

New Tertiary Mollusca from New Zealand—No. 3

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Genus *SCISSURELLA* d'Orbigny.

Type: *Scissurella laevigata* d'Orbigny.

Scissurella apudornata n.sp. (Fig. 1).

Shell, if anything, rather smaller than *ornata* May and possessing all the characters of that species, except that the axials are more numerous and more closely spaced (twenty-two on last whorl of the New Zealand fossil as against eighteen on corresponding whorl of *ornata*). The axial ribs are antecurrent to upper suture. In the interstices the microscope shows spiral threadlets quite similar to those of *ornata*. Altogether this Awamoan shell bears a remarkable resemblance to May's recent form from Australia.

Dimensions: Greatest diameter of base, 1.1 mm.; least diameter of base, 0.95 mm.; height, about 1.0 mm.

Locality, shell-bed, Target Gully, Oamaru (Awamoan).

Type (sole specimen) in writer's collection.

Genus *DANILIA* Brusina, 1865

= *OLIVIA* Cantraine, 1835 (non Bertholoni).

Danilia neozelanica n.sp. (Fig. 2).

Shell small, elevated, height of spire about twice that of aperture. Whorls five, convex; suture well cut in; whorls of spire with three strong cinguli, the centre one rather stronger than the anterior and posterior ones, and forming a slight keel; on body-whorl the posterior cord is practically obsolete, the second and third cords are now of equal strength and are on periphery; base with four cords becoming progressively weaker towards columella. Axial sculpture of thin distant threads, antecurrent to suture on posterior part of whorl, crossing depressions between spirals and nodulating them slightly at the points of intersection. Aperture filled with hard matrix, apparently circular to quadrate, broadly angled behind and widely rounded in front. Apex decollated.

Height, 6.0 mm.; width, 4.0 mm. (holotype).

Locality, Trig. M, near Oamaru, bed "e" of Park, *N.Z. Geol. Surv. Bull.*, No. 20, p. 73.

Type and a juvenile paratype in writer's collection.

This record marks the introduction of *Danilia* to the molluscan fauna of New Zealand. The reference of this shell to *Danilia* has been made by Dr Finlay, who kindly examined the material for the writer.

Genus ZEMINOLIA Finlay.

Type: *Minolia plicatula* Murdoch and Suter.**Zeminolia carinata** n.sp. (Fig. 3).

Shell very small; spire low, of about same height as aperture; whorls shouldered, the part above the keel almost horizontal. Body-whorl with a strong keel at periphery, causing a subangulation at outer lip. Base lightly convex, a wide perspective umbilicus present. Aperture quadrate; parietal wall lightly callused. Protoconch large, bulbous, of one unsculptured volution separated by a curved varix from next whorl, on which the only sculpture is a median keel; on succeeding whorls the carina increases in prominence, and a row of small beads appears close below suture; axial sculpture is present as rather low growth-plications retractive from suture, each arising from one of the beads. Body-whorl with a spiral cord halfway between periphery and suture, and a stronger one on periphery. Edge of umbilicus marked by a low cord with crenulated summit.

Height, 1.5 mm.; width (greatest), 2.6 mm.

Locality, Awamoa Creek, Oamaru (Awamoan).

Type (sole specimen) in writer's collection.

In describing *Z. fossa*, a fossil from the Ototaran beds at Wharekuri, the writer pointed out (*Trans. N.Z. Inst.*, vol. 62, p. 186; 1932) that the differences in sculpture between that species and *Z. plicatula*, the Recent genotype, could reasonably be expected to be bridged by connecting links. The Awamoan species just described is unmistakably such a link between these two forms. It lacks the subsutural channel of *fossa*, has a heavier embryo and a lower spire, in these respects bearing more resemblance to *plicatula*. *Fossa* has two sharp keels on periphery and *carinata* one; *plicatula* has no spiral strong enough to be recognised as a keel. In features of base and of umbilicus *carinata* is very much closer to *fossa* than to *plicatula*.

Genus FAUTOR Iredale.

Type: *Zizyphinus comptus* A. Adams.**Fautor temporemutatus** (Finlay). (Fig. 4).1923. *Calliostoma cancellatum* Finlay. *Trans. N.Z. Inst.*, vol. 54, p. 102, pl. 10, fig. 3.1924. *Calliostoma temporemutata* Finlay. *Trans. N.Z. Inst.*, vol. 55, p. 509 (footnote).1926. *Fautor temporemutatus* (Finlay). Finlay, *Trans. N.Z. Inst.*, vol. 57, p. 360.

Temporemutatus, though founded on a fragment, is a quite distinctive species. The writer has since collected a topotype perfect in all respects except that the apex is missing. Figure 4 illustrates this specimen. There is also a juvenile specimen from the shell-bed at Target Gully.

Genus MAUREA Oliver.

