of the shell distorted by inflation after each varix. Spiral cords prominent, two very strong and producing, where they cross the axials, two rows of tubercles, one on the shoulder angle and one midway between the shoulder angle and the lower suture. On the penultimate whorl a third row of tubercles appears below them. Normally three minor spiral cords present between the rows of tubercles. Minor spirals only on the shoulder. Suture waved, lightly incised. Spire considerably higher than the aperture with canal. Inner lip thick, covering the spirals on most of the base. Columella lightly concave. Fasciole indistinct.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 37 mm. Diameter 20 mm.

This shell is of considerable interest, in that its relationships are with Oamaruan rather than with Recent species. The type was the only specimen obtained from Palliser Bay, but a shell from Hundalee Conglomerate, Billy's Creek, Conway River, South Marlborough, in the writer's collection is evidently conspecific.

Genus AENEATOR Finlay, 1926.

Aeneator imperator n. sp. (Fig. 3).

Shell large, slender, fusiform, sculpture consisting of axial ribs, 12 per whorl, not extending much on to the shoulder, and tending to become obsolete on the body-whorl. Interspaces wider than the ribs. On the spire four flattened spiral cingulae override the axials below the shoulder angle and one above, single secondary threads appearing between them on the fifth whorl. This sculpture of alternate strong and weak spiral cords becomes characteristic of the later whorls, though occasionally two thin spirals appear instead of one. The whole crossed by faint lines of growth. Spire high, $1\frac{1}{2}$ times the height of the aperture without canal. Whorls 7, convex, lightly shouldered, ascending slightly towards the suture. Aperture oval, produced below into a long unnotched canal inclined to the left.

Columella slightly oblique, produced to the left below. Inner lip thin, the spirals showing through above.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 48 mm. Diameter 20 mm.

The *holotype* is not quite full grown. This species is probably related, though not closely, to *A. thomsoni* (Marwick).

Genus *ELLICEA* Finlay, 1928.

Ellicea carinata Powell. *Trans. N.Z. Inst.*, vol. 60, 1929, p. 90, and ***Ellicea orbita*** (Hutton). *Trans. N.Z. Inst.*, vol. 17, 1885, p. 326.

Both species occur plentifully in the Cliffs east of Lake Ferry, Palliser Bay, together with several intermediate forms suggestive of a hybrid swarm.

Genus *AUSTROFUSUS* Kobelt, 1879.

Austrofusus clavicolus n. sp. (Fig. 5).

Shell of moderate size, fusiform, solid. Protoconch worn. Sculpture consisting on the third whorl of prominent, rounded, axial ribs inclined steeply to the left, becoming vertical on the fourth whorl, and persisting to the suture above and below. On the later whorls the axials become accentuated, though not nodular, on the shoulder, and incline to the left at an angle of 30 degrees between the shoulder and upper suture. The interspaces about the same width as the ribs, which tend to become obsolete on the body-whorl. On the fourth whorl two fine spiral cords surmounting the axials appear below the shoulder, a third appearing below them on the fifth, the number increasing to five on the sixth whorl. Below the line of suture on the body-whorl, where the axial ribs have become obsolete, the spiral cords, to the number of nine, become very strong, showing through the inner lip above. Spire turreted, the same height as the aperture with canal. Whorls 7; shoulder broad, convex, ascending strongly to the suture; below the angle the later whorls contract, though the earlier are vertical; suture impressed, slightly waved. Aperture oval, angled above and at the carina, produced below into a short, slightly oblique canal. Outer lip sharp. Columella vertical, turned to the left below. Inner lip spreading narrowly as a thin callus over the body, showing near the top traces of the spirals beneath, and margined from the line of suture to the fasciole by a deep, narrow channel.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 41 mm. Diameter 19 mm.

This species most resembles *A. pagoda* Finlay = (*Siphonalia turrita* Suter), from which it differs in the absence from the spire of sharp nodules where the axial ribs cross the shoulder, the directing forward of the axials above the shoulder, and in the relative subordination of the spirals, especially above the shoulder, which is distinctly rounded, and not sharp as in *pagoda*. On the base the spiral cords are more numerous, wider, and closer together than on topotypes of *pagoda*, and the anterior canal is less bent to the left. On *pagoda*, also, the inner lip is not margined by a deep, narrow channel.

***Austrofusus incertus* n. sp. (Fig. 4).**

Shell of medium size, strong, fusiform. Protoconch, and indeed much of the type specimen, spoiled by solution. Sculpture of axial ribs, about 14 per whorl, only faint above the shoulder angle, and not extending on to the base. Spiral sculpture of weak cords on the shoulder, one situated at about $\frac{2}{3}$ below the suture somewhat stronger. Below the shoulder angle three strong cords surmount the axials and produce nodules. These are somewhat accentuated on the type by solution of the surrounding portions. The base and neck with strong spirals $1\frac{1}{2}$ times their width apart. Spire $1\frac{1}{2}$ times the height of the aperture with canal. Whorls 6 on broken holotype, strongly angled. Suture wavy. Columella vertical, excavated above, strongly bent to the left below. Inner lip thick, spreading well over the body-whorl. Fasciole prominent.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 30 mm. Diameter 17 mm.

This species is of the "glans" type, but is distinctive in its sculpture, high spire, and the strong excavation and twisting of the columella.

***Austrofusus cottoni* n. sp. (Fig. 21).**

Shell of medium size, turreted strong. Sculpture of the post-embryonic whorls consisting of well-marked axial ribs appearing after the $2\frac{1}{2}$ whorls of the protoconch, and growing regularly stronger to the penultimate whorl, interspaces about the same width as the ribs. After the fifth whorl the ribs are only weakly developed above the shoulder, and on the last quarter turn of the body-whorl they tend to become obsolete. On the fourth whorl two spiral cords appear at the shoulder, a third appearing below them on the fifth whorl, two somewhat finer cords also showing above the shoulder. On all the later whorls the two original cords remain the strongest, though a strong cord, and later two strong cords, appear margining the suture below. On the penultimate whorl are 8 spirals and 14 axial ribs. On the base of the shell axials persist feebly, but the spiral sculpture becomes dominant as 7 heavy ridges, somewhat narrower than the interspaces. Spire turreted, very high, $1\frac{1}{2}$ times the height of the aperture. Protoconch smooth, of $2\frac{1}{2}$ whorls. Whorls $8\frac{1}{2}$; shoulder distinct, midway between the sutures. Sutures wavy, due to the axials. Aperture sub-oval, strongly angled above and at the periphery, channelled above and produced below into a strong anterior canal turned to the left. Outer lip probably sharp. Columella vertical, turned to the left below. Inner lip thin, but not showing any trace of axials beneath.

