The Tertiary and Recent Naticidae and Naricidae of New Zealand.

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[*Read, by permission of the Director of the N Z. Geological Survey, before the Wellington Philosophical Society, 10th October, 1923; received by Editor, 22nd December, 1923; published separately, 28th August, 1924.*]

Plates 55–60.

I. Family NATICIDAE.

A SATISFACTORY classification of the Naticidae is, for the following reasons, difficult to carry out: (1) The importance that has been attributed by most authors to the calcareous or horny nature of the operculum; (2) the use of the funicle in classification; (3) the absence of sculpture; (4) the great variability in shape within many of the species.

1. Cossmann (1919, p. 385) criticizes the system of generic division according to the nature of the operculum, and cites *Natica dillwynni* Payr. as the possessor of an operculum partly horny and partly calcareous.

2. The umbilical funicle is by no means a constant, and when coalescent with the parietal callus loses its individuality. In some cases—*e.g.*, *N. maoria*—it becomes quite obsolete.

3. The only sculpture is of simple spiral grooves and cords. On *Sinum* and its allies this is well developed, but is of a very uniform nature throughout. In the other groups weak spirals are often present, particularly in some of the large *Uber* spp., but here they do not have even specific significance.

4. Dall (1892, p. 362) says, "The males, as usual, are apt to be smaller, and, not having to carry the enormous egg-sac of the females, have the 'shoulder' of the shell, or that part of the whorl just in front of the suture, less inflated, giving the whole shell a more evenly conical and less scalar spire. These differences are more marked in the group having a corneous operculum, but are perceptible in the others, especially those with an elevated spire. Apart from sexual differences, there is a certain variability about the coil of the shell, some specimens having a decidedly wider umbilicus than others of the same species; and the grooves and spiral ribs of the interior of the umbilicus vary within certain limits between individuals, and also have a certain range of fluctuation in the same individual at different times."

The system of nomenclature followed below is based mainly on Dall's two papers (1892, 1909), but a departure is made in giving *Amauropsella* generic rank. It has also been found necessary to set up two new genera and two new subgenera. *Sulconacca* is proposed for some of the shells classed under *Ampullina* (*Megatylotus*) by Suter and under *Lunatia* by Hutton; *Globisinum* for the globose shells with spiral sculpture classed sometimes as *Sinum* and sometimes as *Ampullina*; *Magnatica* and *Carinacca* for Naticoid groups, the latter of which was placed under *Lunatia* by Hutton and *Ampullina* by Suter, the former under *Polinices* by Suter.

The table of generic and subgeneric ranges reveals no important additions to the New Zealand fauna since Bortonian times. (The one exception, *Eunaticina cincta*, as stated below, is based on a single specimen of doubtful authenticity.) At first sight this might seem to point to an isolation of the area during that time, preventing the arrival of new forms. Judging from our limited knowledge, however, the generic constitution of neighbouring areas does not seem to have been very different from our own. Thus new arrivals might not be noticed.

The family seems to have had its maximum development as regards differentiation early in the Tertiary, so that few new generic divisions have been evolved since the Oligocene. A noticeable feature shown by Table 1 is the appearance of five new genera or subgenera after the Wangaloan, perhaps indicating an ingression of a northern fauna, for *Natica* s. str. appears to have been absent from the early Tertiary and Cretaceous of Antarctica.

The time divisions used in Tables 1 and 2 below are approximations only, and the terms are used in a very wide sense; also, some changes have been made in Thomson's classification (1916, p. 28 *et seq.*). The Ngaparan has been omitted, since it is based on non-marine sediments. The Bortonian (Park, 1916, p. 34) has been separated from the Waiarekan. and includes, besides the type locality, the Waihao greensands and "Island sandstone," the Kakahu greensands, and the Hampden beds. The stage as thus constituted still represents a long period of time, and should be further divided. The Waiarekan has been reduced to embrace only the tuffs below the Ototaran stone, and with it have been placed, tentatively, the Chatton Creek beds. Of the Ototaran molluscan fauna little is known, for it has not yet been demonstrated what littoral beds of fossiliferous sandstones form the lateral equivalent of the limestone. The Hutchinsonian has been omitted because only its Brachiopod fauna is, as yet, accurately known. The Pakaurangi Point, Clifden, and Otiake beds have been included in the Awamoan largely because the faunal resemblances are with that stage rather than with the Waiarekan, and because of the uncertainty as to the equivalents of the Ototaran and Hutchinsonian. According to information from Mr. H. J. Finlay, a considerable thickness of the fossilferous Clifden beds corresponds to these stages.

ACKNOWLEDGMENTS.

I am indebted to Mr. R. S. Allan and Mr. H. J. Finlay for their generous loan of material and for permission to incorporate into this paper, for the sake of completeness, species that they had already separated out as new; also to the late Mr. R. Murdoch, Miss M. K. Mestayer, Dr. P. Marshall, Mr. W. R. B. Oliver, Professor R. Speight, and Dr. J. A. Thomson for their kindness in lending valuable specimens for examination.

TABLE 1.—APPROXIMATE TIME RANGES OF GENERA AND SUBGENERA.

	Palæocene.	Eocene to Miocene.							Pliocene.			
		Oamaruian.							Wanganuian.			
	Wangaloan.	Bortonian (=Waihao g.s.).	Waiarekan. (Tuffs).	Ototaran.	Awamoan.	Mokau Beds.	Tongaporutuan.	Onaroan.	Waitotaran.	Nukumaruian.	Castlecliffian.	Recent.
Natica												
(*Carinacca* n. subg.) ..												
(*Magnatica* n. subg.) ..												
Sulconacca n. g.												
Uber												
(*Euspira*)												
Neverita												
Amauropsella												
Sinum												
Eunaticina											?	
Globisinum n. g.												

TABLE 2.—APPROXIMATE SPECIFIC TIME RANGES.

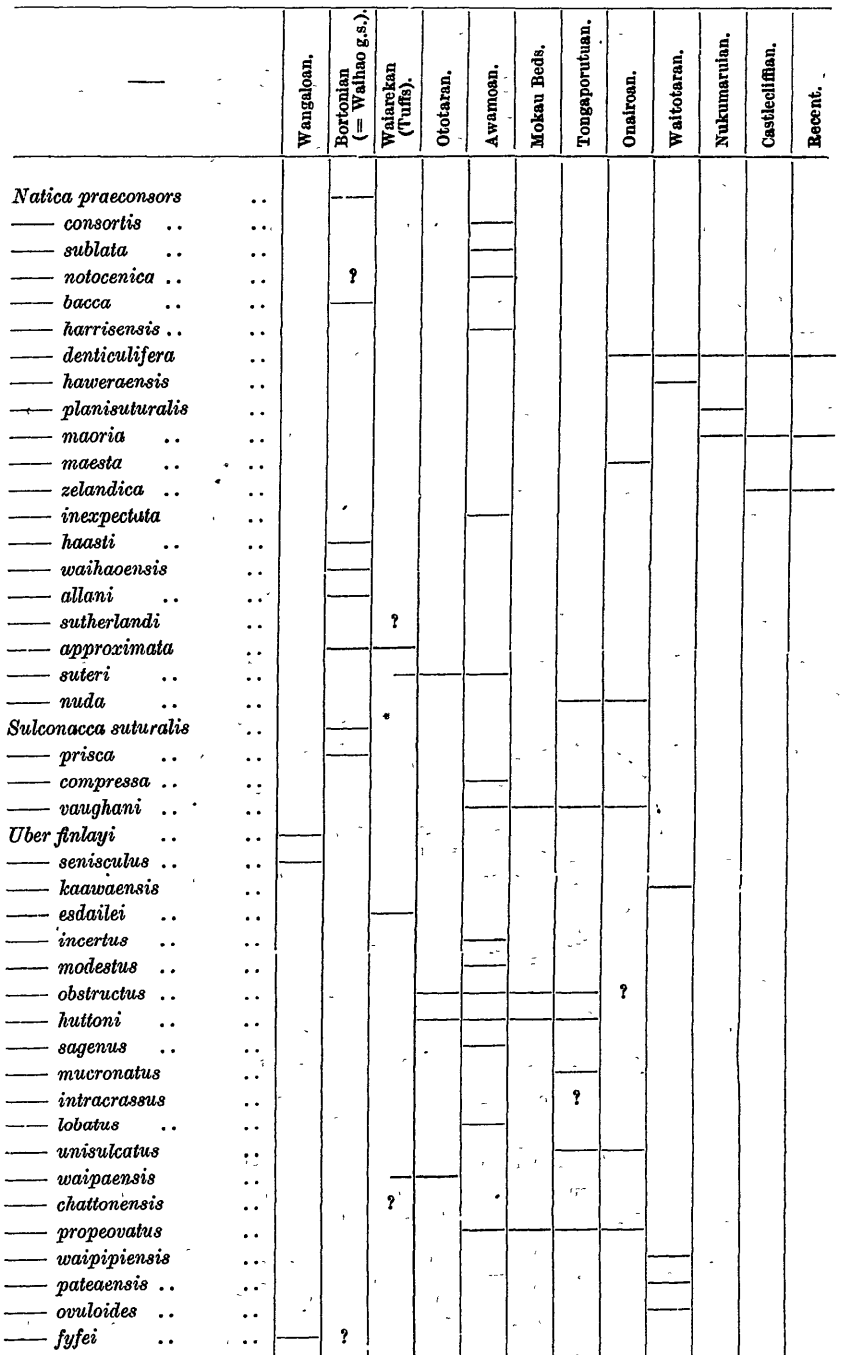

TABLE 3.—APPROXIMATE SPECIFIC TIME RANGES—*continued.*

	Wangaloan.	Bortonian (= Waihao g.s.).	Waiarekan (Tuffs).	Ototaran.	Awamoan.	Mokau Beds.	Tongaporutuan.	Onairoan.	Waitotaran.	Nukumaruian.	Castlecliffian.	Recent.
Uber lateapertus ..	—											
—— *pukeuriensis* ..					—							
—— *pseudovitreus* ..					—							
—— *vitreus*												—
—— *barrierensis* ..												—
—— *pontis*		—										
Amauropsella major ..	—											
—— *teres*	—											
Sinum fornicatum ..		—										
—— *infirmum*					—						?	
—— *cinctum*												
Globisinum spirale ..	—											
—— *elegans*		—										
—— *miocaenicum* ..					—							
—— *drewi*										—	—	
—— *undulatum*										—	—	—
—— *venustum*												—

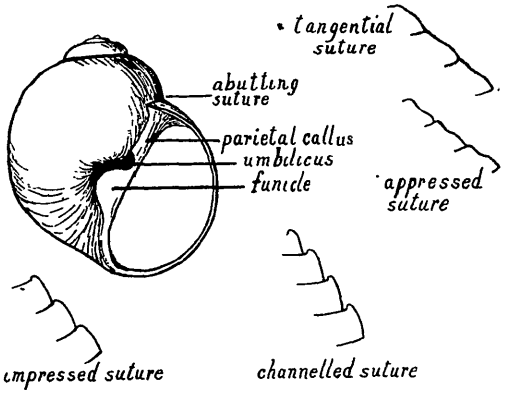

DIAGRAM TO ILLUSTRATE TERMS USED.

ROUGH KEY TO GENERA AND SUBGENERA.

1. *Natica:* Globose; sutures generally abutting, but sometimes tangential; parietal callus thin, separated from a prominent funicle in the umbilicus; operculum shelly.
   (*a.*) (*Carinacca*): Ovate; sutures tangential; umbilicus widely open, bounded by a limb without an accompanying sulcus; funicle rudimentary; parietal callus short but fairly thick.
   (*b.*) (*Magnatica*): Large, globose; sutures tangential; umbilicus open, with a weak ridge on apertural wall, also a weak circum-umbilical limb
2. *Sulconacca:* Small, globose; sutures channelled; umbilicus open, bounded by a low ridge with a well-marked sulcus outside it; no funicle; parietal callus only a thin glaze.

4. *Uber:* Ovate; sutures generally tangential; umbilicus open or closed by the parietal callus, which is thick and coalescing with the funicle; operculum horny.
   (*a.*) (*Euspira*): Globose-ovate; sutures abutting, sometimes appressed; apertural callus moderate; no funicle; operculum horny.
   (*b.*) (*Neverita*): Ovate; sutures tangential, appressed; apertural callus thick, coalescing with a huge funicle, which fills the umbilicus; aperture greatly inclined.
4. *Sinum:* Auriform, extremely flattened, with strong spiral sculpture; aperture distended; columella without callus, concave.
   (*a.*) (*Eunaticina*): Oval; body-whorl compressed, strong spiral sculpture; aperture distended; columella without callus, slightly sinuous.
5. *Globisinum.* Globose; strong spiral sculpture; inner apertural margin without callus and shaped as a shallow reversed S.
6. *Amauropsella:* Shell ovate; spire raised; aperture slightly effuse below; umbilicus with a sharp spiral ridge descending to the anterior end of the inner lip; parietal callus thin.

1. Genus NATICA Scopoli, 1777.

Shell globose, solid, smooth, suture well marked and generally abutting, aperture semilunar, outer lip straight, often retracted to suture, inclined 20°–30° from vertical, inner margin with moderate callus on parietal wall generally not invading umbilicus which is open and contains a funicle spiralling up apertural wall.

Type: *N. vitellus* Linné.

KEY TO SPECIES.

zelandica fairly large, globose; sutures abutting; funicle large, close to anterior and outer umbilical walls, separated from the parietal callus by a notch about half as wide as the funicle.

inexpectata: fairly large, globose; sutures abutting strongly; funicle moderate.

notocenica. small, ovate; sutures tangential; funicle comparatively larger than that of *zelandica.*

bacca: very small, broadly ovate; sutures tangential; funicle rather narrow but long.

planisuturalis. moderate size, broadly ovate; sutures tangential; funicle moderate, about half its own width from the umbilical walls.

haweraensis: moderate size, broadly ovate; sutures tangential; funicle narrow, separated its own width from umbilical walls.

consortis small, globose; spire rather low; sutures abutting; funicle very small, anteriorly placed.

sublata: small, ovate; spire high, gradate; sutures abutting with a flat space below; funicle very small, anteriorly placed.

praeconsors: small, globose; spire low; sutures abutting; umbilicus with two weak funicle ridges.

harrisensis. small, flattened; sutures abutting; umbilicus with a ridge very far forward; two denticles on the parietal callus.

maesta: small, spire low, body subcylindrical; suture impressed; umbilicus very narrow.

maoria: small, globose; sutures abutting; umbilicus variable, sometimes widely open and without trace of a funicle, sometimes restricted and almost closed by a narrow funicle coalescing with the parietal callus.

denticulifera small, ovato-globose; spire high; sutures abutting; umbilicus without a funicle; parietal callus with one or two denticles.

Natica zelandica Quoy and Gaimard, 1832. (Plate 55, figs. 8, 12.)

For synonymy see Suter's *Manual* (1913, p. 289).

Localities.—Recent (type); Castlecliff, Wanganui; Kai Iwi.

This species has been recorded from many Tertiary horizons, from the Hampden beds upwards; but the identifications do not bear critical examination. As here restricted, *N. zelandica* has a very short range—*i.e.*, Castlecliffian to Recent.

Natica notocenica Finlay. (Plate 55, fig. 4.)

1924. *Natica notocenica* Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 450, pl. 49, figs. 2*a*, 2*b*, 2*c*, 2*d*.

Localities.—Awamoa (type); Pukeuri; Rifle Butts; Ardgowan; Pareora; uppermost Mount Brown beds, Weka Pass, large specimen [= *N. australis* (in part) of Suter, 1921, p. 43]; ? Waikaia (umbilicus is concealed by matrix); ? McCullough's Bridge, Waihao.

One good specimen from the last locality has outer lip strongly retracted to suture and funicle smaller and more separated from umbilical walls. Two smaller imperfect specimens are not so distinct from *notocenica*, consequently more specimens are needed before a separation would be justified.

Natica inexpectata Finlay. (Plate 55, fig. 13.)

1924. *Natica inexpectata* Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 452.

Type in the collection of Mr. H. J. Finlay.

Height, 16 mm.; diameter, 15 mm.

Locality.—7A, Clifden, Southland.

Distinguished from *N. zelandica* by its different shape, more convex and wider whorls, and smaller umbilical funicle. *N. consortis* and *N. sublata* are only about half the size, and have much smaller funicles.

Natica bacca n. sp. (Plate 55, fig. 14.)

Shell small, oval; spire low, suture tangential; aperture large, semilunar; outer lip gently retracted to suture for considerable distance; inner lip with thin callus on parietal wall and somewhat narrow but large funicle which about half fills umbilicus; notch separating funicle from parietal callus very shallow.