Type: *Trochus tigris* Martyn.**Maurea fragilis** (Finlay).1923. *Calliostoma suteri fragile* Finlay. *Trans. N.Z. Inst.*, vol. 54, p. 102, pl. 10. fig. 2, a, b, c.1926. *Venustas fragilis* (Finlay). *Finlay Trans N.Z. Inst.*, vol. 57, p. 361.

The writer has collected a half-dozen topotypes, two of them perfect in every detail. He has also obtained one specimen from Mount Harris, from which locality it was not previously recorded.

Subgenus MUCRINOPS Finlay.

Type: *Zizyphinus spectabilis* A. Adams.**Maurea (Mucrinops) suteri** (Finlay).1923. *Calliostoma suteri* Finlay. *Trans. N.Z. Inst.*, vol. 54, p. 101, pl. 10, fig. 1, a, b.1926. *Venustas (Mucrinops) suteri* (Finlay). *Finlay, Trans. N.Z. Inst.*, vol. 57, p. 361.

The type is from Ardgowan, and Finlay records it also from the shell-bed at Target Gully and from Awamoan. In addition, the writer has it also from Pukeuri (one shell) and from Sutherlands, South Canterbury (two shells). It is not a common fossil at any of these Awamoan localities, but is more plentiful at Target Gully than elsewhere.

Maurea (Mucrinops) waiareka n.sp. (Fig. 5).

Shell small, conical, imperforate, outlines of spire straight. Whorls six in number, flat, suture at periphery, and hardly discernible. Sculpture of strong beaded spirals, five primary ones on penultimate whorl, with here and there a weak secondary, also beaded; seven on body-whorl above periphery, rather more widely spaced nearer suture; base with eight coarse, beaded spirals. Axial sculpture practically absent, there being only faint indication of cancellation of sculpture. Base lightly convex. Aperture subrhomboidal, filled with hard matrix so that exact features cannot be made out.

Height, 10.0 mm.; width, 8.5 mm.

Locality, Lorne, near Oamaru (Waiarekan).

Type (the only specimen) in writer's collection.

The periphery is much less sharply angled than that of *suteri*, the beads on spirals not so regular in size and in distance apart, and the spirals more numerous. *M. acutangula* (Suter) seems closely related, but has a deep and more distinct suture; it also has weaker and only indistinctly beaded spirals on base. There is a related species in the beds at Clifden.

Genus ARGALISTA Iredale.

Type: *Cyclostrema fluctuata* Hutton.**Argalista proimpervia** n.sp. (Fig. 6).

Obviously allied to the Awamoan *impervia* Finlay. It has a higher spire than any other Neozelanic species. The whorls are considerably bulging about halfway between sutures. Shell quite

imperforate, pad at base of columella weaker than that of *impervia*, but there is a thick callus over parietal wall. The spiral sculpture is much the same in both species, but less distinct in the Waiarekan shells owing to nature of preservation. In both these species the last part of suture descends the face of whorl towards posterior angle of aperture. This is a feature of the genotype also, but is present in neither *umbilicata* nor *proumbilicata*. There is an entire absence of crenulation in umbilical region, and this, along with the high spire and bulging whorl, allows a ready separation from *impervia*.

Height, 3.0 mm.; width, 2.5 mm. (holotype).

Localities—Trig. M, near Oamaru, type and seven paratypes; Lorne, one shell.

Type in writer's collection.

The shell from Lorne agrees entirely with those from Trig. M.

A. effusa Marwick, from Chatham Islands, is somewhat similar in build, but the spire is not so high nor the whorls so bulging, and there is an umbilicus present.

***Argalista leniumbilicata* n.sp.**

Shell small; umbilicus small, its border not crenulated; spire moderately elevated. Body-whorl rather sharply rounded, not so effuse as that of *effusa* Marwick, from Chatham Islands. *Arta* Marwick, also from the Chathams, has a decidedly flatter spire, and is practically imperforate. *Leniumbilicata* differs at sight from the Recent *umbilicata* Powell in its much smaller umbilical perforation. It seems to come closest to the Awamoan *proumbilicata* Finlay, which, however, has a flatter spire, whorls flatter between sutures, umbilical border strongly crenulated, heavier pad at base of columella, and spirals less numerous and not so regularly spaced. *A. proimpervia* n.sp. (described above) has a much higher spire, more convex whorls, and no umbilicus.

Height, 1.6 mm.; width (greatest), 2.1 mm. (holotype).

Locality, Trig. M, near Oamaru.

Type and seven paratypes in writer's collection.

Genus NEOJANICUS Suter.

Type: *Neojanicus perplexus* Suter.