Locality: Junction of Ruakokopatuna and Makara Streams, South Wairarapa.

Dimensions: Height 30 mm. Diameter 14 mm.

This species differs from all other *Austrofusids* in the abnormal height of the spire.

Austrofusus marshalli n. sp. (Fig. 29).

Shell of moderate size, strong, fusiform. Protoconch worn on all available specimens. Sculpture, early consisting of high axial ribs inclined steeply to the left, later attaining the vertical and becoming obsolete on the last half of the body-whorl. Interspaces a little wider than the ribs, which reach the suture above and below, though considerably weaker above the shoulder. Spiral sculpture of three strong cords and one fine thread above the shoulder, surmounting the axials in weak nodules, and two cords with numerous threads present below the suture. A further cord present on the shoulder angle exhibits a waved appearance between the nodules where it crosses the axial ribs. Base and neck with 8 heavy spiral cinguli. Spire the same height as the aperture with canal. Whorls $7\frac{1}{2}$; shoulder steep, lightly concave; suture waved, due to the axials. Aperture oval, rather narrow for the genus, produced below into a short, strong canal. Inner lip moderately thick, but not obliterating the upper axial ribs. Columella vertical, fasciole prominent.

Locality: Junction of the Ruakokopatuna and Makara Streams, S. Wairarapa.

Dimensions: Height 42 mm. Breadth 19 mm.

The heavy spirals on the base and neck of this shell, together with the formation of the inner lip and fasciole, give a strong resemblance to *A. clavicolus* n. sp. From this, however, it is immediately distinguished by the shape of the shoulder and spire. A certain resemblance between *A. marshalli* and *A. cottoni* quite possibly indicates a common ancestry.

Austrofusids of the "glans-taitae" type occur in almost bewildering variety at the South Wairarapa localities. Some of the more prominent types have been separated above, but until more extensive collections are available it seems best to refrain from further "splitting."

Subgenus *NEOCOLA* Finlay, 1926.

Austrofusus (Neocola) marwicki n. sp. (Fig. 15).

Shell small, bucciniform, solid. Sculpture consisting, on the two earliest adult whorls, of axial ribs contracting on the later whorls to sharp nodules on the shoulder angle, 12 on the penultimate whorl. Strong, subequal spiral cords cover all the adult whorls and the base, where one is sharply nodulous, and forms a well-defined keel margined above by another slightly nodulous spiral and below by a smooth and then a third accentuated nodulous cord. The whole crossed by well-marked lines of growth. Spire about the same height as the aperture with canal. Adult whorls 5, broad, with a long sloping shoulder. Suture impressed, somewhat waved. Base strongly contracted, and twisted into a prominent high fasciole. Aperture narrow, oblique, contracting to a short recurved canal. Outer lip thick, inner lip spreading well over the base. Columella stout, vertical, strongly twisted below.

Locality: Mouth of Putangirua Creek, Palliser Bay.

Dimensions: Height 23 mm. Diameter 12 mm.

This shell most closely resembles *Austrofusus (Neocola) alpha* Finlay from Clifden Band 4b, from which it may be distinguished by the earlier substitution of nodulous for axial sculpture, weaker spiral cords, and the presence, on the base, of the nodulous keel with the bordering strong, nodulous spirals. From topotypes of *A. (Neocola) beta* Finlay it differs in having nodules rather than raised ribs, steeper and longer shoulder, giving a less turreted appearance and the nodulous basal keel.

Genus ZEPHOS Finlay, 1926.

Zephus onokeana n. sp. (Fig. 14).

Shell of medium size, turreted, solid. Sculpture consisting of heavy axial ribs, about the same width as the interspaces, showing no trace of obsolescence even on the body-whorl, where there are 14 ribs. The whole crossed by prominent spiral threads, 3 above and 4 below the shoulder on the penultimate whorl, becoming more distant and a little stronger on the base. Spire turreted, about the same height as the aperture with canal. Protoconch badly worn. Whorls 6; shoulder broad, almost angular. Suture wavy, margined below by an area free of spiral threads. Aperture oval, channelled above and produced below into a short, very oblique, recurved canal. Outer lip thick, spreading a little over the body-whorl. Fasciole prominent, defined above by a thin, sharp ridge.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 21 mm. Diameter 11 mm.

This species differs from *Z. purchasi* (Suter) in its smaller size, more angular shoulder and stronger axial ribs on the body-whorl. There are only 14 axials on the body-whorl instead of 20 as in *purchasi*.

Topotypes show some variation in the height of the spire. Though more than 200 specimens were examined, not one unworn protoconch was obtained.

Genus COMINISTA Finlay, 1926.

Cominista putangirua n. sp. (Fig. 13).

Shell of medium size, fusiform, solid. Sculpture of strong nodules upon the shoulder, 10 on the penultimate whorl. The body-whorl crossed by 10 narrow, distant spiral threads. Growth-lines apparent on the penultimate and body-whorls. Spire conic, much lower than the aperture. Whorls 4 without the protoconch; shoulder low, broad, situated at about $\frac{1}{3}$ of the distance between the sutures on the spire. Suture slightly impressed. Columella vertical, turned to the left below. Inner lip spreading well over the body-whorl. Fasciole strong, paralleled above by a prominent ridge.

Locality: Mouth of Putangirua Creek, Palliser Bay.

Dimensions: Height 25 mm. Diameter $14\frac{1}{2}$ mm.

The unique holotype is unfortunately worn, and details of the earlier sculpture are erased. This species differs from other "*Coministas*" in its abnormal breadth and very depressed spire.

Genus POIRIERIA Jousseau, 1879.

Poirieria zelandica (Q. & G.). *Voy. Astrolabe*, vol. 2, 1833, p. 529.

The specimens obtained from Palliser Bay were all very large, thick shells.

Genus ZEATROPHON Finlay, 1926.

Zeatrophon n. sp. aff. **waitemataensis** Powell and Bartrum. *Trans. N.Z. Inst.*, vol. 60, 1929, p. 436.

A shell similar to *Z. waitemataensis*, but differing in axial sculpture, having more numerous and weaker axial ribs (15 on the body-whorl), all inclined steeply to the left below the shoulder angle and directed forward at an angle of 50° on the shoulder. They also persist on to the neck of the shell, though this may be only a juvenile feature.

Genus ZEMITRELLA Finlay, 1926.

Zemitrella n. sp. aff. **pseudomarginata** (Suter). *Proc. Mal. Soc.*, vol. 8, 1908, p. 179.

The single specimen obtained is too broken to warrant description.