Type in collection of New Zealand Geological Survey. Kindly presented by Dr. P. Marshall.

Height, 5 mm.; length, 5 mm.

Locality.—Hampden.

This species is probably the *N. zelandica* of former lists. The very shallow notch between the parietal callus and the funicle, and also the narrowness of the latter, distinguish the species from *N. notocenica*, which it resembles in shape.

Natica planisuturalis n. sp. (Plate 55, figs. 10, 11.)

Shell small, broadly ovate; spire moderately raised, less than half the height of aperture; whorls 5, flattened above; suture tangential; outer lip slightly concave, inclined at about 30° from the vertical, slightly retracted to suture; umbilicus wide with an almost central funicle about half its own width from umbilical walls all round; parietal callus thin with deep narrow notch separating it from funicle.

Holotype in collection of New Zealand Geological Survey.

Height, 11 mm.; diameter, 11 mm.

Localities.—1089, blue clays and sands, Okauawa Creek, south side Ngaruroro River (type); 1063, shell-bed, Okawa Creek, north side Ngaruroro River; 1096, clays below limestone, Petane.

Natica haweraensis n. sp. (Plate 55, figs. 6, 7.)

Shell small, broadly ovate; spire low; whorls somewhat flattened, suture tangential; outer lip slightly concave, inclined at about 40° from vertical, slightly retracted to suture; umbilicus very wide with large funicle which is its own width distant from umbilical walls all round; parietal callus thin, not invading umbilicus, and so separated from funicle by deep and wide notch.

Holotype in collection of New Zealand Geological Survey.

Height, 10 mm.; diameter, 10 mm.

Localities.—1173, beach at mouth of Waihi Stream, Hawera; 1101, Waipipi Beach, north of Wairoa Stream, Waverley (= *N. zelandica* of Marshall and Murdoch, 1920, p. 125); 126, Awatere Valley (= *P. ovatus?* of Suter, 1921, p. 30) (poor specimen; may be *N. planisuturalis*).

An imperfect specimen from Waipipi Beach is 20 mm. high.

Natica consortis Finlay. (Plate 55, fig. 2.)

1924. *Natica consortis* Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 451, pl. 49, figs. 1*a*, 1*b*, 1*c*.

Localities.—Pukeuri (type); Target Gully, Oamaru; Parson's Creek, Oamaru; Ardgowan; Rifle Butts; Pakaurangi Point.

Natica sublata n. sp. (Plate 55, fig. 3.)

Shell small, ovate; spire raised, gradate; whorls 5–6, convex on spire, flattened immediately below suture, which is well marked and abutting; growth-lines very strongly marked on subsutural space, surface otherwise smooth; aperture ovate; outer lip straight or slightly concave, retracted to suture, inclined about 25° from vertical; inner lip thin; umbilicus small, with small anteriorly placed funicle separated from parietal glaze by notch of equal width.

Holotype in collection of New Zealand Geological Survey.

Height, 8 mm.; diameter, 7 mm.

Locality.—165, White Rock River, Pareora.

This species is closely related to *N. consortis*, having the same umbilical development with a characteristically small funicle; it is easily distinguished by its narrower diameter, raised spire, and flattened subsutural space with strong growth-lines. (= *N. zelandica* and *N. australis* of Suter, 1921, p. 59.)

Natica praeconsors Finlay. (Plate 55, fig. 1.)

1924. *Natica praeconsors* Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 451.

The funicle is very small, and there is another smaller umbilical ridge placed well forward, like the ridge in *Amauropsella*. Perhaps the shell is worth sectional distinction from *Natica* s. str., but only one specimen was seen by the writer.

Locality.—McCullough's Bridge, Waihao.

Natica harrisensis n. sp. (Plate 55, fig. 5.)

Shell small, oval; spire almost flat; whorls 4, convex on spire, body-whorl wide increasing rapidly in size; suture well marked, abutting, with indistinct flattening of whorl below; aperture semilunar; outer lip

retracted to suture above but otherwise straight, inclined at about 20° from vertical; umbilicus small but penetrating, hardly encroached on by apertural callus, which bears two denticles on lower part; an extremely small and anteriorly placed funicle, amounting only to a ridge, descends from within umbilicus to abut on inner lip just before it curves round to base.

Holotype in collection of New Zealand Geological Survey.

Height, 6 mm.; length, 6 mm.

Locality.—Mount Harris, South Canterbury. (= *P. amphialus* of Suter, 1921, p. 64.)

A fairly large shell of a similar nature occurs in bed 6B at Clifden, Southland, but the available specimens were not complete enough to show whether they were adults of the Mount Harris shell or a different species.

Natica maoria Finlay. (Plate 55, figs. 16, 18.)

1878. *Lunatia australis* Hutton, *Journ. d. Conch.*, vol. 26, p. 23.
1893. *Natica australis* Hutton, *Macleay Mem. Vol.*, p. 54, pl. 7, fig. 38 (not of d'Orbigny).
1924. *Natica maoria* Finlay, *Proc. Malac. Soc.*, vol. 16, p. 101.

Lectotype in Otago Museum.

Height, 6 mm.; diameter, 6 mm.

Localities.—Recent (type from Auckland); Castlecliff; Kai Iwi; 1063, Okawa Creek, Ngaruroro River; 1096, Esk Bridge, Petane; 1040, Twaite's Cutting, five miles south of Martinborough.

Each of Hutton's three syntypes has a fairly open umbilicus and obsolete funicle. Other specimens from Auckland in Suter collection and in Dominion Museum have a very narrow umbilicus almost filled by the rather narrow funicle. It may be that we are dealing with two species, for the shell in the Petane beds commonly classed as *N. australis* has a very wide umbilicus and a thinner inner lip than the typical specimens, and no examples with a narrow opening were seen. At Castlecliff and Kai Iwi both forms are present, so it seems advisable for the present to recognize only one species.

In the widely umbilicated specimens the funicle is absent; sometimes, but not always, there is a slight furrow to mark its lower extremity. Such shells as the Petane ones, if considered on their own merits, would be classed as *Euspira,* but they are certainly closely related to if not specifically identical with *N. maoria,* which has a shelly operculum.

Natica denticulifera n. sp. (Plate 55, fig. 9.)

Shell small, ovate; spire raised, over half height of aperture; whorls 5, convex, often slightly depressed below suture; protoconch smooth, nucleus moderate; whorls polished, with irregular microscopic spirals; growth-lines well marked, stronger near suture, which is abutting; aperture semilunar; outer lip very slightly sinused above and scarcely retracted to suture, inclined 25° from vertical, inner margin straight with light parietal callus, lower border of which half-covers umbilicus; lower outside corner of callus marks apex of a triangular shallow depression with a small denticle on each side; umbilical funicle is absent unless lower part of apertural callus represents it.

Holotype in collection of New Zealand Geological Survey.

Height, 9 mm.; diameter, 8 mm.

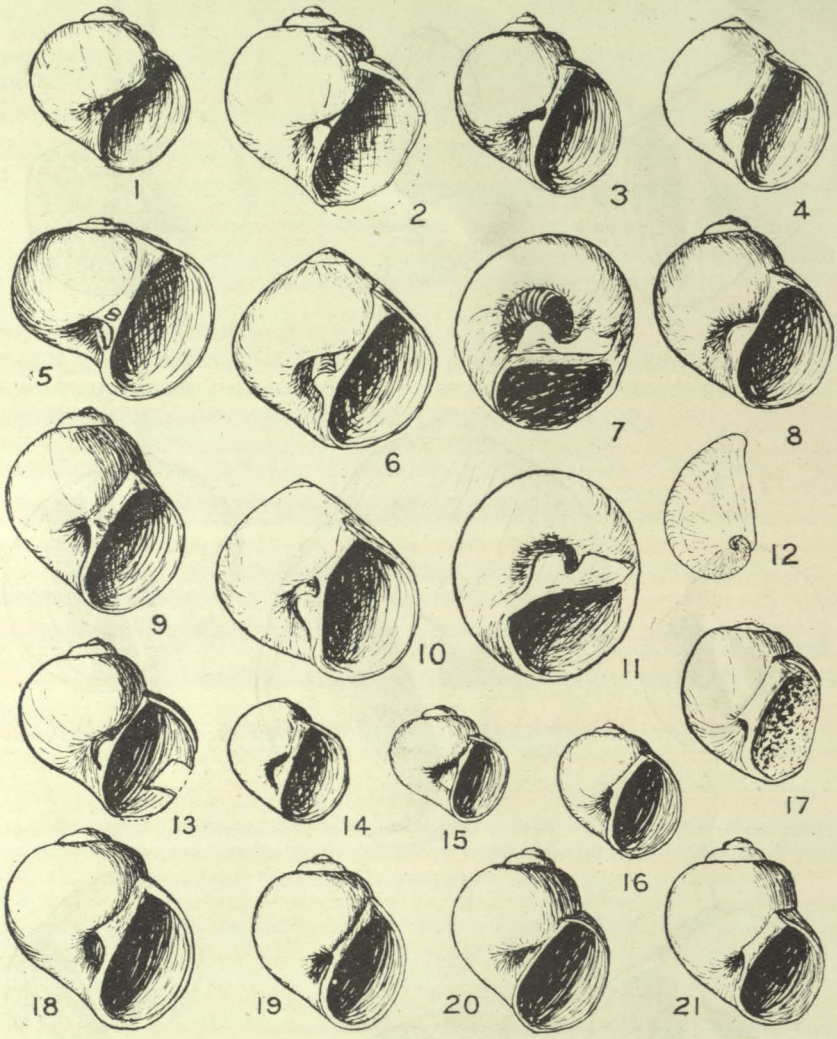

FIG. 1.—*Natica praeconsors* Finlay: holotype. × 3.
FIG. 2.—*Natica consortis* Finlay: holotype. × 3.
FIG. 3.—*Natica sublata* n. sp.: holotype. × 3.
FIG. 4.—*Natica notocenica* Finlay: holotype. × 3.
FIG. 5.—*Natica harrisensis* n. sp.: holotype. × 4.
FIGS. 6, 7.—*Natica haweraensis* n. sp.: holotype. × 2½.
FIGS. 8, 12.—*Natica zelandica* Q. & G., Kai Iwi. × 1.
FIG. 9.—*Natica denticulifera* n. sp.: holotype. × 3.
FIGS. 10, 11.—*Natica planisuturalis* n. sp.: holotype. × 2½.
FIG. 13.—*Natica inexpectata* Finlay: holotype. × 1.
FIG. 14.—*Natica bacca* n. sp.: holotype. × 3.
FIG. 15.—*Polinices (Euspira) barrierensis* n. sp.: holotype. × 3.
FIG. 16.—*Natica maoria* Finlay, Auckland, Recent. × 3.
FIG. 17.—*Natica maesta* n. sp.: holotype. × 3.
FIG. 18.—*Natica maoria* Finlay: lectotype. × 4.
FIG. 19.—*Uber (Euspira) vitreus* (Hutton): lectotype. × 3.
FIG. 20.—*Uber (Euspira) pukeuriensis* n. sp.: holotype. × 4.
FIG. 21.—*Uber (Euspira) pseudovitreus* (Finlay): holotype. × 3.

Face p. 552.]

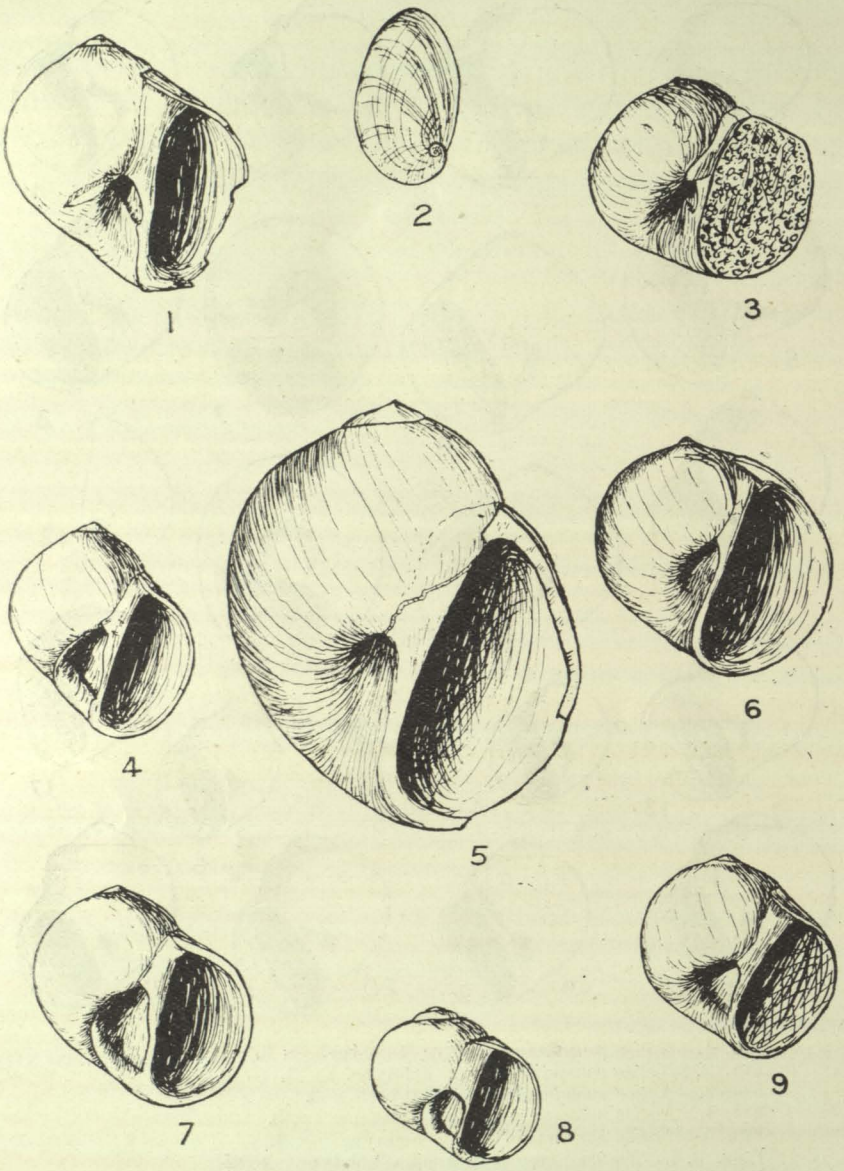

FIG. 1.—*Natica (Magnatica) sutherlandi* n. sp.: holotype. × 1.
FIG. 2.—Operculum of *N. suteri*, Trig. Z, Otekaike. × 1.
FIG. 3.—*Natica (Magnatica) approximata* (Suter): topotype. × 1.
FIG. 4.—*Natica (Carinacca) allani* n. sp.: holotype. × 1½.
FIG. 5.—*Natica (Magnatica) suteri* n. mut., Kekenodon beds. × 1.
FIG. 6.—*Natica (Magnatica) suteri* n. mut., Trig. Z., Otekaike. × 1.
FIG. 7.—*Natica (Carinacca) waihaoensis* (Suter): topotype. × 1½.
FIG. 8.—*Natica (Carinacca) haasti* n. sp.: holotype. × 3.
FIG. 9.—*Natica (Magnatica) nuda* n. sp.: holotype. × 2.

Localities.—Recent specimens in Dominion Museum, locality unknown; Castlecliff, Wanganui; 1163, Kai Iwi, Wanganui (type); 1096, clay below limestone, Petane; 1145, mouth of Onairo Stream, Waitara Survey District; 1146, mouth of Waiau Stream, Waitara Survey District.

It is possible that this shell is a *Uber* (*Euspira*), for it closely resembles *P. vitreus*. It is just as like the openly umbilicated forms of *N. maoria*, however, so is classed here as a *Natica*.

Natica maesta n. sp. (Plate 55, fig. 17.)

Shell small, suboval; spire depressed; whorls convex, body-whorl subcylindrical; suture deeply impressed; aperture semilunar; outer lip slightly concave in middle, antecurrent to suture, inclined about 20° from vertical; inner lip with moderate parietal pad of callus coalescing with so as to mask funicle; umbilicus very narrow, almost closed.

Type in collection of New Zealand Geological Survey.

Height, 7 mm.; diameter, 7 mm.

Localities.—1129, Whitecliffs, Taranaki (type); Tukituki, Waiapu, East Cape district.

This species is somewhat like some Recent forms of *N. maoria* with an almost closed umbilicus, but it differs from them in its deeply impressed suture. The Waiapu specimen is more effuse at anterior corner of aperture, and more specimens might justify their separation as a distinct species.

a. Subgenus CARINACCA n. subg.