***Neojanicus wharekuriensis* n.sp. (Fig. 8).**

Shell very small, flat, oval; apex terminal, large, inflated, smooth, distinctly marked off, and of about one oblique turn. Sculpture of irregular concentric growth-lines and one or two larger, more distant undulations. Margins smooth. Inner surface shining, polished. Muscle-scar not distinct, but can just be made out under microscope, quite similar to that of the genotype. Basal plate absent.

Length, 3.2 mm.; width, 2.8 mm.

Locality, Wharekuri greensands, Waitaki River.

Type in writer's collection.

This is the only undoubted species other than the genotype. *N. kaawaensis* is very doubtfully a *Neojanicus*, and was only provisionally included here by Bartrum and Powell (*Trans. N.Z. Inst.*, vol. 59, p. 143; 1928).

Genus *TRICHOSIRIUS* Finlay.

Type: *Trichotropis inornata* Hutton.

Trichosirius finlayi n.sp. (Figs. 9, 31).

Shell of moderate size, its outline closely similar to that of *inornata*, but the whorls are evenly convex, not angled as are those of *inornata*. The anterior canal is longer and not so broadly open; the spire-whorls of *inornata* have five spiral cords, the strongest on the angulation; and of the four remaining cords two are posterior and two anterior to the angulation. In the new species (also with five cords) the two anterior ones are equal in strength to the middle one, the two posterior ones weaker than those of *inornata*. Axial sculpture is similar in both species. The protoconch (specimen from Awamo Creek) is blunter and heavier than that of either of the Recent species.

Height (estimated), 14.0 mm.; width, 8.0 mm. (holotype).

Localities—Otiake (type); Blue Cliffs, South Canterbury; Awamo Creek, Oamaru.

Type in writer's collection.

This seems to be directly ancestral to the Pliocene and Recent *T. inornata*. A juvenile shell from Chatton seems referable to this species. A shell from Clifden, band 8 (Awamoan) may belong here also. Its apex is midway between that of *inornata* and *finlayi*; the spire is high and the shell more attenuate than *inornata*, thus approaching *finlayi*; in strength of spiral cords it approaches *inornata*, though the whorls are not angulated. The rounded whorl of these fossils recalls *octocarinatus* Powell, but the spiral sculpture is different.

Genus *ZEMACIES* Finlay.

Type: *Zemacies elatior* Finlay.

Zemacies elatior Finlay. (Fig. 10).

1926. *Zemacies elatior* Finlay. *Trans. N.Z. Inst.*, vol. 56, p. 252.

The writer collected at Ardgowan a very large shell, nearly 100 mm. in height, that appears in no way except in size to differ from the type. The apex is broken off. It is here figured, as, so far as the writer knows, it is the only record of the genus from North Otago localities.

Zemacies simulacrum n.sp. (Fig. 11).

Shell of moderate size, elongately biconic; whorls strongly shouldered slightly above middle, concave above the keel, straight below; suture margined below by a broad, low, slightly swollen zone bearing four or five weak, wavy spirals; spirals on concave shoulder less obvious, those below angle coarser and more distant one from the other. Angulation of whorl ornamented by weak

nodules (seventeen on penultimate whorl) extending axially almost to suture on uppermost whorls and carried obliquely only a short distance below on later whorls. Sinus fairly deep, its apex widely rounded and situated midway between angulation and suture. Apex normal for the genus, polygyrate and sharply pointed.

Height, 49 mm.; width, 14 mm. (holotype).

Locality—Clifden, Southland, bed B on left side of river = base of band 7 of the beds on right side (Hutchinsonian).

Type and a paratype in writer's collection.

This shell has close affinity with *Z. ordinaria* (Marshall), from Pakaurangi Point. Dr Marshall's species, however, has heavier, more-rounded nodules, which become obsolete on later whorls of spire, their place being taken by a swelling of the angulation to form a blunt keel. Further, the nodules are definitely limited to the peripheral angulation, and are not extended down axially as in the new species.

***Zemacies lividorupis* n.sp. (Fig. 12).**

Shell of moderate size, elongately biconic; whorls roundly angled at middle, faintly concave above, almost straight below; suture margined below by a lightly swollen zone bearing two closely spaced, thin, spiral threads; spirals over whole surface of shell, fine and close on concavity of shoulder, coarser below angulation. Axial sculpture represented by nodules at periphery, present on all whorls, extending obliquely a short distance towards anterior on later whorls. Sinus and embryo normal for the genus. Body flattened over periphery.

Height (estimated), 50 mm.; width, 13.0 mm. (holotype).

Localities—Blue Cliffs, South Canterbury (type); Otiake.

Type and a paratype in writer's collection.

This is a very near relative of *Z. elatior* Finlay, the type of the genus. *Altiior* is rather more attenuate; lacks nodules on periphery of all save first few whorls, where they are not so distinct as those of *lividorupis*; has a heavy, rounded periphery; coarser spiral ornamentation; whorls more concave below angulation; and a concave, not straight, periphery to last whorl.