Genus ANTIZAFRA Finlay, 1926.

Antizafra wairarapa n. sp. (Fig. 10).

Shell small, bucciniform. Protoconch smooth, of 2½ whorls. Axial sculpture of numerous low, smooth ribs, about their own width apart, on all the adult whorls. On the first adult whorl several spiral cords cross the axials, but die out on the second adult whorl. A narrow channel margins the suture below. The base and neck covered by low, flat spiral cords. Aperture semilunar, produced below into a notched recurved canal; outer lip thin; inner lip not pronounced. Columella vertical, bent to the left below.

Locality: Hurupi Creek, Palliser Bay.

Dimensions: Height 4 mm. Diameter 2 mm.

Genus PACHYMELON Marwick, 1926.

Pachymelon bartrumi n. sp. (Fig. 32).

Shell large, solid, broadly fusiform. Protoconch large, blunt, of two smooth whorls. Sculpture of low, somewhat obsolete longitudinal ribs, rather stronger below the shoulder, on the first two spire-whorls; after which the shell is devoid of ornament though crossed by numerous well-marked growth-lines. The obsolescence of the axial ribs is somewhat variable on different specimens, one paratype showing them persisting for almost three complete whorls. Spire low, about one-half the height of the aperture. Whorls 6½, convex, lightly shouldered. Columella with five plaits, the uppermost weakest. Inner lip spreading as a glaze well over the body-whorl. Anterior notch moderately deep, fasciole inconspicuous.

Locality: Junction of the Ruakokopatuna and Makara Streams, S. Wairarapa.

Dimensions: Height 90 mm. Breadth (estimated) 45 mm.

A specimen from Tinui, Wairarapa, now in the collection of the N.Z. Geological Survey may possibly be this species.

Genus *ALCITHOE* H. & A. Adams, 1858.

Alcithoe swainsoni Marwick. *Trans. N.Z. Inst.*, vol. 56, 1926, p. 294.

The Wairarapa fossils are much more like Recent shells than the type which is from Kai-Iwi. They are devoid of tubercles on the body-whorl.

Genus *IREDALINA* Finlay, 1926.

Iredalina finlayi n. sp (Figs. 23, 24, 25).

Shell large, fusiform, smooth, with a glazed, shining surface. Apex lost on holotype, projecting as a long spike on paratypes. Sculpture, a few barely discernible spiral lirae on the base, beginning at the lower half of the aperture, otherwise smooth and glossy. Fine, close lines of growth, slightly retracted to the suture above, apparent on unrubbed portions of the shell. Spire a little lower than the aperture. Whorls convex, regularly increasing both in size and convexity. Aperture long, oblique, produced below into a long anterior canal. Outer lip thin, slightly retracted above, broken below. Inner lip smooth. Columella vertical, completely devoid of plaits, but with a light tubercle low down. Juvenile paratypes exhibit the trace of a single plait low down on the columella.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 88 mm. Diameter 36 mm.

The caricelloid spike forming the apex in juvenile paratypes has the shelly material worn so that comparisons based upon it may be erroneous; but it recalls the similar appearance of several South American Volutes, e.g., *Zidona angulata* (Solander). The subobsolete columella plait in juveniles is a feature of great importance, showing descent from a stock in which this feature was developed. Dr Finlay, to whom these shells were submitted for comparison with his *Iredalina mirabilis* (see Finlay, 1926C), has kindly commented as follows upon this juvenile plait: "This (plait) is not at all like the *Lyria-Eosephaea-Plejona* plait which runs through a large number of Volute genera. . . . but is more like a fusinid ridge such as is seen in *Fasciolaria* derivatives, *Euthriofusus* and the *Buccinulum* series." In comparison with *I. mirabilis* he notes: "The sutural sinus, polish and general habit are the same, but the spire is relatively lower, that of *mirabilis* having a much more unrolled appearance. The whorls are also less clasping, the subsutural concave space in *mirabilis* being wider and more striking. The columella seems identical." In connection with the spiral sculpture on the base he notes: "I have not mentioned this as one of the distinctions from *mirabilis* (though it may be), as the surface of the Genotype is mostly chalky and rubbed on the base. However, there are a few

polished patches left on the area mentioned, and on none of these can I detect any spirals, so it may well be that this is a feature of your n. sp."

It would seem that *I. finlayi* is very close to *I. mirabilis*, and is directly ancestral. Its presence in the Tertiary shows that the genus is a true member of the New Zealand fauna, and has been here since at least Nukumaruan times.

Genus COMITAS Finlay, 1926.

Comitas abnormis n. sp. (Fig. 17).

Shell of medium size, strong, fusiform. Sculpture of short axial ribs (almost nodules) on and just below the shoulder angle. Weak spiral threads cover most of the spire-whorls, and are stronger below the shoulder angle. The base is also covered with fine to medium spiral riblets. Protoconch broken on holotype, smooth on a paratype, later developing a median spiral cord, which later still becomes nodulous. Whorls 6 on the broken type; shoulder long, steep, ascending strongly to the waved suture. Aperture oblique, oval, contracting below; outer lip thin; inner lip spreading thinly over the base.

Locality: Mouth of Putangirua Creek, Palliser Bay.

Dimensions: Height 25 mm. Diameter 11 mm.

Comitas onokeana n. sp. (Fig. 16).

Shell of medium size, fairly thick, strong, fusiform. Sculpture: Protoconch of $1\frac{3}{4}$ whorls, smooth on the first $1\frac{1}{4}$ whorls, then developing a strong median spiral cord, below which appear somewhat later two fine spiral lirae. After half a whorl, nodules develop on the median cord, which then becomes obsolete, the nodules becoming elongate and reaching to the suture below, but not passing much over the shoulder. The two spiral lirae persist and become stronger, overriding the axial ribs, and increase in number to four on the fifth whorl. The base of the shell is covered with broad, flat spirals. The most prominent sculpture consists of heavy axial ribs (after the second whorl) inclined steeply to the left, and passing to the suture below, but not above the shoulder. Spire turreted, high, $1\frac{1}{2}$ times the height of the aperture with canal. Whorls $7\frac{1}{2}$; shoulder concave, well developed, accentuated by the axials, halfway between the sutures. Suture simple, not impressed. Aperture oval, produced below into a long canal turned to the left, and then becoming vertical; posterior sinus strong. Outer lip sharp. Columella vertical, slightly bent to the left below. Inner lip thin, bounded by an incised line.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 30 mm. Diameter 12 mm.

This species may easily be distinguished from *C. oamarutica* (Suter) by its more slender form and the persistence of the axial ribs. From *C. fusiformis* (Hutton) it differs in its more slender form, higher spire, and less convex whorls.