Shell of moderate size, ovate, smooth, widely umbilicated; spire low; suture sometimes slightly impressed but generally tangential; aperture semilunar; outer lip practically straight but strongly retracted to suture, inclined 25° to 30° from vertical; inner margin straight with short, fairly thick parietal callus; umbilicus with an obsolete funicle on its long apertural margin (sometimes absent altogether), and bounded by broad strong ridge formed by a prominent thickening of apertural margin at anterior corner.

Type: *Ampullina waihaoensis* Suter.

Suter classed the type under *Ampullina* because of the strong basal limb, but it differs from that genus in its ovate shape, tangential suture, rudimentary umbilical funicle, and also in the disposition of the basal limb. In *Ampullina* this is a step, but in *A. waihaoensis* it is a well-defined ridge. There is considerable similarity to *Natica burdigalensis* Mayer and related species (Aquitainian), although none of them has such a well-developed basal limb. *Natica macrotrema* Ad. & Reeve from the living fauna of Borneo (Tryon, 1886, pl. 22, fig. 27) also appears to be related.

b. Subgenus MAGNATICA n. subg.

Shell large, globose, smooth; spire low, often almost flat, suture tangential; aperture similunar; outer lip with a sharp edge, slightly sinuous and strongly retracted to suture, inclined about 25° from vertical; inner margin straight with moderate parietal callus; umbilicus always open, with a weak funicular ridge or step inclined to become obsolete, and bounded by a broad but low limb which also tends to become obsolete.

Type: *Polinices planispirus* Suter (= *Natica suteri* Marwick).

KEY TO SPECIES.

Carinacca.

(*a.*) Suture impressed, not tangential.
haasti : very small; no funicle, huge basal limb.
(*b.*) Suture tangential.
waihaoensis : moderate size, broadly ovate; large basal limb, very wide umbilicus, slight funicle coalescing with parietal callus.
allani : moderate size, ovate; large basal limb, large umbilicus, slight coalescing funicle.

Magnatica.

sutherlandi : fairly large, broadly ovate; weak basal limb, moderate umbilicus, funicular ridge separated from callus.
approximata : fairly large; obsolete basal limb, rather small but open umbilicus, funicular ridge present but weak, a groove from umbilicus across callus.
suteri : large, broadly ovate to oval; obsolete basal limb; umbilicus variable, never very large; traces of funicular ridge.
nuda : small, broadly ovate; obsolete basal limb; umbilicus fairly large, funicular ridge obsolete.

Natica (Carinacca) waihaoensis (Suter). (Plate 56, fig. 7.)

1917. *Ampullina waihaoensis* Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 11, pl. 11, fig. 10.

As Suter's type specimen was imperfect, he did not note the slight thickening of the umbilical wall on the apertural side. In some specimens this feature is quite well marked, and evidently corresponds to the funicle of *Natica* s. str.

Locality.—Greensand, McCullough's Bridge, Waihao.

Natica (Carinacca) haasti n. sp. (Plate 56, fig. 8.)

Shell small, broadly oval; spire low, about one-third height of aperture; whorls 4; protoconch with moderate nucleus; surface with fine growth-lines, suture impressed not channelled; aperture broadly semilunar; outer lip straight, slightly retracted to suture, inclined about 30° from vertical; inner lip with thin parietal callus not invading umbilicus, which is relatively large and bounded by very strong broad limb which forms prominent thickening at anterior corner of aperture.

Type in collection of Mr. R. S. Allan.

Height, 7 mm.; diameter, 8 mm.

Localities.—McCullough's Bridge, Waihao; Hampden (one specimen is 13 mm. in height = *Ampullina suturalis* of Marshall, 1923, p. 117).

Natica (Carinacca) allani n. sp. (Plate 56, fig. 4.)

Shell small, ovate; spire less than one-third height of aperture, with almost straight outlines; protoconch of three and a half smooth whorls with minute nucleus, sutures slightly impressed but almost tangential, whorls depressed somewhat below it; aperture semilunar; outer lip straight, strongly retracted to suture, inclined about 25° from vertical; inner lip with short, fairly thick callus on parietal wall, coalescing below with slight funicular thickening; umbilicus widely open, bounded by high wide arm caused by a prominent thickening of anterior corner of apertural margin.

Type in collection of Mr. R. S. Allan.

Height, 19 mm.; diameter, 16·5 mm.

Localities.—Greensand, Waihao Downs; 164, Greensand above coal-beds, Kakahu, South Canterbury (= *P. ovatus* and *P. huttoni* of Suter, 1921, p. 53); 176, sandstone above coal-beds, Black Point, Waitaki Valley (= *P. ovatus* of Suter, 1921, p. 72); Hampden (= *Ampullina waihaoensis* of Marshall, 1923, p. 117).

Distinguished from *N. waihaoensis* by narrower shape and more restricted umbilicus.

Natica (Magnatica) sutherlandi n. sp. (Plate 56, fig. 1.)

Shell large, broadly ovate; spire low and with almost straight outlines; whorls 6, slightly depressed in front of suture; protoconch nucleus very small; suture tangential; surface with sinuous growth-lines, stronger above; aperture semilunar; outer lip concave, strongly retracted to suture, inclined about 30° from vertical; inner lip with moderate callus on parietal wall; umbilicus well open, with well-marked funicular ridge and circum-umbilical limb which forms a prominent angle where it meets anterior margin.

Type in collection of Mr. R. A. Sutherland, Wanganui.

Height, 32 mm.; diameter, 32 mm.

Localities.—Chatton Creek, Gore; ? Trig. M, Totara, small specimen (= *P. amphialus* of Suter, 1921, p. 88).

Natica (Magnatica) approximata (Suter). (Plate 56, fig. 3.)

1917. *Turbo* (*Marmorostoma*) *approximatus* Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 6, pl. 2, fig. 5.

The type of *Turbo approximatus* is in an extremely poor state of preservation, squeezed out of shape, and with the front half of the shell missing. It should never have been described. Fortunately, in the same collection is a fairly well-preserved shell, squeezed in the same manner and undoubtedly of the same species. This was identified by Suter as *Polinices huttoni* (1921, p. 68). Close relationship exists with *P. planispirus* Suter (now *N. suteri*), but there is always a groove running from the umbilicus across the callus towards aperture and slightly upwards. There is a low funicular ridge in the umbilicus, which is moderately open, and bounded by an obsolete arm not definitely marked off.

Localities.—486, Wharekuri greensand; Kakanui tuffs (H. J. Finlay).

Natica (Magnatica) suteri nom. mut. (Plate 56, figs. 2, 5, 6.)

1917. *Polinices planispirus* Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 10, pl. 3, figs. 1, 2 (not *N. planispira* of Phillips).

Suter generally identified this species as *Polinices huttoni*, especially the specimens from the Waitaki Valley. It will be shown below that *P. huttoni* = *P. gibbosus*, and is not an openly umbilicated shell like this one. In the original description no mention is made of the low funicular ridge in the umbilicus, but Suter's fig. 1 shows it. The specimens from locality 476, at least, are of variable shape; some have an almost flat summit like the type, others have a fairly high spire (see Plate 56, fig. 5). The size of the umbilical opening and the strength of the funicular and circum-umbilical ridges also are inconstant, so that more specific divisions may be required. At Trig. Z, Otekaike, where these shells are common, occur many large calcareous Naticid opercula which must belong to them, for there is no other shell to which they can be attributed. According to our present system

of classification, the species cannot, therefore, be placed under *Polinices* (= *Uber*), which has a horny operculum. The change to *Natica* necessitates an alteration of the specific name, for there is a prior *Natica planispira* Phillips (*Illust. Geol. Yorkshire*, pt. 2, 1836, p. 224, pl. 14, fig. 30).

Localities.—Blue Cliffs, South Canterbury, immediately above limestone (type); 476, "Kekenodon beds," Wharekuri; 526, Okoko; 477, "Otekaike limestone," Station Peak, Waitaki Valley; 733, Orbitolite limestone, Hokianga South Head; Trig. Z, Otiake beds above Otekaike limestone (G. H. Uttley); 1160, Awamoa Creek (J. Marwick).

Natica (Magnatica) nuda n. sp. (Plate 56, fig. 9.)

Shell small, strong; spire low with almost straight outlines, one-quarter of height of aperture; whorls 4, convex, flattened or even concave below tangential suture, which is descending on body-whorl; surface with fine growth-lines only; aperture semilunar; outer lip straight, strongly retracted above to suture, inclined 32° from vertical; inner lip calloused on parietal wall, and thickened again below where basal limb abuts; umbilicus wide, bounded by an obsolete rounded ridge.

Holotype in collection of New Zealand Geological Survey.

Length, 13 mm.; diameter, 13 mm.

Localities.—1134, coast quarter-mile north of Papatiki Stream, North Taranaki; 1117, coast 3 chains north of Maungapuketea Steam, Mimi Survey District, North Taranaki (L. I. Grange).

2. Genus Sulconacca n. gen.

Shell moderate to small in size, smooth, umbilicated; spire low, gradate; protoconch with minute nucleus; suture deeply channelled; aperture semilunar; outer lip straight or slightly concave, sometimes gently retacted to suture, inclined 20° from vertical; inner margin straight, with thin enamel on parietal wall; umbilicus always open, bounded by low ridge outside which is a broad sulcus caused by an angular thickening of anterior apertural margin, on exterior of which is a notch.

Type: *Sulconacca vaughani* Marwick.

Suter classed all the shells embraced by this genus as *Ampullina* (*Megatylotus*) *suturalis* (Hutton). *Megatylotus* is founded on a huge shell, *N. crassatina* Lamk., which has a wide basal callosity covering the umbilicus, and with a folded outer margin; there is an umbilical chink in the young but there is no basal sulcus.

The sulcus also distinguishes *Sulconacca* from *Ampullina*, in which the basal limb has the nature of a collar or a step. The ridge bounding the inside of the sulcus of *Sulconacca* is not unlike that in the Eocene *Amauropsina* Chelot, which Cossmann (1919, p. 392) considers a subgenus of *Natica*. In Chelot's subgenus, too, the suture is canaliculate.

Further support for the closer relationship to *Natica* than to *Ampullina* is presented by the groups of shells here classed under the new subgenera *Carinacca* and *Magnatica*. The small *N. haasti*, with its impressed suture and no funicle, could easily be mistaken for a *Sulconacca*, but a careful examination shows that it has the same basal limb as *A. waihaoensis*, which has a weak funicle, and is related through *N. sutherlandi* to *N. approximata* and *N. suteri*, a shelly-operculate species.

KEY TO SPECIES.

suturalis: globose; sutural channel about 0·75 mm. wide; outer lip retracted to suture.

prisca: slightly compressed; channel about 1 mm. wide; outer lip concave, noticeably retracted to suture.

compressa: compressed; channel about 0·75 mm. wide; outer lip slightly retracted to suture.

vaughani: often large and strong, globose; spire elevated; sutural channel about 0·5 mm. wide, sometimes less; outer lip not noticeably retracted to suture.

Sulconacca suturalis (Hutton). (Plate 57, fig. 1.)

1877. *Lunatia suturalis* Hutton, *Trans. N.Z. Inst.*, vol. 9, p. 597, pl. 16, fig. 11.
1915. *Ampullina* (*Megatylotus*) *suturalis* (Hutton) Suter, *N.Z. Geol. Surv. Pal. Bull. 3*, p. 10.

Shell rather small, globose; spire gradate, a little over half the height of aperture; whorls 5, convex; suture fairly deeply and widely channelled (0·75 mm. wide in a shell of 10 mm.); whorls smooth and polished, with some obsolete microscopic spirals, crossed by very fine growth-lines: aperture semilunar, effuse below; outer lip with a shallow sinus in middle and slightly retracted to suture on upper part of whorl, inclined 20° from vertical; inner lip thin; umbilicus fairly wide but varying somewhat, bounded by a shallow furrow.

Neotype in collection of Mr. R. S. Allan, Dunedin.

Height, 12 mm.; diameter, 10 mm.

Locality.—Greensand, McCullough's Bridge, Waihao River.

Hutton's type, which was stated to be from Waihao (*i.e.*, the greensands), has been lost (Suter, 1915, p. 10). Since several similar species occur at this and other localities (all previously classed *A. suturalis*), it is therefore important to choose a suitable neotype. Obviously, if there were no impediment, the specimen used by Suter for his description should be taken, but unfortunately the locality is doubtful. The tablet is labelled "Waihao," but the form and preservation of the shell, and the matrix within it, were noticed by Mr. Allan to be different from such as are found in the greensand there. Similar shells and matrix occur above the limestone of the Pareora River, at Blue Cliffs and Mount Horrible, so it seems likely that the specimen was from one of these localities and had become mixed with a Waihao collection. Perhaps it is really from the Waihao Valley, but from a horizon above the limestone. Hutton distinctly says his Waihao shells were from the greensand, so unless his actual type can be produced the neotype should be chosen from that bed. His figure is of a globose shell with a low spire, and of large dimensions, and does not look very like a Waihao shell. Indeed, it is more like Suter's specimen, so the error of locality may have crept in before Hutton handled the specimen, and Suter may have actually used the type for his description without knowing it.

Since there are no means of finding out which is the correct solution, and since Hutton gave the locality as "Waihao greensand," it seems advisable to select a neotype from the several species that occur in that bed. Therefore the specimen from Mr. Allan's collection, figured on Plate 57, fig. 1, is here chosen. We know that Hutton had some specimens from McCullough's Bridge, because he speaks of a small shell with a very strong umbilical ridge. This can be none other than *N. haasti.*

Sulconacca prisca n. sp. (Plate 57, fig. 2.)

Shell rather small, subglobose, with somewhat flattened sides; spire gradate, about one-half the height of aperture; whorls 5 or 6, with some

microscopic spirals crossed by fine growth-lines; suture deeply and widely channelled (about 1 mm. wide in a shell of 10 mm. diam.); aperture semilunar, narrower above; outer lip slightly concave, retracted to suture above; inner lip with thin enamel on parietal wall; umbilicus widely open, bounded by low ridge outside which is broad sulcus caused by notch in anterior margin of aperture; on umbilical side of this notch is a thickening of margin which gives rise to ridge.

Holotype in collection of Mr. R. S. Allan.

Height, 11 mm.; diameter, 10 mm.

Localities.—Greensand, Waihao Downs (type); 164, greensand above coal-beds, Kakahu.

Sulconacca compressa n. sp. (Plate 57, fig. 3.)

Shell rather small, ovate, with compressed sides; spire gradate, about one-half the height of aperture; whorls 5, with microscopic spirals crossed by fine growth-lines; suture channelled (about 0·75 mm. in a shell of 10 mm. diameter); aperture ovate; outer lip slightly concave and gently retracted to suture, inner lip with thin enamel on parietal wall; umbilicus narrow, bounded by low ridge and shallow furrow.

Holotype in collection of Mr. H. J. Finlay.

Height, 11 mm.; diameter, 9 mm.

Locality.—7c, Clifden.

This species is distinguished from *S. prisca* by its more compressed shape, slightly narrower channel, ovate aperture, narrow umbilicus, and weak circum-umbilical sulcus.

Sulconacca vaughani n. sp. (Plate 57, fig. 4.)

Shell of moderate size, globose, robust; spire gradate, from one-half to two-thirds the height of aperture; whorls 6; protoconch of two smooth convex whorls with minute nucleus and with impressed suture which changes suddenly to a channelled one at commencement of the neanic shell; sutural channel when shell is 10 mm. in diameter is from 0·3 mm. to 0·5 mm. wide and about half this in depth; whorls smooth and polished, with some fine spirals crossed by inconspicuous growth-lines; aperture semilunar; outer lip straight, not retracted to suture except from bottom of channel, inclined about 20° from vertical; inner lip with relatively thick callus on parietal wall, thin and sharp on umbilical wall, then thickened again below; umbilicus moderate, bounded by furrow of variable depth which meets anterior margin of aperture at a shallow notch; on inner side of furrow is a more or less prominent ridge or basal limb.

Holotype in collection of New Zealand Geological Survey.

Height, 14·5 mm.; diameter, 12 mm.

Localities.—1161, Pakaurangi Point (type); 166, Mount Horrible, Pareora River; Otiake beds, Trig. Z, Otekaike; 1172, Pukeuri, Oamaru; uppermost Mount Brown beds, Weka Pass [= *N. australis* (in part) of Suter, 1921, p. 43]; 882, sandy claystone above limestone, Waitomo Valley; 862, argillaceous sandstone, head of Waimata River; uppermost Mount Brown beds, Weka Pass (J. A. Thomson); Target Gully, Oamaru; Rifle Butts, Oamaru; Awamoa; 4B, 6A, 6C, Clifden, Southland (H. J. Finlay); Ardgowan; 1144, Okoko Road, one mile west of Pehu Trig., Upper Waitara; 1142, near junction of Tangitu Stream and Waitara River (L. I. Grange).