Genus *ALCITHOE* H. and A. Adams.

Type: *Buccinum arabicum* Martyn.

***Alcithoe familiaris* Marwick. (Fig. 13).**

1926. *Alcithoe familiaris* Marwick. *Trans. N.Z. Inst.*, vol. 56, p. 291, pl. 64, fig. 2.

Finlay (in Laws, *Trans. N.Z. Inst.*, vol. 62, p. 202) has commented on this species as follows:—Marwick compared this species (known then only from the unique type, with the lower part of the body-whorl missing) with the Recent *arabica*, but commented on the different pillar plaits. The Ardgowan specimen collected by Mr Laws agrees exactly with the type, but is more complete, and shows that this species is not of the *arabica* style with long body-whorl and aperture, but is relatively short for so large a species. It

also shows quite clearly that it is a direct ancestor of *A. lutea* Marwick (and probably *A. transformis*), having an identical build, columella, and development of sculpture, but much stronger spines on last whorl. The four rather low pillar plaits (with a weak fifth) are quite different in style from those of the *wekaensis-cylindrica* line."

The Ardgowan specimen referred to by Dr Finlay is here figured.

Genus WAIHAOIA Marwick.

Type: *Waihaoia allani* Marwick.

***Waihaoia formosa* n.sp. (Fig. 14).**

Shell small, narrowly fusiform, body-whorl long, tapering well out in front. Whorls roundly subangled a little above middle; lightly concave above shoulder, lightly convex below. Uppermost whorls of spire missing. Body-whorl narrow, its length considerably greater than half that of shell, flatly concave in a narrow zone above, broadly rounded over periphery, contracting early and rather rapidly towards axis of shell; base concave; beak long, twisted to left. Aperture long and narrow, sharply angled behind, anterior notch not deep; outer lip not reflected, convex; three distant plaits apparent, but hard matrix partly fills aperture. Fasciole not differentiated. Sculpture of sixteen low, narrow axial ribs on body-whorl, anterior to suture on shoulder; interstices wider than ribs; ribs not nodulated, weaker on shoulder of whorls, dying out early on base.

Height (estimated), 38 mm.; width, 14.0 mm.

Locality, Trig. M, Oamaru.

Type (unique) in writer's collection.

***Waihaoia nodulifera* n.sp. (Fig. 15).**

Shell quite small, spire a little less in height than aperture, post-embryonic whorls five in number. Protoconch of two or three smooth volutions. Whorls angled at about middle, the periphery set with small but distinct, somewhat sharpened nodules arising from axial ribs. Shoulder faintly concave; whorl straight below angle. Axial ribs (eleven on a whorl) extending across entire whorl, but weaker on shoulder; ribs die out early below periphery on last whorl, scarcely reaching on to base; interspaces of less width than ribs. Body-whorl long and narrow, slowly contracting and drawn out to a long, straight beak below. Fasciole hardly differentiated. Aperture long and narrow, sharply angled behind, inner and outer lips about parallel; columella with five regularly spaced plaits, the middle three of equal strength, the anterior and posterior ones weaker; outer lip not reflexed, inner lip with a very light callus.

Height, 30 mm.; width, 10.0 mm.

Locality, Wharekuri (greensands).

Type in writer's collection.

This is a near relative of *W. aculeata* (Hutton). It has a relatively higher spire, angle not so low on whorls, more numerous and closer axials (eleven; eight in *aculeata*); and five as against four plaits on the pillar.

Genus INGLISELLA Finlay.

Type: *Ptychatiactus pukeuriensis* Suter.

Inglisella pukeuriensis is a North Otago species (Awamoan). The writer has it from Pukeuri (type locality), Ardgowan, Target Gully, Awamoa Creek, and Rifle Butts. There is a shell very closely similar to *pukeuriensis* in the Mahoenui (Hutchinsonian) beds at Awakino Gorge; and this seems to be the same as that recorded by Marwick from beds of the Ihungia Series, Gisborne District (*N.Z. Geol. Surv. Pal. Bull.*, No. 13, p. 122; 1931). *I. cincta* (Hutton) is confined to South Canterbury Awamoan horizons around Timaru. The writer has it from White Rock River (type locality); Sutherlands, Tengawai River; Holme Station, Pareora Gorge. In the Awamoan beds in Waihao District, South Canterbury, *cincta* is apparently not present, but another species occurs, and this is described as new below.

***Inglisella ampla* n.sp. (Fig. 16).**

This is a constantly larger species than either *pukeuriensis* or *cincta*. The heavy build and coarse, blunt axials show it to be related to *pukeuriensis*, from which, however, it can be distinguished at a glance by its much less attenuate habit and much wider body. In *pukeuriensis* the body-whorl is less than half the height of the shell, whereas the new species has the last whorl longer relative to height of shell. Lirations within outer lip six in number (four in *pukeuriensis*); *pukeuriensis* has ten axials on each of the later whorls, *ampla* nine; embryo larger and blunter than that of *pukeuriensis*.