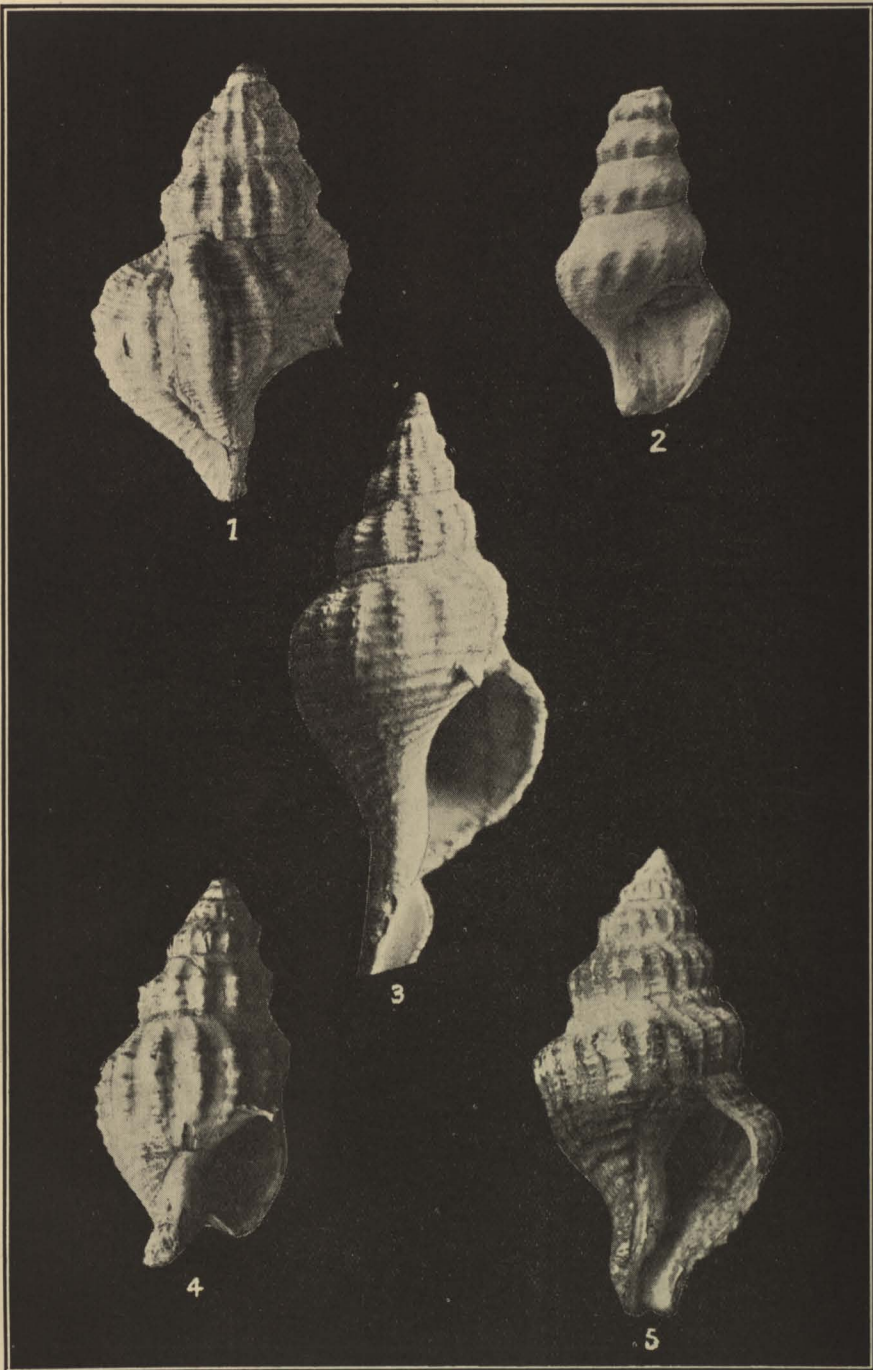
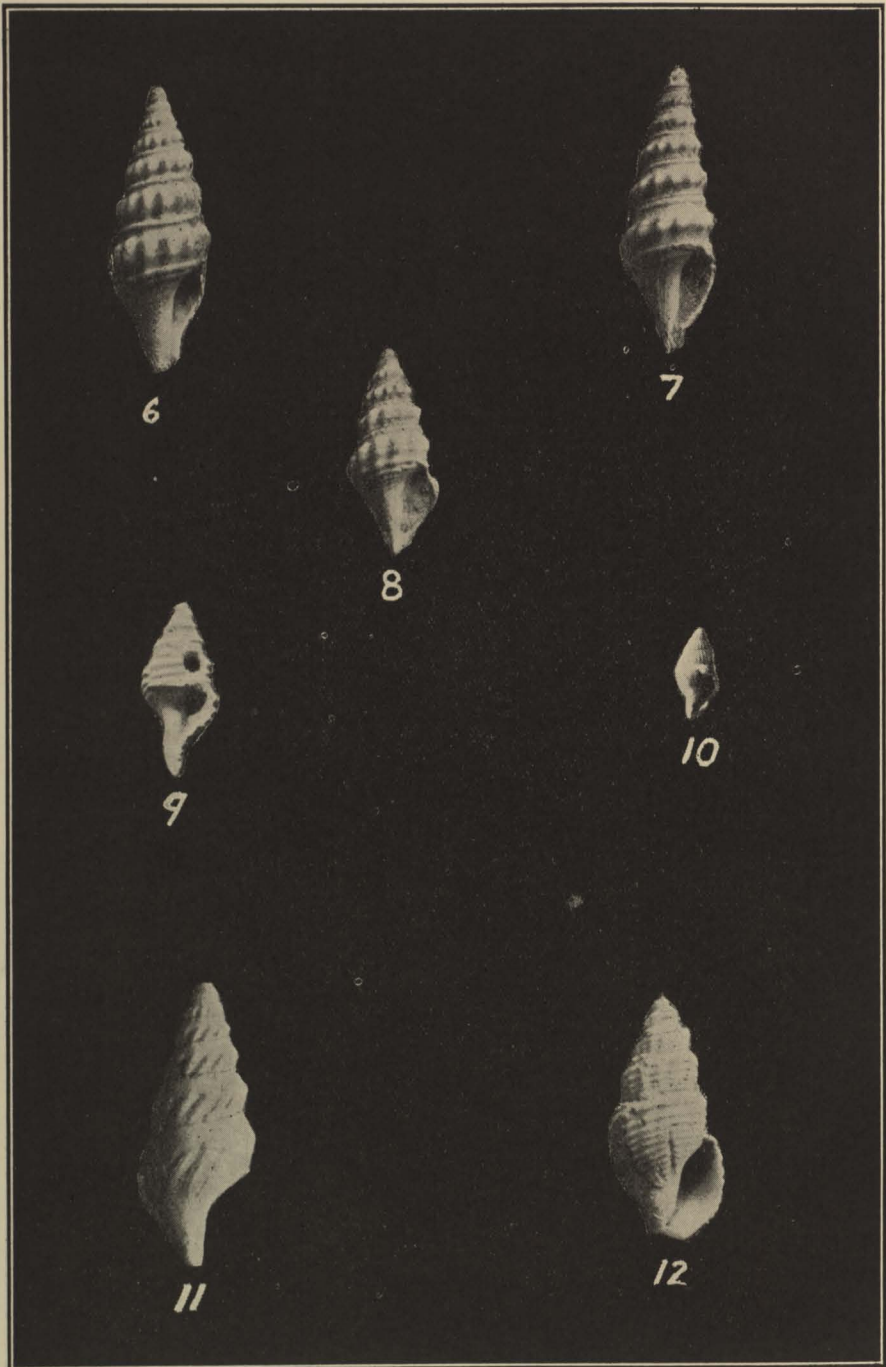