Distinguished from *suturalis* by its large size, slightly narrower sutural channel, and straight outer lip not retracted to suture except from bottom

of channel. In *S. suturalis* and *S. prisca* the lip is noticeably though gently retracted for a considerable distance.

It is possible that another specific division can be made for those shells with a narrower sutural channel than the type. This narrowing is greatest in shells from the Waitara beds, which are also stratigraphically the youngest, but more material than is at the writer's disposal is required.

The species is named in honour of Dr. T. Wayland Vaughan, of the United States Geological Survey, who collected at Pakaurangi and many other Tertiary localities in 1923.

3. Genus UBER Humphreys, 1797* (= *Polinices* Montfort, 1810).

Shell ovate to subcylindrical; sutures tangential; aperture with a thick parietal callus coalescing with the funicle and invading the umbilicus, which is sometimes completely filled, sometimes left widely open; operculum corneous.

Type: *Nerita mammilla* Linné.

KEY TO SPECIES.

huttoni: very large, sometimes ovate, generally subcylindrical with a low spire, umbilicus closed or shallow, never penetrating.

sagenus: moderate size, roundly oval, flattened; umbilicus wide, variable; aperture greatly inclined.

mucronatus: moderate size, longitudinally oval, apex mucronate, umbilicus closed, callus very thick.

intracrassus: large, subcylindrical, summit flat; callus enormous, filling suture and umbilicus.

lobatus: moderate size, ovate; umbilicus closed; callus fairly thick with two converging grooves, interspace lobed.

unisulcatus: moderate size, ovate; umbilicus closed; callus with only one groove at base, close and parallel to apertural margin.

waipaensis: small, ovate; umbilicus closed; callus like *unisulcatus;* nucleus of protoconch minute.

chattonensis: large, ovate; umbilicus open below; callus joined to parietal wall for full length, no groove.

propeovatus: large, broadly ovate; umbilicus open below; callus projecting in a prominent angle over funicle, junction marked by deep groove.

waipipiensis: large, broadly ovate; umbilicus with large opening left between parietal wall and callus.

pataeensis: large, broadly ovate; umbilicus widely open, funicle narrow; callus not advancing far down and ending in a lobe.

ovuloides: large, ovate; umbilicus almost closed by callus and wide funicle, leaving only narrow slit.

finlayi: fairly large, ovate; callus rather narrow, but often filling umbilicus, which is narrow; inner margin of aperture strongly sinuous.

seniscolus: very small, ovate; callus with parietal side straight; umbilicus generally a shallow groove.

kauwaensis: very small, broadly ovate; callus with parietal side concave; umbilicus generally quite filled.

esdailei: small, broadly ovate; umbilicus a narrow slit, not penetrating; callus with single transverse groove.

incertus: small, ovate; umbilicus closed; callus with single groove, above which it projects on to parietal wall.

modestus: small, ovate; umbilicus closed; callus broadly rounded off below, grooves inconspicuous.

obstructus: moderate size, ovate; umbilicus generally closed or with a narrow chink; callus narrow with two transverse almost parallel grooves.

scalptus: moderate to small, broadly ovate; transverse grooves low down; aperture greatly inclined.

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* See HEDLEY, C., Some Naticoids from Queensland, *Rec. Aust. Mus.*, vol. 14, No. 3, 1924, an article which the author has been enabled to see since the reading of this paper.

The last eight species form a distinct group. They are smaller and have a more restrained apertural callus than the others The umbilicus is restricted and generally quite filled by the narrow funicle and callus. on which there are two almost parallel grooves (sometimes one or both obsolete). The arrangement of the umbilical callus is rather like that in the subgenus *Mammilla*, which, however, has a more distended aperture. It is possible that the relationship is closer to it than to *Uber* s. str.

Uber huttoni (von Ihering). (Plate 58, fig. 10.)

1873. *Natica solida* Sowerby: Hutton, *Cat. Tert. Moll.*, p. 9 (not of Sowb.).
1886. *Natica solida* Hector, *Outline of N.Z. Geol.*, p. 51, fig. 9, No. 19.
1886. *Natica* (*Neverita*) *gibbosa* Hutton, *Trans. N.Z. Inst.*, vol. 18, p. 334 (not of Lea).
1907. *Polynices huttoni* v. Ihering, *Ann. d. Museo Nac. de Buenos Aires*, serie 3, tomo 7, p. 154, pl. 5, fig. 16.
1915. *Polinices gibbosus* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 3*, p. 9, pl. 5, figs. 1, 2.

Type in Museo Nacional, Buenos Aires.

Height, 68 mm.; *diameter, 64 m. (taken from* Hutton's plesiotype of *N. solida* Sowb. = *N. darwini* Hutt.).

Localities.—Broken River, Trelissick Basin (type); 165, White Rock River, Pareora; Target Gully shell-bed, Oamaru; Tangarakau River, two miles below large waterfall (Mokau beds); Maungamatukutuku, Tutamoe (Tawhiti sandstone); Taumatamaire Hill (Mahoenui beds); 44, *Conus* beds, Brewery Creek, Mokihinui River; Chatton, Southland, sharp-spired form (R. A. Sutherland); Waikaia, sharp-spired form; 6B, 6C, 6D, 7B, 7C, 8A, Clifden, Southland.

Hutton recorded the species as occurring in the Pliocene at Matapiro, but his specimen, if correctly identified, was probably from some other locality. This type of *Uber* was extinct in New Zealand long before the deposition of the Matapiro beds (= Nukumaruian).

Suter generally applied the specific name *huttoni* to shells with a widely open umbilicus not invaded by callus, such as those (*N. suteri*) from locality 476, Kekenodon beds, Waitaki Valley. The shell figured by von Ihering, however, is from Broken River, Trelissick Basin, and has the heavy callus and cylindrical shape of Hutton's *gibbosus*. The two names are therefore synonymous; and, as *N. gibbosa* was already occupied by Lea for a North American Eocene fossil when Hutton proposed it, von Ihering's *U. huttoni* must be used.

Round *U. huttoni* are grouped a large number of variable forms, for which satisfactory specific divisions have not yet been found. Among the material available no absolute line could be drawn between such extreme forms as *U. unisulcatus* and *U. intracrassus* (= *N. callosa* Hutt.). At Chatton there is a large shell with a high, sharp spire; at Waikaia and in several horizons at Clifden are somewhat similar though smaller ones apparently grading into a much broader type with a low spire. Perhaps some of the differences are due to sex, but there is variation in shells from different localities. Both forms are represented at Target Gully with slight differences in outline. The shells of White Rock River, Pareora, are of more uniform character, being cylindrical in shape, with a low spire, and reaching a very large size (like the typical Broken River specimens). There is considerable variation, however, in the comparative length and callosity, a process carried to extreme in the *U. intracrassus*

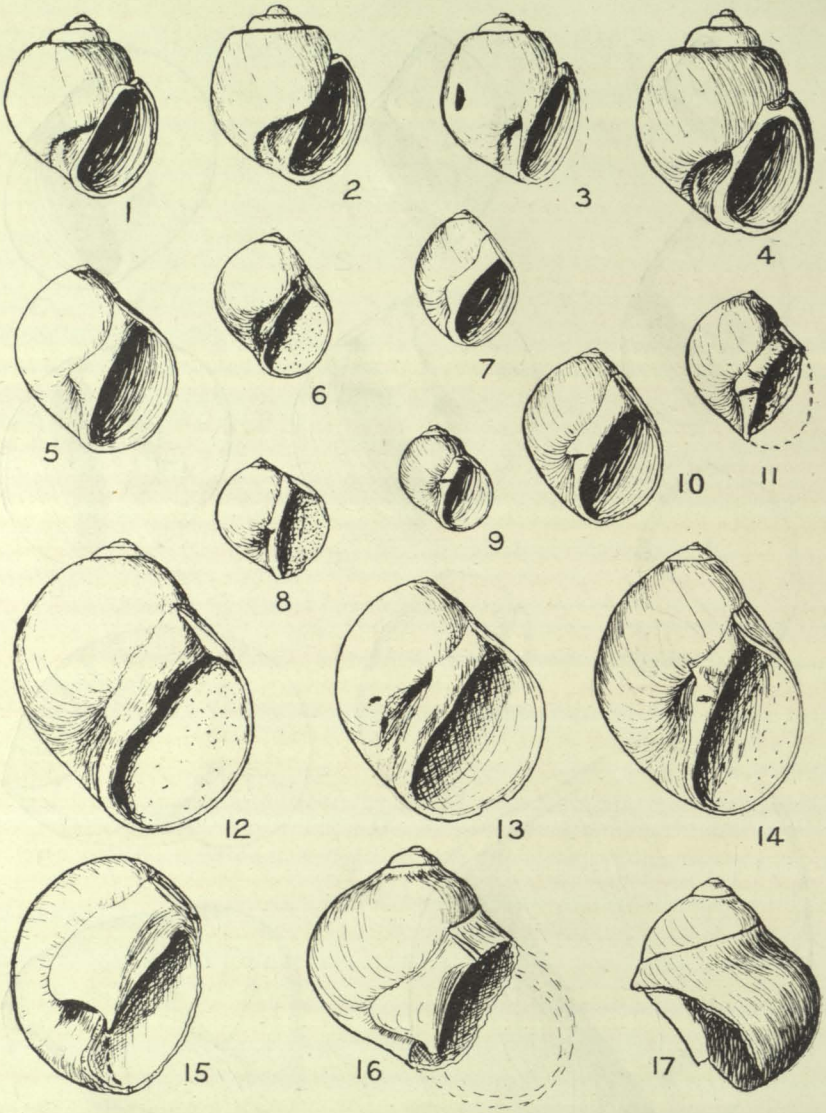


FIG. 1.—*Sulconacca suturalis* (Hutton): neotype. × 2.
FIG. 2.—*Sulconacca prisca* n. sp.: holotype. × 2.
FIG. 3.—*Sulconacca compressa* n. sp.: holotype. × 2.
FIG. 4.—*Sulconacca vaughani* n. sp.: holotype. × 2.
FIG. 5.—*Uber kaawaensis* n. sp.: holotype. × 4.
FIG. 6.—*Uber senisculus* n. sp.: holotype. × 3.
FIG. 7.—*Uber modestus* n. sp.: holotype. × 1.
FIG. 8.—*Uber finlayi* n. sp.: paratype. × 1.
FIG. 9.—*Uber esdailei* n. sp.: holotype. × 1.
FIG. 10.—*Uber incertus* n. sp.: holotype. × 1.
FIG. 11.—*Uber scalptus* n. sp.: holotype. × 1.
FIG. 12.—*Uber finlayi* n. sp.: holotype. × 1.
FIG. 13.—*Uber finlayi* n. sp.: paratype. × 1.
FIG. 14.—*Uber obstructus* n. sp.: holotype. × 1.
FIGS. 15, 16, 17.—*Uber (Neverita) pontis* n. sp.: holotype. × 3.

Face p. 560.]

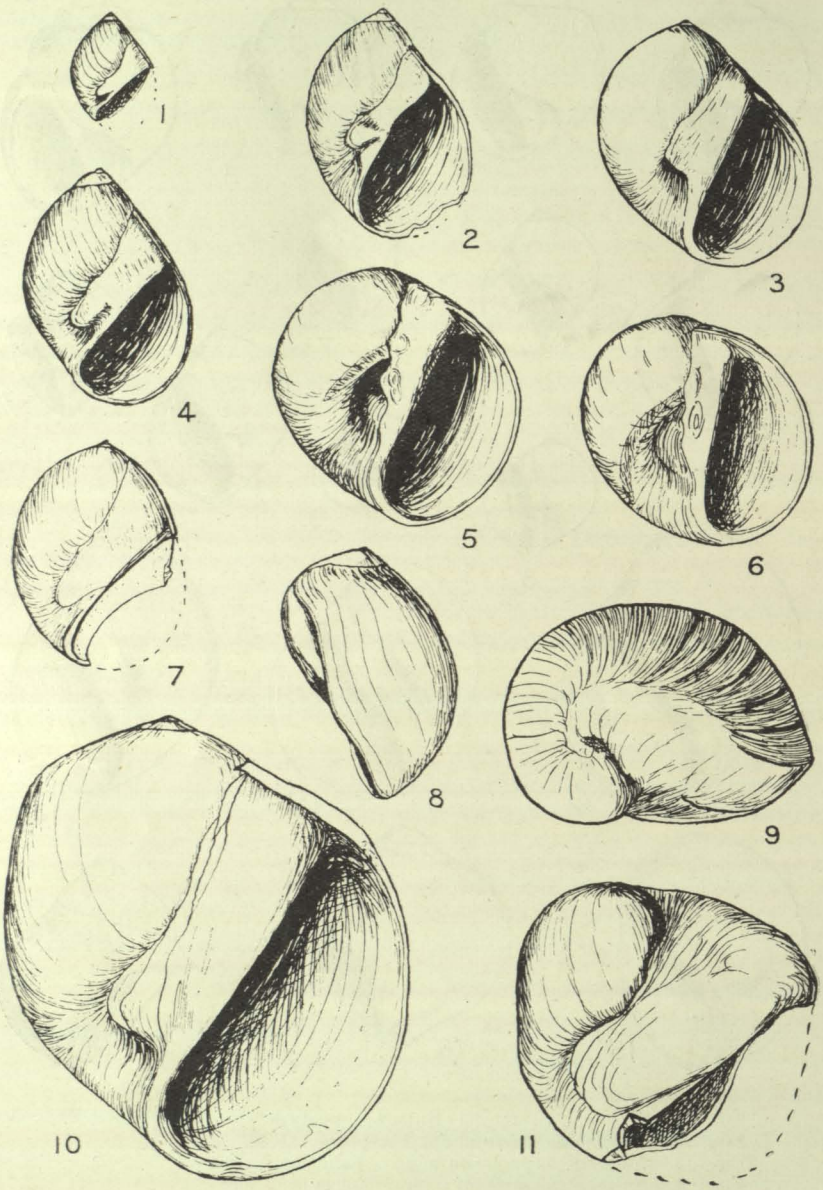


FIG. 1.—*Uber waipaensis* n. sp.: holotype. × 1.
FIG. 2.—*Uber lobatus* n. sp.: holotype. × 1.
FIG. 3.—*Uber chattonensis* n. sp.: holotype. × 1.
FIG. 4.—*Uber unisulcatus* n. sp.: holotype. × 1.
FIGS. 5, 8.—*Uber sagenus* (Suter): holotype. × 1.
FIG. 6.—*Uber sagenus* (Suter): topotype. × 1.
FIG. 7.—*Uber mucronatus* n. sp.: holotype. × 1.
FIGS. 9, 11.—*Uber intracrassus* (Finlay): lectotype. × 1.
FIG. 10.—*Uber huttoni* (v. Ihering), White Rock River. × 1.