Height, 12.0 mm.; width, 5.0 mm. (holotype); corresponding dimensions of *pukeuriensis*, 8.5 mm., 3.0 mm. (topotype).

Localities—Blue Cliffs, South Canterbury, type and many paratypes (Hutchinsonian); Otiake, Waitaki Valley, three shells; Elephant Hill and Mount Harris (Awamoan horizons, near Waihao).

There is also a juvenile shell from Rifle Butts, Oamaru, that cannot be differentiated from juveniles of this species from Blue Cliffs.

***Inglisella parva* n.sp. (Fig. 17).**

This is the smallest Neozelanic Inglisellid, appearing quite a dwarf when placed alongside the adult *ampla*. The axial ribs are relatively heavier than those of *I. cincta* and the spirals finer and more thread-like than those of other recorded species. The last whorl has nine rounded axial ribs, which vary slightly in strength. Plaits of almost equal strength, low and rounded, not so elevated as those of *cincta*, *pukeuriensis*, and *ampla*. Spiral threads slightly nodulated on summits of axials, giving a prickly effect to the sculpture. Lirations within outer lip four in number.

Height, 4.1 mm.; width, 1.95 mm. (holotype).

Locality, Clifden, Southland, bands 4 (type) and 6C (Hutchinsonian).

Type in writer's collection.

The shells from band 6C have spirals rather coarser and the sculpture more prickly than that of the type.

Inglisella awakinoensis n.sp. (Fig. 18).

Shell moderately stout, spiral sculpture similar to that of other recorded species. The axials extend across entire whorl, and do not perceptibly weaken on shoulder, as is the case with the shells from South Island localities, and the spire-whorls are less convex and the suture less cut in. The columellar plaits are heavy, the posterior one the more prominent, a feature which at once distinguishes *awakinoensis* from the southern fossils. The height of the body-whorl is two-thirds that of the shell, and thus this species has a noticeably longer body than other *Inglisellas*. Though the outer lip is broken away, the lirations are seen as low but broad ridges extending well back into aperture.

Height, 5.5 mm.; width (estimated), 3.0 mm.

Locality, Mokau sandstone, Awakino Gorge (Awamoan).

Type (unique) in writer's collection.

Genus **ANAPEPTA** Finlay.

Type: *Admete anomala* Marshall and Murdoch.

Finlay (*Trans. N.Z. Inst.*, vol. 61, p. 241; 1930) in instituting *Anapepta*, allotted it subgeneric status under *Inglisella*. The divergent characters of the apex in the two groups seem to warrant full generic recognition for the *Anapepta* series of shells.

Anapepta tuberculifera n.sp. (Fig. 19).

This species is very close to *A. finlayi* Marwick, from Awamoan Creek. If anything, it is rather more slender, with a slightly narrower body-whorl. The anterior of the aperture is not so broadly rounded, and the canal narrower and more flexed to the left. Marwick states that *finlayi* has three low folds on the columella. The present species has but two, and these, though weak when seen from the front, are strong, blunt, and rounded when seen a little distance within the aperture. The embryonic and brephic sculpture of the two species is identical, but in *tuberculifera* two weak spirals appear on shoulder of penultimate whorl and three on shoulder of last whorl. All the spire-whorls of *finlayi* are biangulate; those of *tuberculifera*, with the exception of the first (which is biangulate), carry three strong spirals, diminishing in strength from behind. The outer lip has seven or eight lirations within.

Height, 11.0 mm.; width, 4.5 mm. (holotype).

Locality, Clifden, Southland, new road-cutting behind race-course (type) = band 7 of the beds along the river. Also bed A, left side of river = band 6C on right side (two shells). Hutchinsonian.

Type in writer's collection.

Anapepta explicata n.sp. (Fig. 20).

This species can at once be distinguished by the decreasing prominence of axials on penultimate whorl and their entire absence from last whorl. The protoconch is large and broad over summit, the nucleus minute and central, as described by Marwick (*N.Z. Geol. Surv. Pal. Bull.*, No. 13, p. 122; 1931) for his *A. finlayi*. There is

a light shoulder slightly above middle of whorls; whorl flattish on shoulder, lightly convex below. Shoulder unsculptured except for two close, thin, spiral threads; the strongest spiral of a whorl is that at periphery, and this is slightly pinched up on summits of the axials; four or five spirals below periphery, of rather uneven strength. There are eleven axials on penultimate whorl. Body-whorl fairly full, regularly convex. Columella-plaits two, not seen from front, but situated well inside, and subequal in strength; outer lip effuse below, more so than that of *tuberculifera*; seven lirations within outer lip. *A. anomala* has heavier spirals and axials on all whorls. *A. finlayi* is of closely similar build, but has biangulate whorls, axials present on last whorl, and aperture more broadly rounded in front.