FIG. 1.—*Cymatium jobbernsi* n. sp.; Holotype; 37 mm. \times 20 mm.
 FIG. 2.—*Comitas imperfecta* n. sp.; Holotype; 25 mm. \times 14 mm.
 FIG. 3.—*Aeneator imperator* n. sp.; Holotype; 48 mm. \times 20 mm.
 FIG. 4.—*Austrofusus incertus* n. sp.; Holotype; 30 mm. \times 17 mm.
 FIG. 5.—*Austrofusus clavicularius* n. sp.; Holotype; 41 mm. \times 19 mm.



- FIG. 6.—*Austrodrillia alpha* n. sp.; Holotype; 12 mm. \times $4\frac{1}{2}$ mm.
 FIG. 7.—*Austrodrillia beta* n. sp.; Holotype; 12 mm. \times $4\frac{1}{2}$ mm.
 FIG. 8.—*Austrodrillia gamma* n. sp.; Holotype; 10 mm. \times 4 mm.
 FIG. 9.—*Filodrillia studiosorum* n. sp.; Holotype; 8 mm. \times 4 mm.
 FIG. 10.—*Antizafra wairarapa* n. sp.; Holotype; 4 mm. \times 2 mm.
 FIG. 11.—*Insolentia solitaria* n. sp.; Holotype; 13 mm. \times 5 mm.
 FIG. 12.—*Awateria retiolata* n. sp.; Holotype; 10 mm. \times $4\frac{1}{2}$ mm.

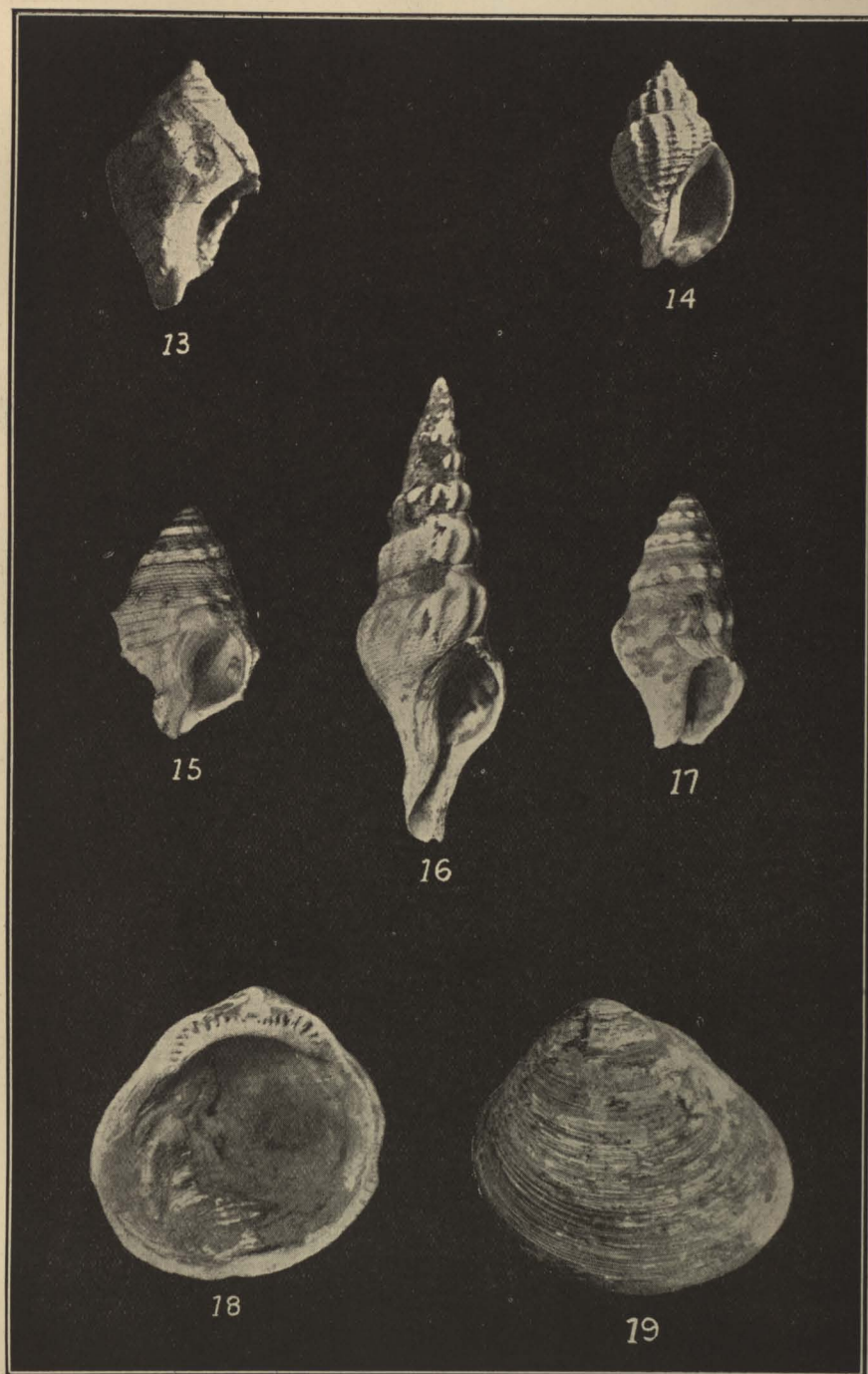


FIG. 13.—*Cominista putangirua* n. sp.; Holotype; 25 mm. \times 14½ mm.