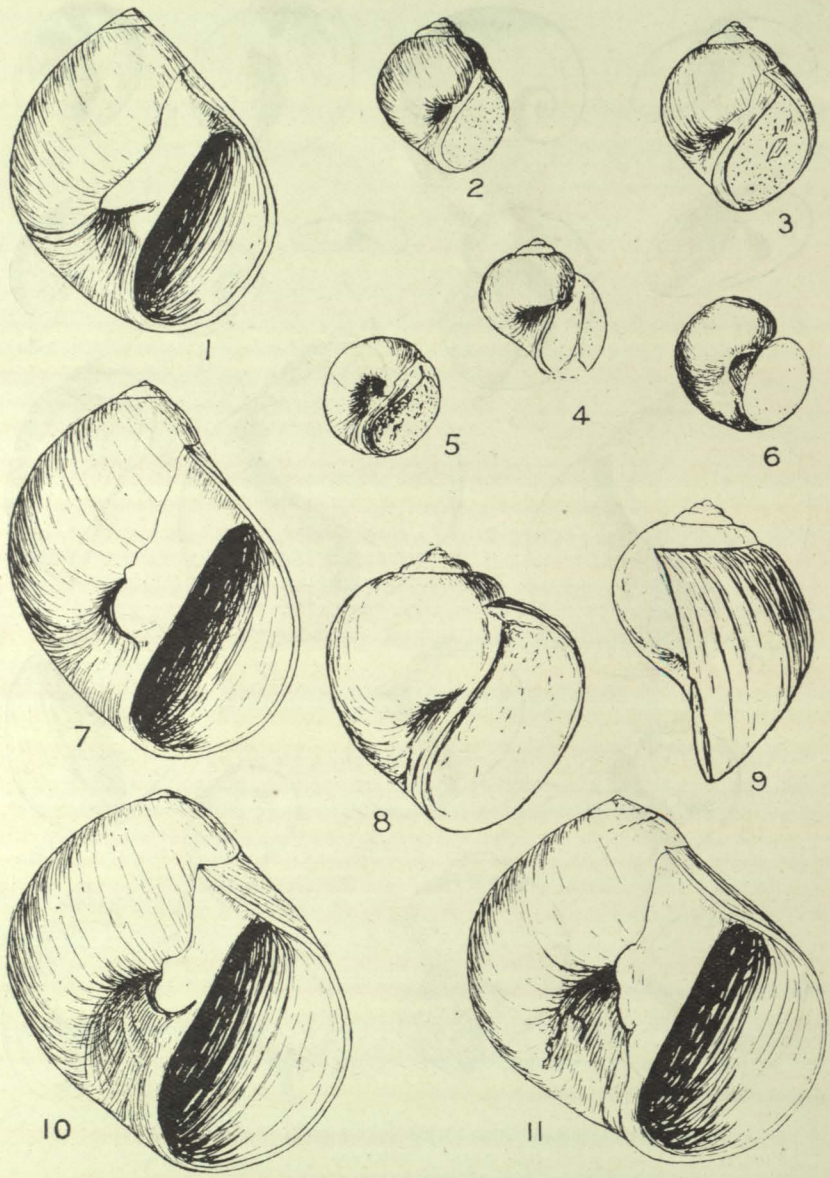
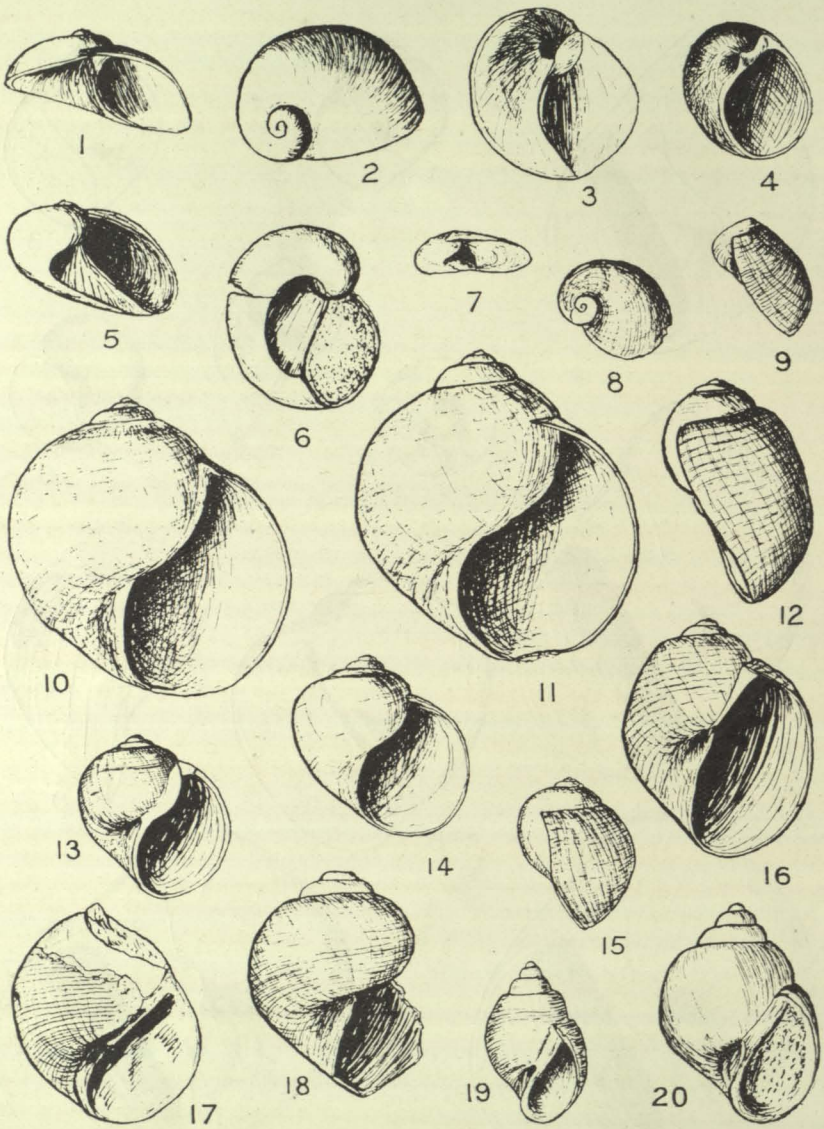


FIG. 1.—*Uber propeovatus* n. sp. : holotype. × 1.
FIG. 2.—*Uber (Euspira) firmus* n. sp., loc. 480, Waihao. × 1.
FIG. 3.—*Uber (Euspira) firmus* n. sp. : holotype. × 1.
FIG. 4.—*Uber (Euspira) lateapertus* n. sp. : holotype. × 1.
FIG. 5.—*Uber (Euspira) lateapertus* n. sp. : paratype. × 1.
FIG. 6.—*Uber (Euspira) lateapertus* n. sp. : paratype. × 2.
FIG. 7.—*Uber ovuloides* n. sp. : holotype. × 1.
FIGS. 8, 9.—*Uber (Euspira) fyfei* n. sp. : holotype × 1.
FIG. 10.—*Uber pateaensis* n. sp. : holotype. × 1.
FIG. 11.—*Uber waipipiensis* n. sp. : holotype. × 1



FIGS. 1, 2, 3.—*Micreschara (Macromphalina) huttoni* n. mut.: holotype. × 5.
FIGS. 4, 9.—*Sinum fornicatum* Suter.: holotype. × 1.
FIGS. 5, 6.—*Micreschara (Macromphalina) auriformis* n. sp.: holotype. × 5.
FIGS. 7, 8.—*Sinum infirmum* n. sp.: holotype. × 4.
FIG. 10.—*Globisinum venustum* (Suter): holotype. × 1.
FIG. 11.—*Globisinum drewi* (Murdoch): holotype. × 1.
FIGS. 12, 16.—*Sinum (Eunaticina) cinctum* (Hutton): holotype. × 1.
FIG. 13.—*Globisinum miocaenicum* (Suter), Parson's Creek. × 1.
FIG. 14.—*Globisinum undulatum* (Hutton), Wanganui (? Landguard Bluff). × 1.
FIG. 15.—*Globisinum drewi* (Murdoch), juv. Kai Iwi. × 1.
FIG. 17.—*Globisinum spirale* (Marshall): holotype. × 1.
FIG. 18.—*Globisinum elegans* (Suter): holotype. × 2.
FIG. 19.—*Amauropsella major* (Marshall): holotype. × 2.
FIG. 20.—*Amauropsella teres* n. sp.: holotype. × 2.

of Lower Waipara Gorge, where greatly elongated specimens are seen grading into typical *intracrassus*.

At many localities along the east coast of the North Island, in beds somewhat younger than the Awamoan, occur rather smaller shells, generally with a mucronate apex (*U. mucronatus*). Some are of an elongate-oval shape, while others are more like the typical *U. huttoni*. On the west coast (North Island) those of typical shape do not rise any higher than the Mokau beds, but in the Onairo fauna appears an acuminate-spired ovate shell (*U. unisulcatus*) only a little more slender than some of those from Waikaia and Clifden.

The forms which have been given specific rank are :—

(1.) *U. huttoni*.

(2.) *U. intracrassus*. The shell on which the name is founded is of such extreme development as to merit specific separation. There is no evidence that intermediate forms occur at the type locality; perhaps the Waipara Gorge is intermediate in age between Broken River and Castle Point. In any case, even when the shape is the same as that of *U. huttoni*, the apertural callus is noticeably thicker.

(3.) *U. unisulcatus*. This is only slightly more slender than ovate specimens of *U. huttoni* from Waikaia. At the lower horizon, however, there is an intergradation with broader forms, but at the higher these are absent.

(4.) *U. mucronatus*. Although depressed adult forms are equalled by high forms of young *U. huttoni*, the callus on the former is considerably thicker than that on the latter.

Tate (1893, p. 320, pl. 6, fig. 4) records *Natica gibbosa* Hutton from a "locality not actually known, but reported a well-sinking in the Murray Desert." The disposition of the apertural callus is not the same as in the New Zealand species, for it is much wider over the umbilicus than on the parietal wall, where it is relatively narrow. It is most likely that a critical examination of the actual specimen would show other important differences, and that it should be classed as a distinct species.

Uber intracrassus (Finlay). (Plate 58, figs. 9, 11.)

1873. *Natica* (?) *callosa* Hutton, *Cat. Tert. Moll.*, p. 9 (not of Sowerby).
1914. *Polinices callosus* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 2*, p. 4.
1924. *Polinices intracrassus* Finlay, *Proc. Malac. Soc.*, vol. 16, p. 101.

Shell large, subcylindrical, summit flatly convex; spire concealed by body-whorl, which has the left-to-right diameter much greater than that from back to front; apertural callus enormous, completely filling the umbilicus and for last half of body-whorl occupying suture and extending across flat summit to apex.

Holotype in collection of New Zealand Geological Survey.

Height, 37 mm. (estimated); diameter, front to back 29 mm., left to right 39 mm.

Localities.—Castle Point, Wellington (?) (type); County Council quarry, Maungapakeha Stream, six miles west-south-west of Tinui, Castle Point County; Lower Waipara.

The name *N. callosa* is preoccupied by Sowerby; therefore Finlay rightly changed Hutton's name to *intracrassus*. Hutton was uncertain about the locality of his types, but Castle Point is probably correct in a broad sense. The richly fossiliferous beds at Castle Point itself (Geol.

Surv. loc. 81) have a Wanganuian fauna; this type of *Uber* belongs to a lower horizon, and probably came from the "Taipo" beds in the neighbouring district.

Uber mucronatus n. sp. (Plate 58, fig. 7.)

Shell of moderate size, oval; spire short, acute or often mucronate; outer lip not greatly inclined; apertural callus large, sealing umbilicus, lower end of callus lobed and bounded by very deep groove on apertural side; sometimes when the callus is not fully developed there remains slight umbilical opening which resembles that of *U. propeovatus*.

Type in collection of New Zealand Geological Survey.

Height, 29 mm.; diameter, 23 mm.

Localities.—1037, Hurupi Creek, Palliser Bay (type); 882, argillaceous sandstone, Waitomo; 862, head of Waimata River, Gisborne; 1121, Wharekahika River, East Cape; Muddy Creek, Arowhana; 1156, Awatere Mouth, East Cape; upper grey marls, south cliff, north branch of Dee River (= *P. gibbosus* of Suter, 1921, p. 82).

Uber unisulcatus n. sp. (Plate 58, fig. 4.)

Shell of moderate size, elongate, ovate; spire high, conic, slightly mucronate; apertural callus well developed, filling umbilicus with a somewhat narrow lobe bounded by deep broad groove which lies very close to inner margin of aperture, but is not quite parallel to it; outer lip slightly retracted to suture.

Type in collection of New Zealand Geological Survey.

Height, 31 mm.; diameter, 23 mm.

Localities.—1136, Mangare Road, near Mangaone Stream, Upper Waitara Survey District (type); 1128, Putiki Stream, Tongaporutu River; 1113, Rapanui Island, Taranaki (L. I. Grange).

Uber waipaensis n. sp. (Plate 58, fig. 1.)

Shell small, plump, ovate, of about five and a half whorls; spire acute; protoconch very small; outer lip inclined at 30° from vertical, retracted above to suture, but otherwise straight; apertural callus thick, completely covering umbilicus; a shallow groove ascends from base of callus near and parallel to apertural margin.

Type in collection of New Zealand Geological Survey.

Height, 15 mm.; diameter, 13 mm.

Localities.—1029, one mile north-north-east of limestone-crushing plant, Alexandra Survey District; Pourakino, Riverton (H. J. Finlay).

The disposition of the callus is much the same as that of *U. unisulcatus*, but the shell is more globose and the protoconch as well as the whole shell is much smaller. There is also considerable resemblance to *U. mucronatus*, which, however, is larger and has a more nearly vertical outer lip.

Uber lobatus n. sp. (Plate 58, fig. 2.)

Shell of moderate size, elongate, ovate; spire acuminate; apertural callus comparatively narrow, but sealing umbilicus by a lobe bounded below by deep groove which is inclined at about 45° to apertural margin; somewhat higher there is a wider and shallower groove at right angles

to apertural margin where it meets lower groove, space between the two being occupied by lobe of callus; the inner margin of aperture noticeably sinused about top of funicle.

Type in collection of New Zealand Geological Survey.

Height, 30 mm.; diameter, 22 mm.

Localities.—165, White Rock River, Pareora (type); Target Gully, Oamaru; 1075, argillaceous sandstone, 12 chains north-north-west of Rangiriri Trig., Piopiotea West Survey District (Mohakatino base); 649, Paparoa Rapids, Wanganui River; 475, Mount Harris, South Canterbury (= *P. gibbosus* and *P. ovatus* of Suter, 1921, p. 64); 958, Rifle Butts, Oamaru, bed A, overlying Oamaru stone (= *P. gibbosus* of Suter, 1921, p. 86); 458, Pareora (= *P. gibbosus* of Suter, 1921, p. 58); Awamoa (H. J. Finlay); Wharekuri? horizon (H. J. Finlay).

Uber sagenus (Suter). (Plate 58, figs. 5, 6, 8.)

1917. *Polinices (Neverita) sagenus* Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 10, pl. 3, fig. 3.

The holotype has a widely open umbilicus which reaches up to apex of shell, but no other specimen has been seen which agrees exactly with this shell. The large species, so common in the Lower Wanganuian beds at Waipipi, Hawera, Waingongoro, &c., and identified by Suter (1921, p. 25), also by Marshall and Murdoch (1920, p. 125; 1921, p. 87), as *P. sagenus*, is in this paper named *U. waipipiensis*; for, while it resembles *sagenus* in umbilical development, its shape is quite different. The most important difference, however, is in the inclination of the outer lip. In *U. waipipiensis* it is inclined at about 26° from the vertical, while in *U. sagenus* the angle is 37°.

The specimen figured on Plate 58, fig. 6, is a topotype of *U. sagenus*, and, as may be seen, has the same outline and same disposition of callus. The inclination of outer lip is also about 37° from the vertical. There can therefore be little doubt that the two shells are conspecific. One important difference exists, however: in the type specimen the umbilicus is wide and deep, extending almost to the spire; in the other it is quite shallow, and when the shell was a quarter of a whorl younger must have been completely closed. The only other specimen seen which agrees with these two in outline, aperture, and callus is from Trelissick Basin. In this specimen the umbilicus is for the most part shallow, as in the second Pareora specimen, but there is a very small chink at top penetrating upwards perhaps $\frac{1}{8}$ in. Despite these differences the actual appearance of the apertural callus is similar in all cases, and with the great inclination of outer lip justifies specific recognition.

Localities.—165, White Rock River, Pareora; 226, Porter and Thomas Rivers, Trelissick Basin.

Uber chattonensis n. sp. (Plate 58, fig. 3.)

Shell fairly large, ovate; spire sharp, about one-third height of aperture (including callus); whorls 5, rapidly increasing, surface with growth-lines; suture tangential; aperture semilunar; outer lip sinuous, slightly concave in middle, and retracted above to suture; inner lip with thick parietal callus nearly covering umbilicus (which, however, is penetrating), and cemented to parietal wall along its whole outer side; umbilicus with funicle coalescing with callus, line of junction not marked by distinct groove.

Type in collection of Mr. H. J. Finlay.
Height, 32 mm.; diameter, 27 mm.
Locality.—Chatton, near Gore.
This species is very like *U. propeovatus* and *U. ovuloides*. It is distinguished from the former by the absence of deep groove at junction of funicle and callus, also by rather narrower umbilicus; from the latter by the disposition of callus, which is cemented to parietal wall along its whole length.

Uber propeovatus n. sp. (Plate 59, fig. 1.)

Shell large, ovate; spire short, pointed; spire-whorls slightly convex, body-whorl very large; suture tangential; aperture semilunar; outer lip almost straight; umbilicus of moderate width but shallow, and nearly closed by large funicle and apertural callus which projects across and down on to parietal wall; lowest lobe of callus bounded below, where it crosses funicle by deep groove.
Type in collection of New Zealand Geological Survey.
Height, 43 mm.; diameter, 35 mm.
Localities.—1135, Tirangi Stream, Ngatimaru Survey District, Taranaki (type); 895, Rapanui River mouth, and many other localities in the Tongaporutu and Onairo areas; 679, Waihou, Bay of Plenty; ? 996, Kaawa Creek, south of Waikato River; Marshall's Road, Mangaehu Creek, Waimata River (Tawhiti beds); ? Target Gully (one broken specimen).