Height, 11.0 mm.; width, 4.8 mm.

Locality, Blue Cliffs, South Canterbury (Hutchinsonian).

Type (sole specimen) in writer's collection.

Anapepta serrata n.sp. (Fig. 21).

Easily separable on account of its heavy, sharp axial ribs on all adult whorls; the shoulder is very distinct and unsculptured; there are two thin, sharply elevated folds on columella, quite visible from the front; the lirations within outer lip are of the nature of distinct spiral threads (six in number) retreating within as far as can be seen. The structural features of the embryo are quite those of *Anapepta*, but it is much narrower and smaller than that of any other species so far recorded for the genus. This provides perhaps the readiest means of separation. Below the shoulder of penultimate whorl there are four thin, distant, distinct spiral threads, the posterior one considerably pinched up on surmounting axials. There are also four on body whorl between suture and shoulder, but here fine interstitial threadlets are also present. Apertural characters are those of *Anapepta*.

Height, 10.5 mm.; width, 4.5 mm. (holotype).

Localities—Blue Cliffs, South Canterbury (type and two paratypes); blue clays at foot of Mount Horrible, Pareora River, South Canterbury (one shell). Both are Hutchinsonian horizons.

Type in writer's collection.

Genus **RUGOBELA** Finlay.

Type: *Ptychatractus tenuiliratus* Suter.

Rugobela tenuicostata n.sp. (Fig. 22).

This species is allied to very similar shells from Otiake (described below as a new species) and also to "*Guraleus*" *sepelibilis* Powell and Bartrum from the Hutchinsonian beds at Waiheke. The Otiake shells have a protoconch that is larger, more pointed, and with flatter volutions. Also the axials are wider, blunter, not so numerous; the shoulder is not so distinct; unlike the new species, they have axial obsolescence on last whorl. *Sepelibilis* has fewer and heavier axials, much more distinct and coarser spirals, and not so strongly differentiated shoulder. *R. tenuilirata* has fewer and

coarser axial ribs, convex whorls with much less distinct shoulder. Its protoconch is that of the new species, and this serves to distinguish it from the Otiake shells. In the new species the polygyrate apex has a minute nucleus, convex volutions; in the brephic stage thin, curved axials appear, with spiral threads absent; thereafter the whorls are very sharply shouldered near their summits; the shoulder concave, with two or three spirals and weak posterior prolongations of axial ribs. A light subsutural swelling is present. The axial ribs (fourteen on penultimate whorl) are very thin, distant, sharply elevated, and nodulated at shoulder. The whole adult surface is ornamented by rather fine spiral threads. The beak is more drawn out than that of *tenuilirata*, and has four distinct plications below, some much weaker ones above them.

Height, 9.0 mm.; width, 4.0 mm.

Locality, Blue Cliffs, South Canterbury (Hutchinsonian).

Type (sole specimen) in writer's collection.

***Rugobela semilaevigata* n.sp. (Fig. 23).**

Separable from *tenuilirata* by means of character of protoconch, as remarked above in description of *tenuicostata*, from which species the same characters serve to differentiate it. Further comparisons with *tenuicostata* are also given under that species. In addition, the last whorl is free of axial sculpture, the plications on columella are finer, more closely spaced, and more numerous, the beak more drawn out than is the case with either *tenuicostata* or *sepelibilis* Powell and Bartrum. The summits of the axials are not nodulated; the axials are not so heavy nor so bluntly rounded as those of the genotype, and seem to be midway between those of that species and the Blue Cliffs shell just described.

Height 13.5 mm.; width, 5.5 mm. (holotype).

Locality, Otiake, Waitaki Valley.

Type and many paratypes in writer's collection.

Genus **ZAFRA** A. Adams.

Type: *Zafra mitriformis* A. Adams.

***Zafra opihiensis* Laws. (Fig. 24).**

1933. *Zafra opihiensis* Laws. *Trans. N.Z. Inst.*, vol. 63, p. 324.

The description of this species was not accompanied by an illustration. The shell is now figured.

Genus **ZEMITRELLA** Finlay.

Type: *Lachesis sulcata* Hutton.