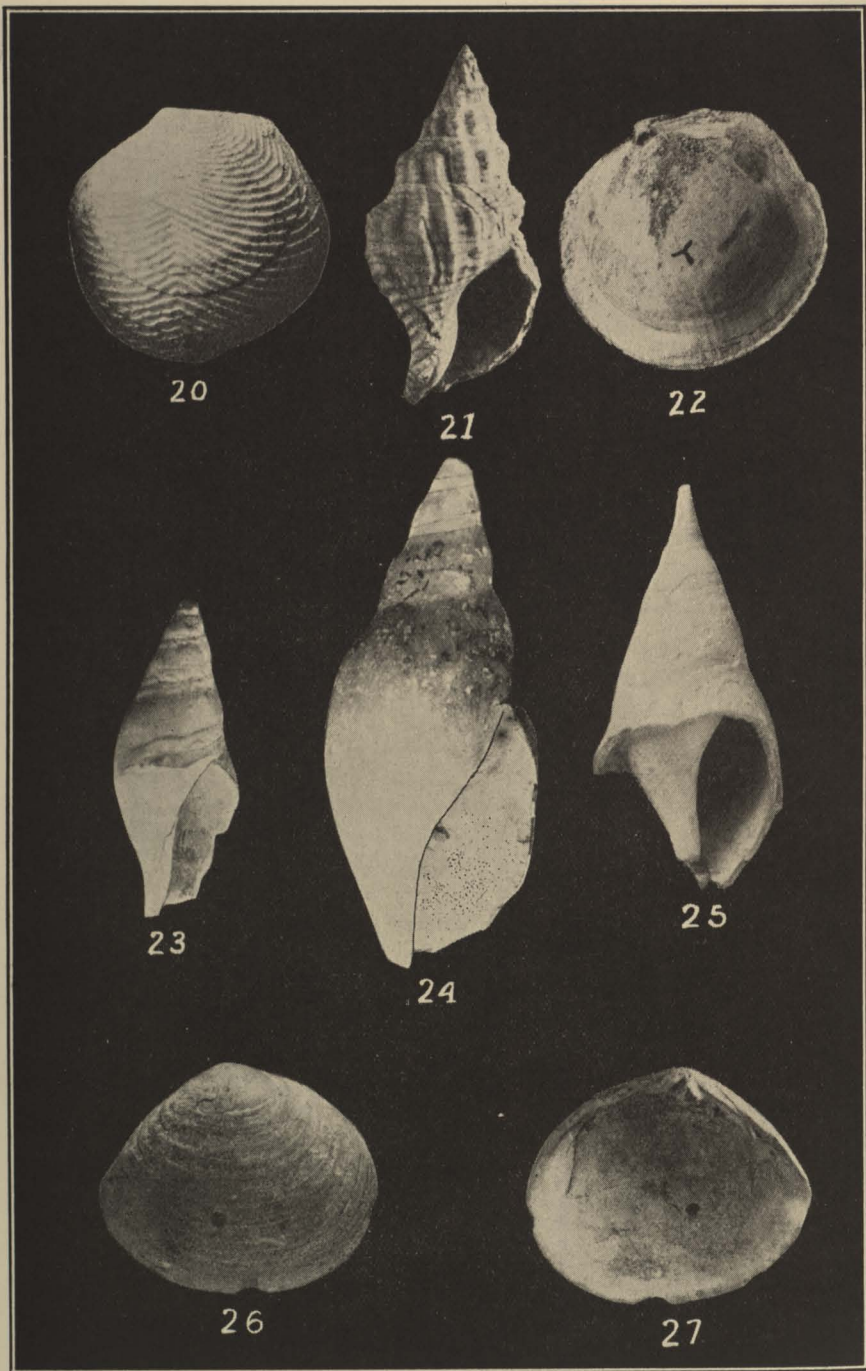
FIG. 14.—*Zephus onokeana* n. sp.; Holotype; 21 mm. \times 11 mm.

FIG. 15.—*Austrofusus (Neocola) marwicki* n. sp.; Holotype; 23 mm. \times 12 mm.

FIG. 16.—*Comitas onokeana* n. sp.; Holotype; 30 mm. \times 12 mm.

FIG. 17.—*Comitas abnormis* n. sp.; Holotype; 25 mm. \times 11 mm.

FIGS. 18 & 19.—*Limopsis lawsi* n. sp.; Holotype; 27 mm. \times 25 mm.



FIGS. 20 & 22.—*Divaricella notocenica* n. sp.; Holotype; 20 mm. \times 20 mm.
 FIG. 21.—*Austrofusius cottoni* n. sp.; Holotype; 30 mm. \times 14 mm.
 FIG. 23.—*Iredalina finlayi* n. sp.; Paratype; juvenile.
 FIG. 24.—*Iredalina finlayi* n. sp.; Holotype; 88 mm. \times 36 mm.
 FIG. 25.—*Iredalina finlayi* n. sp.; Paratype; showing apex.
 FIGS. 26 & 27.—*Barytellina anomalodonta* Finlay; worn specimen.



FIG. 28.—*Pellicaria acuminata* (Marwick); specimen with abnormally high spire.
 FIG. 29.—*Austrofusus marshalli* n. sp.; Holotype; 42 mm. \times 19 mm.
 FIG. 30.—*Struthiolaria tasmani* n. sp.
 FIG. 31.—*Alcithoe exigua* Marwick; specimen showing sculpture; 62 mm. \times 18 mm.
 FIG. 32.—*Pachymelon bartrumi* n. sp.; Holotype; 90 mm. \times 45 mm.



Comitas imperfecta n. sp. (Fig. 2).

Shell of medium size, fusiform. Sculpture: Shoulder smooth, axial ribs steeply inclined to the left and crossed by fine spiral lirae below the shoulder angle. Base with spiral lirae only. Shoulder steep, lightly concave, crossed by strongly recurved lines of growth. Spire high. Aperture oval, contracted to a strong anterior canal, and notched above by a deep, broad sinus.

Locality: Marls one mile below Turanganui Gorge, S. Wairarapa.

Dimensions of broken holotype: Height 25 mm. Diameter 14 mm.

This shell is evidently ancestral to *C. onokeana* nov., from which it differs in the greater steepness and lighter concavity of the shoulder and the possession of weaker axial sculpture.

Genus **AUSTRODRILLIA** Hedley, 1918.**Austrodrillia alpha** n. sp. (Fig. 6).