Uber waipipiensis n. sp. (Plate 59, fig. 11.)

Shell large, ovate: spire short and broad but pointed; whorls on spire lightly convex, body-whorl very large; suture tangential; aperture semilunar; outer lip slightly sinuous; umbilicus widely open and deep, extending directly up towards spire; funicle large but not extending more than half-way across umbilicus; apertural callus overlapping funicle above on to parietal wall but not below.
Type in collection of New Zealand Geological Survey.
Height, 49 mm.; diameter, 47 mm.
Localities.—1101, Waipipi Beach, north of Wairoa Stream, Waverley (type); 875, 1172, mouth of Waingongoro River, Taranaki; 876, 1173, Waihi Stream, Hawera Beach; 126 (? Thomson coll.), Awatere Valley, decorticated and fragmentary (= *A. suturalis* of Suter, 1921, p. 30); New River, Westland; ? 154, Kanieri; ? Motunau beds, Weka Pass, B3; 857, above waterfall, Starborough Creek, Awatere (= *P. huttoni* of Suter, 1921, p. 30); 858, below waterfall, Starborough Creek, Awatere (= *P. huttoni* of Suter, 1921, p. 31).

Uber pateaensis n. sp. (Plate 59, fig. 10.)

Shell large, ovate; spire short and broad but pointed; whorls on spire lightly convex, body-whorl very large; suture tangential; aperture semilunar; outer lip slightly sinuous; umbilicus wide but shallow; funicle narrow below but widening suddenly above; apertural callus moderate, extending down over top of funicle as short rounded lobe bounded below by deep groove
Type in collection of New Zealand Geological Survey.
Height, 50 mm.; diameter, 45 mm.
Locality.—1171, Patea.

Uber ovuloides n. sp. (Plate 59, fig. 7.)

1873. *Natica* (*Mamilla*) *ovata* Hutton, *Cat. Tert. Moll.*, p. 9, in part (not of Klipstein).
1886. *Natica ovata* Hector, *Outline N.Z. Geol.*, p. 5, fig. 9, No. 15.
1893. *Natica* (*Mamilla*) *ovata* Hutton, *Macleay Mem. Vol.*, p. 55, pl. 7, fig. 40.

Shell large, ovate; spire acuminate; umbilicus with large funicle; apertural callus thick, projecting slightly over funicle but not reaching across umbilical depression, thus leaving a diagonal umbilical slit; a groove in callus above lower part of funicle meets apertural margin at angle of 45°.

Type in collection of New Zealand Geological Survey.

Height, 50 mm.; diameter, 38 mm.

Localities.—1171, Patea; 1172, Waingongoro Mouth.

Great confusion has arisen over this species through the non-designation of a definite holotype. Hutton's original description gave as localities "Shakespeare Cliff; Callaghan's Creek; Motunau (L); Kanieri; Broken River (U and L); Weka Pass (M); Oamaru; Awamoa; Lyndon," and the specimen preserved in the collection illustrating the *Catalogue* is labelled "Shakespeare Cliff." This shell was figured by Suter and designated by him "holotype." Although Thomson (preface to *Pal. Bull. 2*) thought it possible that Hutton selected holotypes for his species, the writer cannot agree with this. In addition to the contrary evidence cited by Thomson, the following points are also important: No mention is ever made by Hutton of the word "type"; in many cases a number of specimens were preserved; the illustrating specimen often does not agree with the dimensions quoted. It would thus be better to consider the types revised by Suter as lectotypes, except where only one locality and one specimen are represented. The use of "Shakespeare Cliff" in this instance is in a very wide sense, because the large *Uber* spp. do not reach any higher in the stratigraphical column than the Waitotara series, and Hutton's specimens probably came from Patea. In any case, Suter's type was wrongly attributed by him to the Wanganui district; a microscopic examination of the matrix shows that it is from locality 227, Kanieri, Westland. Moreover, it is specifically distinct from any of the Waitotaran *Uber*, and in the collection from 227 there are about fifty specimens agreeing in all essentials with this one. The dimensions given by Hutton are 1·45 in. × 1·25 in. (= 37 mm. × 32 mm.), but those of Suter's type are 36 mm. × 28 mm. The form that has generally been considered as the typical *P. ovatus* is the one from Patea which has the umbilicus almost filled by a large funicle and apertural callus, leaving always a narrow, slightly inclined penetrating slit. Both Hector's and Hutton's figures show this type of shell, so that on these grounds alone Suter's choice of a type could have been upset. The position is, however, simplified by the fact that *Natica ovata* is preoccupied by Klipstein (*Beitrage zur geologischen Kentniss der ostlichen Alpen*, 1843), so that we can start again with fresh specific names.

Uber finlayi n. sp. (Plate 57, figs. 8, 12, 13.)

Shell fairly large, ovate; spire sharp but not high; whorls about 6, slightly convex in spire; surface with numerous growth-lines; suture tangential, aperture semilunar; outer lip lightly sinuous, retracted to suture, inclined about 35° from vertical; inner lip sinuous with fairly thick callus coalescing with and little wider than funicle, which almost or quite fills the rather narrow umbilicus.

Type in collection of Mr. H. J. Finlay.
Height, 37 mm.; diameter, 34 mm.
Localities.—Boulder Hill, near Dunedin (type); Wangaloa.

This species presents such a variety of form that it is difficult to give an adequate description embracing the whole. In youth the shape is very broadly ovate or oval and funicle relatively narrow, being merely a thickening of the whole front part of inner margin; the parietal callus is wider and contracts suddenly to funicle (see Plate 57, fig. 8). This stage is represented at a higher horizon by *U. incertus* of Target Gully. The umbilicus is a shallow scarcely-penetrating groove. Later the shell becomes more ovate, and the sharp angle showing junction between parietal callus and umbilicus disappears, and a condition not unlike *U. modestus* is produced where umbilicus is quite filled. A continuation of this stage to the adult is represented by the holotype, but in many cases the funicle narrows with growth so that an umbilical groove is again formed. The top of this groove is sometimes penetrating. This form (Plate 57, fig. 13) is extremely like *U. obstructus*. Suter classed the species under *P. gibbosus*, presumably because umbilicus was sealed; but the disposition and manner of growth of callus and funicle are quite different. The well-marked sinus at posterior end of inner margin is also distinctive of the older species.

The great inclination of outer lip separates *U. finlayi* from *U. obstructus* and *U. incertus;* also absence of grooves across callus.

Uber senisculus n. sp. (Plate 57, fig. 6.)

Shell very small, ovate, solid; spire one-half height of aperture; whorls 5, slightly convex on spire, suture tangential; aperture semilunar to ovate; outer lip straight or slightly concave, gently retracted to suture; inner lip with moderate callus, coalescing below with large funicle; umbilical opening a rather shallow groove bounding funicle, but penetrating above.

Type in collection of Mr. H. J. Finlay.
Height, 6 mm.; diameter, 5 mm.
Locality.—Boulder Hill.

This shell looks like a miniature *U. finlayi*, but is certainly not the young of that species, for it has too many whorls; also, the young of *U. finlayi* are more globose and do not have such a wide funicle or umbilical opening.

Uber kaawaensis n. sp. (Plate 57, fig. 5.)

Shell very small, broadly ovate; spire less than half the height of aperture; whorls $4\frac{1}{2}$, slightly convex on spire; suture tangential; aperture semilunar; outer lip almost straight, antecurrent to suture; inner lip with fairly thick callus, which has a convex parietal boundary and is much wider over umbilicus, where it coalesces with funicle and generally completely fills the opening.

Type in collection of New Zealand Geological Survey.
Height, 6 mm.; diameter, 5·5 mm.
Locality.—996, Kaawa Creek, Waikato (Dr. J. Henderson).

This species strongly resembles *U. senisculus*, but the umbilicus is typically much more calloused; also the parietal boundary of the callus is convex, not straight as in Boulder Hill species. It is the *P. amphialus* and probably the *N. australis* of Bartrum (1919, p. 105).

Uber esdailei n. sp. (Plate 57, fig. 9.)

Shell small, broadly ovate; spire moderate; spire-whorls convex, somewhat depressed below suture which is almost tangential; outer lip much inclined; apertural callus relatively narrow; umbilicus almost filled by funicle, but there is a narrow shallow depression; a deep groove crosses callus about top of funicle, and above this the apertural margin inclines well forward.

Type in collection of New Zealand Geological Survey.

Height, 14·5 mm.; diameter, 13 mm.

Localities.—1100, conglomerate band in Waiarekan tuffs, quarter-mile west of Lorne, North Otago (probably the same as Geol. Surv. loc. 831, collected from by T. Esdaile); Trig. M, Totara (Suter, 1921, p. 88, *P. gibbosus*).

Remarks.—Distinguished from others of the group by the well-inclined aperture, and single transverse groove on callus.

Uber incertus n. sp. (Plate 57, fig. 10.)

Shell of only moderate size, ovate; spire short, acuminate; suture tangential; aperture semilunar; outer lip inclined; apertural callus moderate, extending down and covering umbilicus, bounded below by a groove traversing a very narrow funicle, and projecting above this groove over to outer wall of umbilicus.

Type in collection of New Zealand Geological Survey.

Height, 22 mm.; diameter, 18 mm.

Localities.—Target Gully (type); 1161, Pakaurangi Point.

The *Polinices ovatus* of Suter (1921, p. 51) from "tuffs interbedded with chalk marls, Trelissick Basin," is related to this species, but is too imperfect for definite identification.

Uber modestus n. sp. (Plate 57, fig. 7.)

Shell somewhat small, ovate, sometimes elongate; spire acuminate; outer lip much inclined except near suture, which it meets almost at right angles; apertural callus moderate; umbilicus completely filled by funicle and apertural callus; the outer margin of this callus slightly concave along most of its length, and anterior end somewhat suddenly rounded off, but not forming prominent lobe; there are sometimes two faint transverse grooves converging midway along callus.

Type in collection of New Zealand Geological Survey.

Height, 18 mm.; diameter, 13·5 mm.

Localities.—Target Gully (type); Awamoa; Pukeuri; 1150, Mokau beds, Tongaporutu River, near junction with Papakino River; 919, Mahoenui beds, Awakino Valley (= *P. gibbosus* of Suter); 476, Kekenodon beds, Waitaki River (= *P. gibbosus* of Suter); 483, "Hutchinson Quarry" beds, Wharekuri (= *P. gibbosus* and *P. ovatus* of Suter); 1065, grit band, Kururau Road, Taumarunui; 7C (? 6B, ? 8A), Clifden, Southland (H. J. Finlay); All Day Bay, Kakanui (H. J. Finlay).

Uber obstructus n. sp. (Plate 57, fig. 14.)

1873. *Natica* (*Mamilla*) *ovata* Hutton, *Cat. Tert. Moll.*, p. 9, in part (not of Klipstein).

1914. *Polinices* (*Mamma*) *ovatus* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull, 2*, p. 21, pl. 17, fig. 1 *a*, *b*.

Shell of moderate size, ovate; spire acuminate; outer lip well inclined but bending above to meet suture; umbilicus narrow, almost or

completely filled by funicle; apertural callus narrow, restricted, posterior end separated by marked channel from outer lip; two well-marked almost parallel grooves cross callus, the lower about middle of funicle, the other a wide shallow one about top of funicle, and generally coincident with a short spur of callus projecting on to parietal wall.

Holotype in collection of New Zealand Geological Survey.

Height, 36 mm.; diameter, 28 mm.

Localities.—227, Kanieri (type); 6B, 7C, 8A, Clifden, Southland; 1090, "Tawhiti beds," one mile north-west of Kahukura, Block V, Waiapu Survey District; 1157, mouth of Awatere River, East Cape Survey District; 1158, coast, 30–80 chains east of mouth of Awatere River, East Cape Survey District; Otiake (H. J. Finlay).

The holotype is the specimen wrongly stated by Suter to be the type of *Natica ovata* Hutton and to be from "Shakespeare Cliff" (see remarks under *U. ovuloides*). The umbilicus is sometimes completely filled by the funicle, but in others—*e.g.*, the type specimen—there is a narrow chink left. The species is closely related to *U. modestus*, and some border-line specimens are difficult to classify. *U. obstructus* is a larger shell, and the callus tapers off gradually below and is not contracted quickly as in *U. modestus*. Also, even when the umbilicus is sealed, there is a deeper depression in that region.

Uber scalptus n. sp. (Plate 57, fig. 11.)

Shell of moderate size, broadly ovate; spire rather low but pointed; nucleus of protoconoch minute; whorls 5–6, slightly convex on spire, somewhat flattened above; suture tangential; surface with growth-lines getting much stronger as they approach suture; aperture semilunar; outer lip lightly sinuous, strongly retracted to suture which it meets at right angle, inclined about 40° from vertical; inner margin slightly concave; parietal callus moderate, widening over umbilicus and coalescing with funicle, crossed by two grooves and often by other numerous short irregular ones, the two main grooves situated fairly low down, converging; umbilicus completely closed.

Type in collection of New Zealand Geological Survey.

Height (when complete), 20 mm.; diameter, 17 mm.

Localities.—1148, Mangare Road, Upper Waitara (type); 1123, mouth of Tongaporutu River; Rapanui Mouth, north Taranaki; Tongaporutu, 60 chains south of post-office (L. I. Grange).

Distinguished from *U. obstructus* by the greater inclination of the aperture, greater retraction of the outer lip to the suture, and lower situation of the transverse grooves, and from *U. lobatus* by shape, thinner callus, and want of a prominent lobe between the grooves.

a. Subgenus EUSPIRA Agassiz, 1842 (= *Lunatia* Gray, 1847).

Shell globose; spire moderate; whorls convex, surface smooth except for fine growth-lines; aperture semilunar; outer lip straight, slightly retracted to suture, inclined about 30° from vertical; inner margin with light callus on parietal wall; umbilicus open and without any funicle; operculum horny.

Type: *N. labellata* Lamk. (Eocene).

Dall (1909, p. 87) says, "It seems that we shall have to give up *Lunatia* Gray in favour of *Euspira*, which has five years' priority, and of which

both species mentioned when the name was first proposed appear to be *Lunatias;* though species belonging to *Ampullina* seem to have been included later."

KEY TO SPECIES.

fyfei: large (38 mm. high), oval; low spire, sinuous inner margin.
firmus: moderate size (about 20 mm. high), ovate; umbilicus slightly overlain by inner lip.
lateapertus: moderate size (about 20 mm. high), globose; suture impressed or channelled, umbilicus very wide.
vitreus: spire moderate, outlines regular; umbilicus small, circular, almost closed in young; lip retracted to suture.
pseudovitreus: spire variable, generally high, spire-whorls strongly convex; lip not retracted to suture.
pukeuriensis: suture impressed.
barrierensis: flattened shape, low spire, very wide umbilicus.

Uber (Euspira) fyfei n. sp. (Plate 59, figs. 8, 9.)

Shell large, oval; spire low, gradate; whorls 6, convex on spire, body-whorl increasing rapidly, extended somewhat anteriorly; surface with growth-lines; suture deeply impressed; aperture large, ovate, channelled posteriorly; outer lip almost straight, with slight posterior sinus antecurrent to suture; inner lip sinuous; parietal wall with thin enamel layer not straightening contour of inner lip; umbilicus open, of moderate size, without funicle or bounding-limb.

Type in collection of Mr. H. J. Finlay.

Height, 38 mm.; diameter, 35 mm.

Localities.—Boulder Hill; Wangaloa; ? Hampden (a crushed specimen in which the outer lip is slightly retracted to the suture and which may be a distinct species).

Because of its low spire, this shell somewhat resembles *N. suteri,* but several important characters show that it is but distantly related thereto. These are the sinuous inner margin of the aperture, impressed suture, absence of any trace of a funicle or circum-umbilical limb, and strongly antecurrent outer lip. The salient characters are reminiscent of Hedley's genus *Friginatica,* members of which are all very small, and with rather elevated spires, but with a sunken suture, and "without an umbilical funicle or a callus pad at the insertion of the right lip."

Uber (Euspira) firmus n. sp. (Plate 59, figs. 2, 3.)

Shell of moderate size, globose-ovate, solid; spire one-half the height of aperture or less; whorls about 5, convex on spire, body-whorl globular; suture abutting, sometimes tangential; aperture semilunar; outer lip straight, retracted to suture, inclined about 35° from vertical; inner lip slightly concave, with thin parietal callus contracting suddenly to inner margin; umbilicus moderate to fairly large, open, without funicle.

Type in collection of Mr. H. J. Finlay.

Height, 24 mm.; diameter, 21 mm.