***Zemitrella haroldi* n.sp. (Fig. 25).**

Shell small, spire regularly conic, its height about half that of shell; post-nuclear whorls five in number. Protoconch rounded and blunt at summit, convex and smooth below that; nucleus small, depressed. Whorls practically flat; suture at periphery, indistinct. Spire-whorls entirely devoid of sculpture. Body-whorl flattish above, sharply convex to subangled at periphery, concave below that, and

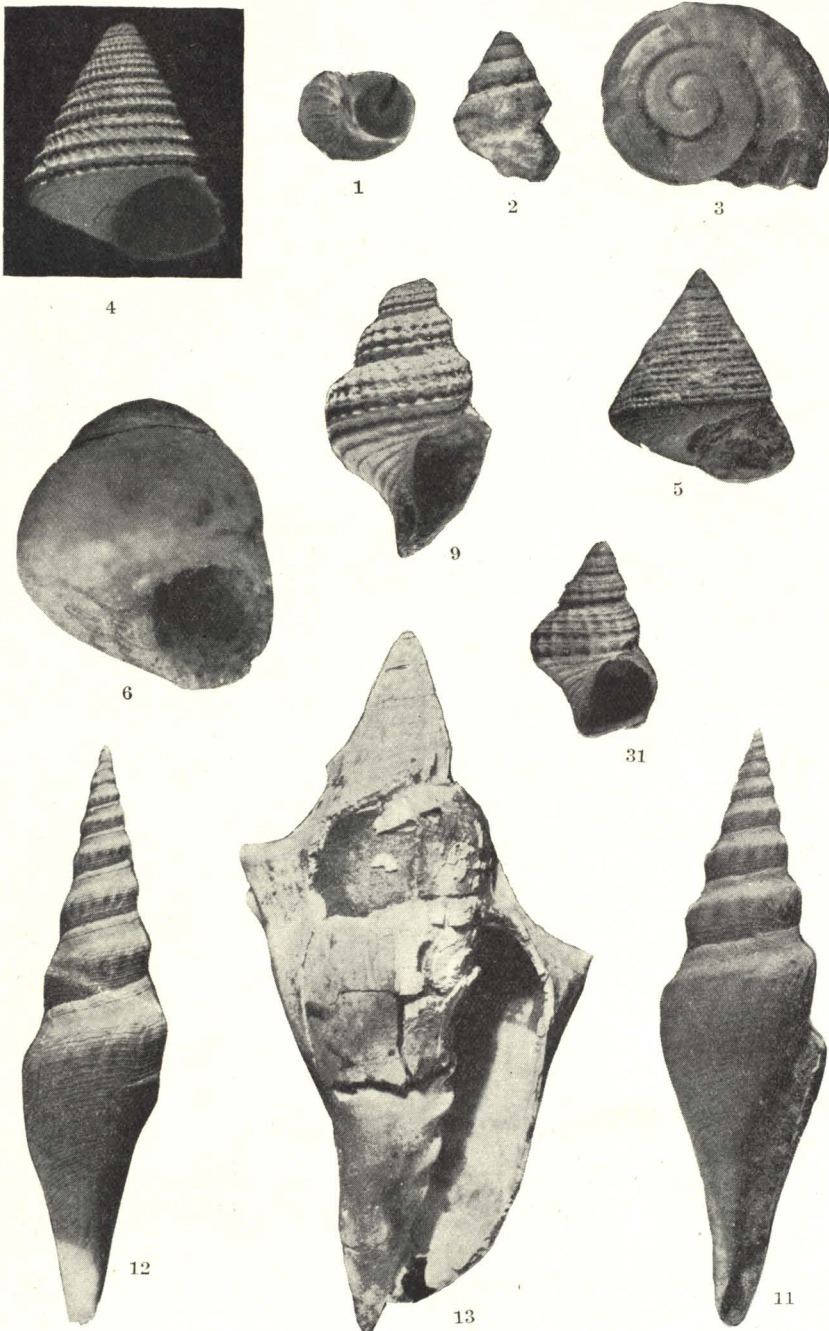


FIG. 1.—*Scissurella apudornata* n.sp. Holotype, $\times 12.3$. FIG. 2.—*Danilia neozelanica* n.sp. Holotype, $\times 3.3$. FIG. 3.—*Zeminolia carinata* n.sp. Holotype, $\times 12.3$. FIG. 4.—*Fautor temporemutatus* (Finlay). Topotype, $\times 2.8$. FIG. 5.—*Maurea* (*Mucrinops*) *waiareka* n.sp. Holotype, $\times 2.8$. FIG. 6.—*Argalista proimpervia* n.sp. Holotype, $\times 12.3$. FIG. 9.—*Trichosirius finlayi* n.sp. Holotype, $\times 3.0$. FIG. 11.—*Zemacies simulacrum* n.sp. Holotype, $\times 1.5$. FIG. 12.—*Zemacies lividorupis* n.sp. Holotype, $\times 1.5$. FIG. 13.—*Alcithoe familiaris* Marwick. $\times 0.8$. FIG. 31.—*Trichosirius finlayi* n.sp. Awamo Creek, $\times 3.1$.

To face p. 40.