Shell small, fusiform. Protoconch worn. Sculpture commencing as a strong median cord, becoming heavily nodulous after one whorl, the nodules rapidly attaining an elongated form and passing into ribs, strong below, but only faint upon the shoulder, not reaching the suture above and only just attaining it below. Shoulder concave, folded above into a prominent cord which margins the suture below. Spiral threads very faint upon the spire, but strengthening and forming the only sculpture on the base and neck. Spire high, $1\frac{1}{4}$ times the height of the aperture with canal. Whorls $7\frac{1}{2}$, convex. Aperture oval, slightly oblique, produced below into a broad canal inclined to the left. Outer lip sharp. Columella vertical, turned to the left below. Inner lip well defined.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 12 mm. Diameter $4\frac{1}{2}$ mm.

Austrodrillia beta n. sp. (Fig. 7).

Shell small, slender, fusiform. Protoconch smooth. Sculpture on the first $1\frac{1}{2}$ whorls consisting of a strong median keel, which later becomes nodulous; this condition then persists throughout. Spiral sculpture of three very weak threads on the shoulder angle and a strong spiral cord margining the suture below. The base with one strong spiral cord below the line of suture and numerous weak spiral threads. The whole crossed by faint lines of growth. Whorls 8, very convex. Shoulder concave. Aperture oblique, oval, produced below into a sub-vertical canal. Columella vertical, slightly turned to the left below. Outer lip thin; inner lip well defined.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 12 mm. Diameter $4\frac{1}{2}$ mm.

This species differs from *alpha* in having median nodules on the shoulder in place of axial riblets.

Austrodrillia gamma n. sp. (Fig. 8).

Shell small, fusiform. Protoconch worn. Sculpture of axial ribs, steeply inclined to the left, crossed by two prominent spiral cords on the shoulder angle, with a third near the suture below. The base with spiral sculpture only. Whorls 6 (7 on a paratype), convex. Shoulder concave, mounting to a strong cord below the suture. Aperture slightly oblique, produced anteriorly into a short canal inclined to the left. Outer lip sharp; inner lip thick.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 10 mm. Diameter 4 mm.

This species may be distinguished from *alpha* and *beta* by its stumper appearance and the two strong spiral cords on the shoulder angle.

Genus **INSOLENTIA** Finlay, 1926.**Insolentia solitaria** n. sp. (Fig. 11).

Shell small, turreted, axially costate and spirally lirate. Protoconch smooth, of $1\frac{1}{4}$ whorls. Early sculpture of broad, close axial costae, later confined below the shoulder angle and inclined to the left at an angle of 60° . Obsolete on the body-whorl. Spiral lirae covering all the whorls (except protoconch), five above and six below the shoulder angle. Irregular growth-lines cross most of the shell. Whorls 6, angled near the middle, with a high sloping shoulder. Spire gradate, high, twice the height of the aperture. Aperture broken; inner lip smooth, white. Columella vertical.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 13 mm. Diameter 5 mm.

This species is only provisionally placed in *Insolentia*, as the holotype is too incomplete to serve as standard for a new group.

Genus **FILODRILLIA** Hedley, 1922.**Filodrillia studiosorum** n. sp. (Fig. 9).

Shell small, fusiform, with prominent spiral sculpture, consisting of a strong cord on the shoulder with a somewhat weaker cord between it and the lower suture. Strong spiral cords, rather more than their width apart on the base. One weak cord parallel to the suture below. Axial sculpture absent, growth-lines well marked. Whorls 5, carinate; shoulder concave. Spire about the same height as the aperture with canal. Inner lip well defined. Columella vertical, bent to the left below. Fasciole distinct.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 8 mm. Diameter 4 mm.

This shell resembles *F. rupta* Marwick, but it is doubtful if any relationship exists, and its reference to *Filodrillia* must be regarded as provisional.

Named in recognition of the students who collected with me at Palliser Bay, August, 1931.

Genus *AWATERIA* Suter, 1917.***Awateria retiolata* n. sp.** (Fig. 12).

Shell small, thin, turreted. Protoconch worn. Sculpture consisting, on the spire-whorls, of axial ribs reaching from the shoulder to the suture and inclined steeply to the left. Interspaces the same width as the ribs. On the spire-whorls four spiral cords, the upper two the stronger, cross the axials below the shoulder, giving a reticulate sculpture to the spire. Shoulder smooth, concave. The body-whorl with spiral sculpture only. The uppermost spiral cord on the shoulder angle is faintly nodulous on the earlier part of the body-whorl as a last suggestion of the previous axial sculpture. Weak growth-lines cover most of the shell, being rather more prominent on the smooth shoulder. Spire high, $1\frac{1}{2}$ times the height of the aperture. Whorls $4\frac{1}{2}$. Aperture subquadrate, strongly channelled below and with a light sinus above. Columella vertical, bent to the left below. Outer lip thin; inner lip well defined.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

Dimensions: Height 10 mm. Diameter $4\frac{1}{2}$ mm.

This species and *Awateria* n. subsp. below are but doubtfully referable to the genus. Though they resemble *A. evanida* Suter they do not compare well with *A. streptophora* Suter, the genotype. As a long series has not been available for study, they are, however, left in *Awateria* for the present.

***Awateria mollyae* n. sp.**

Shell similar to *A. retiolata* from which it may be distinguished by a much steeper shoulder, giving the whorls a much less convex appearance, the presence of weak axial ribs on the body-whorl and the fact that only half as many spiral cords appear on the spire-whorls and the upper half of the body-whorl.

Locality: Cliffs east of Lake Ferry, Palliser Bay.

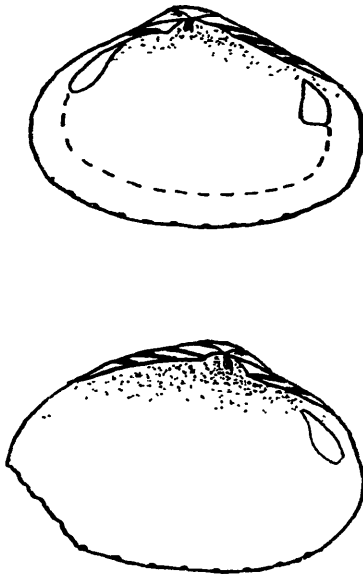
Genus *ZEACUMINIA* Finlay, 1926.

***Zeacuminia orycta* (Suter).** *Trans. N.Z. Inst.*, vol. 45, 1913, p. 295.

The Hurupi specimens closely resemble Target Gully shells.