Localities.—Boulder Hill (type); 887A, Wangaloa (= *P. amphialis* of Suter, 1921, p. 97); 480, "Island sandstone," overlying coal-beds, Waihao River (= *P. huttoni* and *P. amphialis* of Suter, 1921, p. 65).

Uber (Euspira) lateapertus n. sp. (Plate 59, figs. 4, 5, 6.)

Shell of moderate size, globose; spire gradate, about one-third the height of aperture; whorls 5, convex on spire; suture deeply impressed,

channelled in young; aperture ovate; outer lip slightly sinuous, retracted to suture for very short distance; inner lip thin, almost straight with very thin callus on parietal wall; umbilicus very large, widely open, the earlier whorls visible, apertural wall of umbilicus closely spirally grooved.

Type in collection of Mr. H. J. Finlay.

Height, 18 mm.; diameter, 17 mm.

Locality.—Boulder Hill.

Uber (Euspira) pukeuriensis n. sp. (Plate 55, fig. 20.)

Shell very small; spire scalar, over one-half height of aperture; whorls 3½; suture slightly impressed; aperture oval; outer lip straight, antecurrent to suture, inclined at about 25° from vertical; inner lip thin, not reflexed; umbilicus widely open, without funicle and free from apertural callus.

Holotype in collection of Mr. H. J. Finlay.

Height, 6 mm.; diameter, 5·5 mm.

Localities.—Pukeuri, Oamaru (type); shell-bed, Target Gully, Oamaru.

Remarks.—Nearest to *U. barrierensis*, but differs in having an impressed suture.

Uber (Euspira) pseudovitreus (Finlay). (Plate 55, fig. 21.)

1924. *Polinices pseudovitreus* Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 452, pl. 49, figs. 3*a*, 3*b*, 3*c*, 3*d*.

Type in collection of Mr. H. J. Finlay.

Height, 8 mm.; diameter, 7 mm.

Localities.—Rifle Butts, Oamaru (type); 1160, Awamoa Creek.

Remarks.—Typically this shell has a high, rather clumsy spire, but in some cases it is low. The single Awamoan specimen belongs to the low-spired form.

Uber (Euspira) vitreus (Hutton). (Plate 55, fig. 19.)

1873. *Natica vitrea* Hutton, *Cat. Mar. Moll.*, p. 21.
1880. *Lunatia vitrea*, *Manual N.Z. Moll.*, p. 72.
1913. *Polinices amphialus* Watson: Suter, *Manual N.Z., Moll.*, p. 290, pl. 46, fig. 1.
1915. *Polinices vitreus* Hutton: Iredale, *Trans. N.Z. Inst.*, vol. 47, p. 456.

Lectotype in Dominion Museum.

Height, 8 mm.; diameter, 7 mm.

Locality.—Stewart Island (Recent).

Although this seems to be a fairly common shell in Recent times, not one fossil specimen has been seen during this revision. Suter's identifications of fossil, and even Recent, species are quite inconsistent and unreliable.

Hutton (1884, p. 934) thought his species was the same as the later *U. amphialus* (Watson), but neither Watson nor Iredale agreed with this identification. Iredale further pointed out that *U. vitreus* is the older name, and that Suter's use of *U. amphialus* was therefore wrong. Watson (1886, p. 438) says of his species, "combines a flattened globose form with a prominent pointed base and small raised scalar spire in a way that is very peculiar—so much so, indeed, that it almost recalls an *Amphibola*." This description does not suit *U. vitreus* at all, so the two species must be regarded as distinct.

The striking feature of *U. vitreus* is the circular section of the umbilicus when viewed from the base. The inner margin of the aperture does not cut the circle as in other small shells which have been mistaken for this species. Also, the outer lip is retracted to the suture.

Hutton's type material consists of two specimens, the larger of which has been selected as lectotype (see Plate 55, fig. 19). As is often the case, Hutton's measurements (0·35 in. × 0·34 in.) are larger than those of either of his "types." Specimens up to 11 mm. in height are in the Dominion Museum.

Uber (Euspira) barrierensis n. sp. (Plate 55, fig. 15.)

Shell very small, broadly oval, vitreous; spire low; whorls 3½; protoconch smooth, nucleus moderate, whorls polished with microscopic spirals and fine growth-lines; suture abutting; aperture ovate; outer lip almost straight, antecurrent to suture, inclined about 30° from vertical; inner margin thin, slightly reflexed on parietal wall; umbilicus widely open, without funicle and not invaded by callus, traversed on apertural wall by faint spiral threads; operculum unknown.

Holotype and paratypes in the Suter collection, Wanganui Museum.

Height, 5 mm.; diameter, 5 mm.

Locality.—Off Great Barrier Island (110 fathoms).

Remarks.—This shell is referred to by Suter (1913, p. 289) in his remarks on *N. australis*. The identification label was afterwards altered by him to "*Polinices amphialus.*" Of the four specimens none shows any colour, so the specimens with "radiate brown bands" must have been removed.

U. barrierensis differs from *U. vitreus* in its depressed shape and very wide umbilicus.

b. Subgenus NEVERITA Risso, 1826.

Shell of moderate size, depressed; aperture semilunar; outer lip greatly inclined from vertical (40° – 45°); umbilicus with an enormous funicle often quite filling it, and coalescing with the parietal callus.

Type: *N. josephinia* Risso.

Distinguished from *Uber* by the much greater obliquity of the aperture combined with the large size of the funicle.

Uber (Neverita) pontis n. sp. (Plate 57, figs. 15, 16, 17.)

Shell small; spire relatively high; whorls convex, body-whorl depressed near suture; outer lip very much inclined to axis of shell; umbilicus almost filled by large funicle which is overlapped by parietal callus, leaving, however, a small umbilical opening. The callus is wider at anterior end and tapers posteriorly, but expands somewhat again just before it joins outer lip.

Holotype in Dominion Museum, Wellington.

Height, 10 mm.; diameter, 10 mm.

Locality.—Greensands, McCullough's Bridge, Waihao River (J. A. Thomson).

In typical *Neverita* the umbilicus is completely filled by funicle and callus, but although there is a small umbilical opening in this shell the great obliquity of the outer lip and the general appearance indicate close relationship to this subgenus. This is the only specimen of *Neverita* seen in the New Zealand material examined.

4. Genus SINUM Bolten, 1798.

a. Subgenus SINUM s. str. (= *Sigaretus* Lamarck, 1799).

"Shell depressed, auriform, spirally striated or furrowed. Spire very low with rapidly widening whorls. Aperture greatly distended; operculum horny."—(Zittel.)

Type: *Helix haliotoidea* Linné.

Sinum fornicatum Suter. (Plate 60, figs. 4, 9.)

1917. *Sinum fornicatum* Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 11, pl. 3, fig. 5.

Localities.—Maerewhenua River, right bank (Uttley, 1920, p. 150); 480, "Island sandstone," Waihao River; ? 176, Black Point, Waitaki Valley.

This shell is more elevated than the typical *Sinum* with its extremely flattened body-whorl and greatly inclined convex outer lip. The umbilicus also is fairly open, only one side being covered by the reflexed inner lip; but it is nearer to *Sinum* s. str. than to *Eunaticina*. The Black Point specimen is more inflated than the others, and may be a separate species. Occurrences of this genus are very rare in New Zealand, the three localities mentioned being represented each, as far as the writer knows, by only one specimen. The uniformly low horizon is noteworthy: in all cases these fossils occur in the basal marine sandstones just above the coal-measures.

Sinum infirmum n. sp. (Plate 60, figs. 7, 8.)

Shell very small, fragile, depressed auriform, of about three and a half whorls, of which the smooth protoconch occupies over two and a half; spire flat; surface of body-whorl with fine slightly undulating spiral grooves crossed by convex growth-lines; aperture oval, oblique, greatly dilated; outer lip strongly convex; inner lip broken away; umbilicus open but small.

Holotype in collection of Mr. H. J. Finlay.

Height, 2 mm.; diameter, 3·5 mm.

Localities.—Ardgowan (type); Pukeuri.

The type is a juvenile; a fragment from Ardgowan is from a shell that was about 10 mm. in diameter when complete.

S. infirmum can be distinguished from *S. fornicatum* not only by its smaller size, but also by its much flatter spire.

b. Subgenus EUNATICINA Fischer, 1885.

Shell longitudinally oval, spirally striated, umbilicated; body-whorl flattened; aperture distended; outer lip convex, moderately inclined; columella with a bulge opposite the umbilicus.

Type: *N. papilla* Gmelin.

Sinum (Eunaticina) cinctum (Hutton). (Plate 60, figs. 12, 16.)

1885. *Sigaretus (Naticina) cinctus* Hutton, *Trans. N.Z. Inst.*, vol. 17, p. 318, pl. 18, fig. 12.
1893. *Sigaretus cinctus* Hutton, *Macleay Mem. Vol.*, p. 55.
1915. *Polinices (Euspira) cinctus* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 3*, p. 9, pl. 4, fig. 5.
1918. *Sinum cinctum* (Hutton): Suter, *Alph. List N.Z. Tert. Moll.*, p. 25.

Although this specific name appears in many lists of New Zealand Mollusca, none of the specimens examined by the writer was correctly

identified. Hutton says that the type came from "Wanganui," having been sent down by Mr. Drew; but, although many collections have been made at this locality since that time, no one has found another specimen. Both the late Mr. R. Murdoch and Dr. Marshall agreed that they had never seen a similar shell in all their material. The reddish-brown staining on the type is not quite the same as that of any specimens the writer has seen from Wanganui.

The shell is a typical *Eunaticina*, and as this is the only New Zealand specimen of the subgenus which has been seen it should not be unreservedly admitted as a member of our fauna. There is no direct proof that the shell is a foreign one which became mixed with New Zealand specimens; but such things did happen to Hutton (*e.g.*, *Trigonia semiundulata*, *Raeta perspicua*, *Chione lamellatá*, &c.), so that care must be taken in accepting doubtful species.

5. Genus GLOBISINUM n. gen.

Shell large, globose, thin; spire low; whorls convex, spirally striated; protoconch of two and a half whorls sharply defined from the neanic shell, smooth and polished except for the last quarter-turn where the spirals are foreshadowed; suture abutting; aperture large, ovate; outer lip thin, straight or slightly convex, scarcely retracted to suture, inclined at about 25° from the vertical; inner lip strongly sinuous with thin varnish on parietal wall; umbilicus variable, sometimes absent, when present partly overlain by thin inner lip; in the genotype there is no umbilicus.

Type: *Sigaretus drewi* Murdoch.

Differs from *Sinum* s. str. in its globular shape, sinuous columella, and much less inclined lip. The shape is also different from *Eunaticina*, which is longitudinally oval and has a flattened body, a more distended aperture, and a different curve to the inner lip.

Sigaretotrema Sacco, 1890, approaches *Globisinum* in shape, though the body-whorl is still slightly flattened, the outer lip is more inclined, and the inner lip is almost straight.

Under the genus *Sinum* Bolten, Suter (1917, p. 88) lists the following species: *Sinum carinatum* (Hutton), *S. fornicatum* Suter, *S.* (*Eunaticina*) *cinctum* (Hutton), *S.* (*Eunaticina*) *drewi* (Murdoch), *S.* (*Eunaticina*) *elegans* Suter, *S.* (*Eunaticina*) *miocaenicum* (Suter), *S.* (*Eunaticina*) *undulatum* (Hutton). *S. carinatum* is a peculiar keeled shell here located under *Micreschara* (*Macromphalina*); *S. fornicatum* is a *Sinum*, and *S. cinctum* is a typical *Eunaticina*. The other species, however, do not agree with *Eunaticina*, and form a well-defined group, to which should be added *Ampullina spiralis* Marshall from the Wangaloa beds.

The generic position of these shells has been a source of considerable trouble. Hutton at first attributed them to *Sigaretus* Lamarck (= *Sinum* Bolten), but later to *Ampullina*. *Sigaretus* was also used by Murdoch (1899, p. 320). In a footnote to the latter's specific description, the editor of the *Proceedings of the Malacological Society* says, "In attributing this shell to the genus *Sigaretus* the author has evidently followed Hutton, and, owing to the impossibility of communicating with him in time for publication, we have left it so, merely adding a '?'; but it is evidently nearer to *Ampullina*."

The generic position under *Ampullina* was therefore used by Suter (1913, 1914, 1915) and by Marshall (1917), but was changed back to *Sinum*

(= *Sigaretus*), apparently on Cossmann's recommendation (Suter, 1917, p. 88), because there was no umbilical limb. Neither genus is, however, satisfactory for these shells. They differ from *Ampullina*, as was pointed out by Cossmann, in having no basal limb, and in being conspicuously spirally striated; while they are equally far apart from *Sinum* because of their totally different shape, not having the greatly flattened body, as is shown by their being mistaken for *Ampullina*. The subgenus *Eunaticina* (type, *N. papilla* Gmelin), in which Suter placed them, has a sinuous inner lip, but there is a bulge over the umbilicus which is not present in *Globisinum;* the shape also is quite different. In his review of *New Zealand Geological Survey Palaeontological Bulletin 5*, concerning *Sinum* (*Eunaticina*) *elegans*, Cossmann (1918, p. 24) says, "La determination generique me paraît bien douteuse."

Taking all these things into consideration, it is clear that a new generic division is required; the name *Globisinum* is therefore proposed, with *Sigaretus drewi* Murdoch as type. The Wangaloan species has a restricted umbilicus, while in *G. elegans* from Waihao greensand the shell is more loosely coiled, so that the umbilicus is wider In the Awamoan species there is a tightening of the coil and a consequent restriction of the umbilicus; this process is carried still further in the Wanganuian *G. undulatum* and *G. drewi*, for here the basal perforation is obliterated. Apart from this umbilical variation there is little difference between the earliest and the latest species, and the simple globular shape indicates a more primitive type of shell than *Sinum* or *Eunaticina*. *Globisinum* has existed in the New Zealand area at least since the dawn of the Tertiary, and seems to have been represented in Australia by *Natica arata* Tate, from the Lower Tertiary of River Murray cliffs. The genus may, indeed, extend back to the Cretaceous, for the small *Natica ingrata* Wilckens (1922, p. 7) perhaps belongs to that period. It has the same shape, and some specimens show spirals on the base (see Trechmann, 1917, pl. 19, fig. 9*b*).

Ampullina striata Gabb (1869 p. 161, pl. 27. fig. 40) from the Martinez beds appears to be an imperforate species of the genus. There is a considerable resemblance in form between these shells and *Vanikoro* Q. & G., but, the animal and operculum being unknown, they had best be retained under the subfamily Naticinae.

KEY TO SPECIES.

spirale: umbilicus very narrow, aperture rather small, spire relatively high.
elegans: umbilicus large; sculpture fine, coarser on lower half.
miocaenicum: umbilicus rather small, partly covered by reflexed inner lip.
drewi: very large, no umbilicus; spire moderate, columella almost straight.
undulatum: moderate size, no umbilicus; spire low, columella concave, aperture somewhat dilated.
venustum: very large, no umbilicus; spire rather high, columella concave.

Globisinum elegans (Suter). (Plate 60, fig. 18.)

1917. *Sinum* (*Eunaticina*) *elegans* Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 11, pl. 3, fig. 4.

Suter gives as locality of the type, "630, Teaneraki (= Enfield), near Oamaru, North Otago, T. Esdaile." This collection is an unreliable one, containing Hawke's Bay and Mount Harris specimens, and is wrongly attributed to Mr. Esdaile. Most of the specimens, including the type of *G. elegans*, are probably from McCullough's Bridge, Waihao River, where the species is not uncommon. The aperture of the type is broken away

for a considerable distance, and the line of the suture can be followed to the middle of the whorl on Suter's figure, which therefore gives an impression of too great height in comparison with the width. The spirals are generally, but not always, much stronger on the lower part of the whorl than on the upper.

Globisinum spirale (Marshall). (Plate 60, fig. 17.)

1917. *Ampullina spiralis* Marshall, *Trans. N.Z. Inst.*, vol. 49, p. 452, pl. 34, fig. 17.

Localities.—Wangaloa (type); Boulder Hill.
This is the "*Eudolium?*" of Suter (1921, p. 96).

Globisinum miocaenicum (Suter). (Plate 60, fig. 13.)

1873. *Sigaretus subglobosus* Sowerby: Hutton, *Cat. Tert. Moll.*, p. 9 (not of Sowb.).
1914. *Ampullina miocaenica* Suter, *N.Z. Geol. Surv. Pal. Bull. 2*, p. 21, pl. 2, fig. 2.
1918. *Sinum miocaenicum* (Suter), *Alph. List N.Z. Tert. Moll.*, p. 25.