Genus *PERRIERINA* Bernard, 1897.***Perrierina bensoni* n. sp.**

Shell very small, ovate, equivalve, slightly inequilateral. Beaks fairly prominent. Sculpture consisting of microscopic, widely spaced threads. Teeth: Each valve with one bifurcating cardinal beneath the umbo (pointing anteriorly in the left valve, and four straight, horizontal posterior lateral teeth; anterior teeth also straight and horizontal, two in the left and one in the right valve.



Perrierina bensoni. Holotype.

Locality: Junction of the Ruakokopatuna and Makara Streams, South Wairarapa.

Dimensions: Length 2 mm. Height 1.5 mm.

Paratypes of *P. ovata* Marwick, when examined under the microscope, show two cardinal teeth in the left valve and a trace of a central one in the right. These were not noted in his description, and indeed are hardly discernible with a hand lens. It is probable that the type left valve of *P. bensoni* has had the posterior cardinal broken and that the teeth are almost identical with *P. ovata*.

P. taxodonta Bernard I have not seen, but the cardinals exhibited in Suter's drawing (Atlas, Pl. 52, Figs. 12a and b) are very different from those of both *P. ovata* and *P. bensoni*.

GENUS PEDALION Huddesford, 1770.

***Pedalion fortissimum* n. sp.**

Shell heavy, large, sub-trigonal, produced ventrally, not very convex. Beaks anterior. Anterior ear not shown on specimen. Structure strongly lamellar, one valve being nearly half an inch thick. Hinge with six, possibly seven, narrow resiliifer grooves with much wider interstices (usually twice the width of the furrows).

Locality: Boatshed Creek, south of Putangirua Creek, Palliser Bay.

Dimensions: Length 95 mm. Height 130 mm.

This species differs radically in shape from both *P. oneroaensis* Powell and Bartrum and *P. zelandica* (Hutton) recorded originally from Shrimptons (?) Ngaruroro River, and subsequently discussed

by Marshall and Murdoch in their work upon the fossils from Nukumarū. The hinge also cannot be confused with either of the above species.

Pedalion sp. Fragments recorded from Tutamoe Series, N.Z.G.S. localities 1298, 1360, 1794 by Marwick (1931, p. 60) may prove to be this species.

Genus LIMOPSIS Sassi, 1827.

Limopsis lawsi n. sp. (Figs. 18, 19).

Shell of the *zitteli* group, large, inflated; anterior end regularly rounded, posterior produced low down. Beaks not very prominent. Sculpture consisting of irregular growth-ridges with superimposed, fine, concentric striae and faint radial threads. Ligamental area short. Anterior teeth 10, posterior teeth 11.

Locality: Hurupi Creek, Palliser Bay.

Dimensions: Length 27 mm. Height 25 mm.

This species was separated by Dr Finlay some years ago from material in the collection of the Geological Survey, but was not published.

Genus CHLAMYS Roeding, 1798.

Chlamys delicatula (Hutton). *Cat. Tert. Moll.*, 1873, p. 30.

In the Palliser Bay section this species occurs only in the beds at the mouth of the Whangaimona River, i.e., at the base of the fossiliferous beds between Lake Ferry and Whangaimona. See also Thomson (1919, p. 7).

Genus DIVARICELLA v. Martens, 1880.

Divaricella notocenica n. sp. (Figs. 20, 22).

Shell of medium size, subcircular, equivalve, inflated. Sculpture for the first mm. from the umbo of fine, concentric ribs, becoming coarser and waved at 3 mm. from the umbo, later strongly divaricated. The later ribs raised towards the dorsal margin and flattened ventrally. The whole crossed by fine concentric growth-lines and growth-ridges. Ligament sunk, lunule narrow. Right valve with a strong triangular cardinal tooth beneath the umbo, and a deep pit on either side; one very oblique anterior cardinal. Anterior adductor scar long and narrow, posterior oval; pallial line simple.

Locality: Otekaike, Oamaru.

Dimensions: Length 20 mm. Height 20 mm. Thickness (both valves) 10 mm.

As the only specimen from Palliser Bay is closed, a shell from Otekaike, Oamaru, now in the collection of the N.Z. Geological Survey, has, by courtesy of Dr Marwick, been taken as type.

Genus MACOMA Leach, 1819.

Macoma cf. **robini** Finlay. *Trans. N.Z. Inst.*, vol. 55, 1924, p. 474.

The Hurupi shell may, when better material is available, prove to be separable from the Otiake (Hutchinsonian) type. The specimens in the writer's collection are much more attenuated in form, and have a much stronger posterior fold than the true *robini*.

Genus MARAMA Marwick, 1927.

Marama murdochi Marwick. *Trans. N.Z. Inst.*, vol. 57, 1927, p. 601.

This was found only in the higher beds near Lake Ferry.

Genus BASSINA Jukes-Brown, 1914.

Bassina parva Marwick. *Trans. N.Z. Inst.*, vol. 57, 1927, p. 619.

Specimens from the brown sands at the Junction of the Hinakura, Martinborough, and Gladstone Roads are constantly inflated to twice the degree attained by normal shells, as also are most specimens from the Junction of the Ruakokopatuna and Makara Streams.

Genus NEMOCARDIUM Meek, 1876.

Nemocardium pulchellum (Gray). *Dieff. N.Z.*, vol. 2, p. 252.

This, like *Marama murchochi*, was found only in the higher beds near Lake Ferry, Palliser Bay, in the coastal section.

LIST OF NEW SPECIES DESCRIBED IN THIS PAPER.

<i>Struthiolaria tasmani.</i>	<i>Comitas imperfecta.</i>
<i>Cymatium jobbernsi.</i>	<i>Comitas onokeana.</i>
<i>Aeneator imperator.</i>	<i>Austrodrillia alpha.</i>
<i>Austrofusus clavicolus.</i>	<i>Austrodrillia beta.</i>
<i>Austrofusus cottoni.</i>	<i>Austrodrillia gamma.</i>
<i>Austrofusus incertus.</i>	<i>Insolentia solitaria.</i>
<i>Austrofusus marshalli.</i>	<i>Filodrillia studiosorum.</i>
<i>Austrofusus (Neocola) marwicki.</i>	<i>Awateria retiolata.</i>
<i>Zephus onokeana.</i>	<i>Awateria mollyae.</i>
<i>Cominista putangirua.</i>	<i>Perrierina beusoni.</i>
<i>Antizafra wairarapa.</i>	<i>Pedalion fortissimum.</i>
<i>Pachymelon bartrumi.</i>	<i>Limopsis lawsi.</i>
<i>Iredalina finlayi.</i>	<i>Divaricella notocnica.</i>
<i>Comitas abnormis.</i>	

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