Localities.—Awamoa (type); Pukeuri, near Oamaru; 166, 458, Pareora; 475, Mount Harris, South Canterbury; 950, Parson's Creek, Oamaru (= *Sinum cinctum* of Suter, 1921, p. 80); 125, Fox River, Brighton (= *Sinum cinctum* of Suter, 1921, p. 40); Trig. 2, Otekaike, Otiake beds above limestone.

Of the specimens identified as *G. miocaenicum* from "tuffs interbedded with chalk marls, Coleridge Creek, Trelissick Basin" (Suter, 1921, p. 51), only one is in a good condition. It is certainly very like *G. miocaenicum*, but differs slightly in several ways. The body-whorl is even more globose than that of *G. miocaenicum*, so that the distance from the umbilicus to the base of the shell is very short, thus causing the spirals to abut on the lower part of the inner lip at a high angle. The umbilicus is slightly wider than in the Awamoan species. More specimens, however, are required to show whether these differences are constant and worth specific recognition. It is possible that the relationship is closer to *G. spirale*, which has a higher spire and shorter anterior development than *G. miocaenicum*.

Globisinum undulatum (Hutton). (Plate 60, fig. 14.)

1885. *Sigaretus undulatus* Hutton, *Trans. N.Z. Inst.*, vol. 17, p. 318, pl. 18, fig. 11.
1885. *Natica* (*Ampullina*) *laevis* Hutton, *Trans. N.Z. Inst.*, vol. 17, p. 317, pl. 18, fig. 10.
1893. *Sigaretus undulatus* Hutton, *Macleay Mem. Vol.*, p. 55, pl. 7, fig. 41.
1893. *Natica laevis* Hutton, *Macleay Mem. Vol.*, p. 54, pl. 7, fig. 39.
1913. *Ampullina undulata* (Hutton): Suter, *Man. N.Z. Moll.*, p. 291, pl. 15, fig. 17.
1915. *Ampullina undulata* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 3*, p. 11.
1915. *Polinices laevis* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 3*, p. 10.
1917. *Sinum undulatum* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 88.

The type of this species is a Wanganui fossil (precise horizon unknown), and the only record of its Recent occurrence is by Webster (1905, p. 280), who collected a specimen at Cape Maria van Diemen. It is possible that his shell was a *G. venustum*. Hutton's two syntypes of *Natica laevis* are identical in every respect with *G. undulatum* except that the spiral ornamentation is lacking. A careful scrutiny of the surface shows that it is much pitted, and that there are traces of the spirals in protected areas. It is therefore practically certain that the sculpture has been worn off by attrition in the shell-bed from which the specimens came.

Type from Wanganui, but horizon uncertain.

Localities.—Recent (only one record); Castlecliff, Wanganui (type ?); Nukumaru (*fide* Marshall and Murdoch); Petane; 1063, shell-bed below Petane limestone, Okawa Creek, Ngaruroro River.

Globisinum drewi (Murdoch). (Plate 60, figs. 11, 15.)

1899. *Sigaretus* (?) *drewi* Murdoch, *Proc. Malac. Soc.*, vol. 3, p. 320, pl. 16, fig. 1.
1915. *Ampullina drewi* (Murdoch): Suter, *Alph. Hand-list N.Z. Tert. Moll.*, p. 3.
1917. *Sinum* (*Eunaticina*) *drewi* (Murdoch): Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 88.

A careful examination of the anterior part of the body-whorl of the type shows faint indications of low spiral ridges such as exist on the type of *G. venustum*, but smaller specimens from Kai Iwi show no sign of them.

Holotype in Wanganui Museum.

Height, 38 mm.; diameter, 37 mm.

Locality.—Coast north-west of Wanganui, probably in the vicinity of Kai Iwi.

Globisinum venustum (Suter). (Plate 60, fig. 10.)

1907. *Euspira venusta* Suter, *Proc. Mal. Soc.*, vol. 7, No. 4, pl. 18, fig. 13.
1913. *Ampullina venusta* (Suter), *Manual N.Z. Moll.*, p. 292, pl. 15, fig. 18.

Suter's figure is misleading, for it gives far too great prominence to the spiral ribs on the lower part of the shell. These are so inconspicuous that they make practically no difference to the profile, and even when the light is in a favourable position thay can hardly be seen. A topotype in the possession of Miss M. K. Mestayer does not show the ribs at all, and has much the appearance of *G. drewi*. These are the only two specimens of the species which have been found; and, since complete adult specimens of both *G. undulatum and G. drewi* are rare, the material available is not sufficient to give a proper idea of the relative values of the three species named. They may not all be worth recognition.

Holotype in the Suter collection, Wanganui Museum.

Height, 40 mm.; diameter, 37 mm.

Locality.—Near Cape Farewell. (Recent.)

6. Genus AMOUROPSELLA Chelot, 1885.

"Shell thin, scalariform, with elevated spire, sharp at the top; whorls numerous, generally rendered gradate by a spiral plane, sometimes even keeled; aperture scarcely more than half the total height, effuse in front; umbilicus rather small, from the depths of which issues a narrow and sharp ridge which quickly joins the keeled margin of the effuse portion of the aperture, lip little inclined, straight, a little antecurrent opposite the flattened plane, columella scarcely excavated, outer margin little calloused and reflected on the umbilicus."—(Cossmann.)

Genotype: *Natica spirata* Lamk. (Eocene.)

Cossmann (1919, p. 454) places *Amauropsella* Chelot, 1885, as a section of *Crommium* Cossmann, 1888, an interpretation of the law of priority which is not generally favoured. The New Zealand species differ in having a channelled suture, and *A. major* in having spiral grooves. *Amauropsina* has a channelled suture, but the umbilical ridge is not so well marked and is farther forward. *Amauropsella* ranges from Palaeocene to Aquitanian in Europe.

Amauropsella major (Marshall). (Plate 60, fig. 19.)

1917. *Nucleopsis major* Marshall, *Trans. N.Z. Inst.*, vol. 49, p. 458, pl. 36, fig. 38.

Shell rather small, ovate; spire gradate, two-thirds the height of aperture; whorls 6, convex on spire and narrowly shouldered where they bend to the well-channelled suture; surface with numerous spiral threads separated by narrow grooves, about ten on the penultimate and thirty on the body, the upper ones rather broad and often divided by a secondary groove; aperture ovate, effuse below; outer lip slightly concave and gently retracted to the suture in large specimens (but these features are not clear in the type), inclined about 15° from vertical; inner lip nearly straight, with a thin enamel on parietal wall; umbilicus narrow, with sharp spiral ridge descending to meet anterior part of inner margin where it starts to become effuse.

Type in Otago Museum.

Height, 10 mm.; diameter, 6·5 mm.

Localities.—Wangaloa; Boulder Hill.

The original description does not mention the umbilical ridge, nor is it shown in the figure. It is, however, quite well developed. The inclined aperture, the ridged umbilicus, and the smooth columella show that the shell is not one of the Acteonidae.

The strong spiral sculpture is an unusual character for the group, but that it is not of generic importance is indicated by the presence of a smooth shell with the same essential features in the same beds.

Amauropsis martinezensis Dickerson (1914, p. 142, p. 13, figs. 4 *a*, *b*) has a "surface marked by fine but well-marked revolving lines."

Amauropsella teres n. sp. (Plate 60, fig. 20.)

Shell rather small, ovate; spire gradate, two-thirds the height of aperture; whorls 6, convex on spire and narrowly shouldered where they bend over to the well-channelled suture, surface with growth-lines only; aperture ovate, effuse below; outer lip very slightly concave and almost imperceptibly retracted to suture; inner lip straight, with only thin enamel on parietal wall; umbilicus rather small, but not invaded by callus, with sharp spiral ridge which abuts against a projection at anterior end of inner margin.

Type in collection of Mr. H. J. Finlay.

Height, 14 mm.; diameter, 11 mm.

Locality.—Boulder Hill.

II. Family NARICIDAE.

Genus MICRESCHARA Cossmann, 1881.

Section MACROMPALINA Cossmann, 1888.

"Shell auriform, very widely umbilicated, feebly trelissed, aperture obliquely spread out and very depressed, walls of umbilicus ornamented with radial and lamellar folds from peripheral keel.

"Type: *Sigaretus problematicus* Desh. (Eocene.)

"This section—which is separated from *Micreschara* s. str. by its auriform shape and by its wide umbilical funnel—is not confined to the Eocene, as was thought until now; not only did it live in the Miocene of

the South-west; but it is also represented in the Tortonian of Hungary." —(Cossmann.)

The appearance of this rare subgenus in New Zealand is of great interest, especially since its time-range here corresponds approximately to that in Europe.

KEY TO SPECIES.

auriformis : circum-umbilical keel set in from the rounded periphery.
huttoni : circum-umbilical keel forming the periphery.

Micreschara (Macromphalina) auriformis n. sp. (Plate 60, figs. 5, 6.)

Shell small, auriform, depressed; spire very low; whorls 3 or 4 rapidly increasing; surface smooth; suture plain, tangential at first, but abutting near aperture, which is oval, distended, and much inclined; outer lip convex, retracted to suture; inner lip concave, straightened below, slightly reflexed; umbilicus very wide, joining base of body-whorl at sharp angle some distance in from rounded periphery.

Type in collection of Mr. H. J. Finlay.

Height, 3·5 mm.; diameter, 5 mm.

Locality.—Boulder Hill (Palaeocene).

Micreschara (Macromphalina) huttoni n. mut. (Plate 60, figs. 1, 2, 3.)

1877. *Sigaretus carinatus* Hutton, *Trans. N.Z. Inst.*, vol. 9, p. 597 (not of Muenster nor Goldfuss).
1914. *Ampullina carinata* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 2*, p. 10, pl. 8, figs. 2 *a*, *b*, *c*.
1918. *Sinum carinatum* (Hutton): Suter, *N.Z. Geol. Surv. Pal. Bull. 5*, p. 88.

Localities.—White Rock River, Pareora (type); Target Gully, Oamaru: (*fide* P. Marshall). (Lower Miocene or Upper Oligocene.)

M. problematica Desh. and *M. decussata* Cossm. from the Eocene of the Paris Basin are closely similar to the New Zealand species.

The combination *Sigaretus carinatus* was preoccupied when Hutton proposed it—by A. Goldfuss, 1837 (*Abbild. u. Beschr. d. Petrefakten Deutchlands, &c.*, iii, 13, t. 168, f. 16), and by Muenster, 1842 (*Beitrage zur Petrefakten-Kunde*, iv, 93, t. 9, f. 16): therefore the specific name *huttoni* is proposed.

SYNOPSIS OF CHANGES IN NOMENCLATURE AND CLASSIFICATION.

Suter's Classification.	Revised Classification.
Natica australis (Hutton) ..	.. *Natica maoria* Finlay.
—— *zelandica* Q. & G. ..	.. —— *zelandica* Q. & G.
Polinices ambiguus Suter ..	.. (Not seen).*
—— *amphialus* (Watson) ..	.. *Uber* (*Euspira*) *vitreus* (Hutton).
—— *callosus* (Hutton) ..	.. —— *intracrassus* (Finlay).
—— *gibbosus* (Hutton) ..	—— *huttoni* Ihering.
—— (*Neverita*) *huttoni* Ihering	
—— *laevis* (Hutton) ..	.. *Globisinum undulatum* (Hutton).
—— (*Euspira*) *ovatus* (Hutton)	.. *Uber ovuloides* n. sp.
—— *planispirus* Suter ..	.. *Natica* (*Magnatica*) *suteri* n. mut.
—— (*Neverita*) *sagenus* Suter	.. *Uber sagenus* Suter.
Sinum carinatum (Hutton)	.. *Micreschara* (*Macromphalina*) *huttoni* n. mut.

* The type could not be found in Canterbury Museum.

Suter's Classification.	Revised Classification.
Sinum (*Eunaticina*) *cinctum* (Hutton)	*Sinum* (*Eunaticina*) *cinctum* (Hutton) (? New Zealand).
—— (*Eunaticina*) *drewi* (Murdoch) ..	*Globisinum drewi* (Murdoch).
—— (*Eunaticina elegans* Suter ..	—— *elegans* (Suter).
—— *fornicatum* Suter	*Sinum fornicatum* Suter.
—— (*Eunaticina*) *miocaenicum* Suter	*Globisinum miocaenicum* (Suter).
—— (*Eunaticina*) *undulatum* (Hutton)	—— *undulatum* (Hutton).
Ampullina (*Megatylotus*) *suturalis* (Hutton)	*Sulconacca suturalis* (Hutton).
—— *waihaoensis* Suter	*Natica* (*Carinacca*) *waihaoensis* (Suter).
—— *venusta* Suter	*Globisinum venustum* (Suter).
Nucleopsis major Marshall.. ..	*Amauropsella major* (Marshall).
Turbo approximatus (Suter) ..	*Natica* (*Magnatica*) *approximata* (Suter).

LITERATURE.

BARTRUM, J. A., 1919. A Fossiliferous Bed at Kawa Creek, *Trans. N.Z. Inst.*, vol. 51.

COSSMANN, M., 1918. *Revue Critique de Paleozoologie*, No. 1–2.

—— 1919. *Conchologie Neogenique de l'Aquitaine*, tome 3, livr. 2.

COSSMANN, M., and PISSARO, G., 1910–13. *Iconographie complete des Coq. foss. de l'Eocene des Environs de Paris*, tome 2.

DALL, W. H., 1892. Tertiary Mollusks of Florida, *Trans. Wagner Free Inst.*, vol. 3, part 2.

—— 1909. Miocene of Astoria and Coos Bay, Oregon, *U.S. Geol. Surv. Prof. Paper 59*.

DICKERSON, R., 1914. Fauna of the Martinez, *Univ. of California Pub. Geology*, vol. 8.

GABB, W. M., 1869. *Geol. Surv. California, Palaeontology*, vol. 2.

HEDLEY, C., 1924. *Records of the Aust. Mus.*, vol. 14, No. 3, p. 154.

HUTTON, F. W., 1873. *Cat. Marine Mollusca N.Z.*

—— 1873. *Cat. Tertiary Mollusca N.Z.*

—— 1880. *Manual N.Z. Mollusca.*

—— 1884. *Proc. Linn. Soc. N.S.W.*, vol. 9, p. 934.

—— 1893. The Pliocene Mollusca of N.Z., *Linn. Soc. N.S.W. Macleay Memorial Volume.*

IHERING, H. VON, 1907. *Annales d. Museo Nac. de Buenos Aires*, ser. 3, tom. 7.

MARSHALL, P., 1917. The Wangaloa Beds, *Trans. N.Z. Inst.*, vol. 49, pp. 450–60.

—— 1923. Early Tertiary Faunas of N.Z., *Trans. N.Z. Inst.*, vol. 54, pp. 115–21.

MARSHALL, P., and MURDOCH, R., 1920. Tertiary Rocks near Wanganui, *Trans. N.Z. Inst.*, vol. 52, pp. 115–28.

—— —— 1921. Tertiary Rocks near Hawera, *Trans. N.Z. Inst.*, vol. 53, pp. 86–96.

MURDOCH, R., 1899. *Proc. Malac. Soc. London*, vol. 3.

PARK, J., 1916. *N.Z. Geol. Surv. Bull. 20* (n.s.), p. 34.

SUTER, H., 1913. *Manual N.Z. Mollusca.*

—— 1914. *N.Z. Geol. Surv. Pal. Bull. 2.*

—— 1915. *N.Z. Geol. Surv. Pal. Bull. 3.*

—— 1917. *N.Z. Geol. Surv. Pal. Bull. 5.*

—— 1921. *N.Z. Geol. Surv. Pal. Bull. 8.*

TATE, R., 1893. Gastropods of Older Tertiary of Australia, pt. 4, *Trans. Roy. Soc. South Australia*, vol. 17.

THOMSON, J. A., 1916. Stage Names applicable to the Divisions of the Tertiary, *Trans. N.Z. Inst.*, vol. 48, pp. 28–40.

TRECHMANN, C. T., 1917. Cretaceous Mollusca from N.Z., *Geol. Mag.*, dec. 6, vol. 4.

TRYON, G. W., 1886. *Manual of Conchology*, vol. 8.

UTTLEY, G. H., 1920. Tertiary Geology, Otiake River to Duntroon, *Trans. N.Z. Inst.*, vol. 52.

WATSON, R. B., 1886. Report on Scaphopoda and Gastropoda, "*Challenger*" *Expedition, Zoology*, vol. 15, pt. 2.

WEBSTER, 1905. New Species of Marine Shells . . . and Additions to the *Index Faunae, Trans. N.Z. Inst.*, vol. 37.

WILCKENS, O., 1922. Upper Cretaceous Gastropods of N.Z., *N.Z. Geol. Surv. Pal. Bull. 9.*