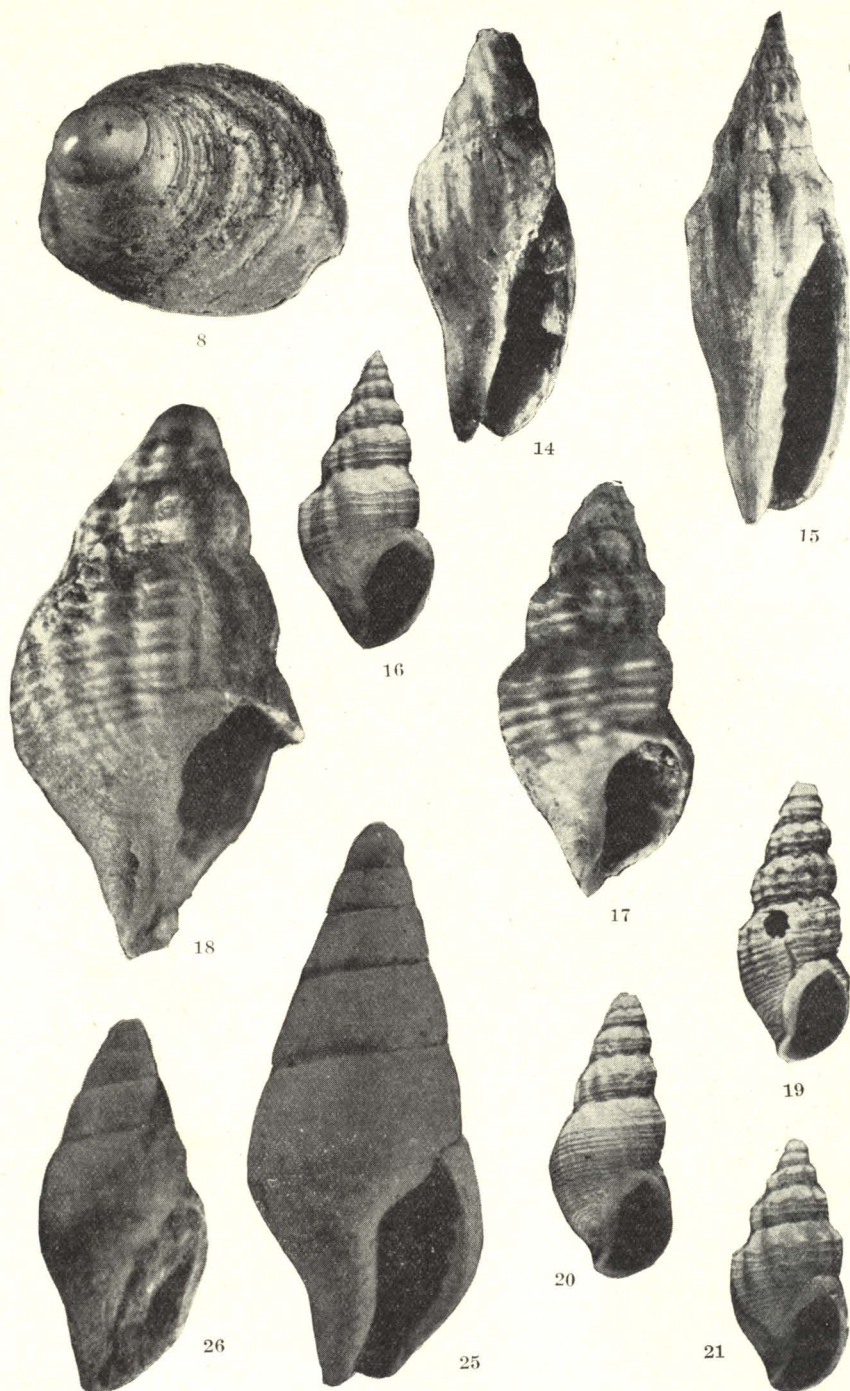


FIG. 8.—*Neojanicus wharekuriensis* n.sp. Holotype, $\times 12.3$. FIG. 14.—*Waihaioia formosa* n.sp. Holotype, $\times 1.7$. FIG. 15.—*Waihaioia nodulifera* n.sp. Holotype, $\times 2.1$. FIG. 16.—*Inglisella ampla* n.sp. Holotype, $\times 3.1$. FIG. 17.—*Inglisella parva* n.sp. Holotype, $\times 12.3$. FIG. 18.—*Inglisella awakinoensis* n.sp. Holotype, $\times 12.3$. FIG. 19.—*Anapepta tuberculifera* n.sp. Holotype, $\times 3.2$. FIG. 20.—*Anapepta explicata* n.sp. Holotype, $\times 3.2$. FIG. 21.—*Anapepta serrata* n.sp. Holotype, $\times 3.2$. FIG. 25.—*Zemitrella haroldi* n.sp. Holotype, $\times 12.3$. FIG. 26.—*Zemitrella mahoenuica* n.sp. Holotype, $\times 12.3$.

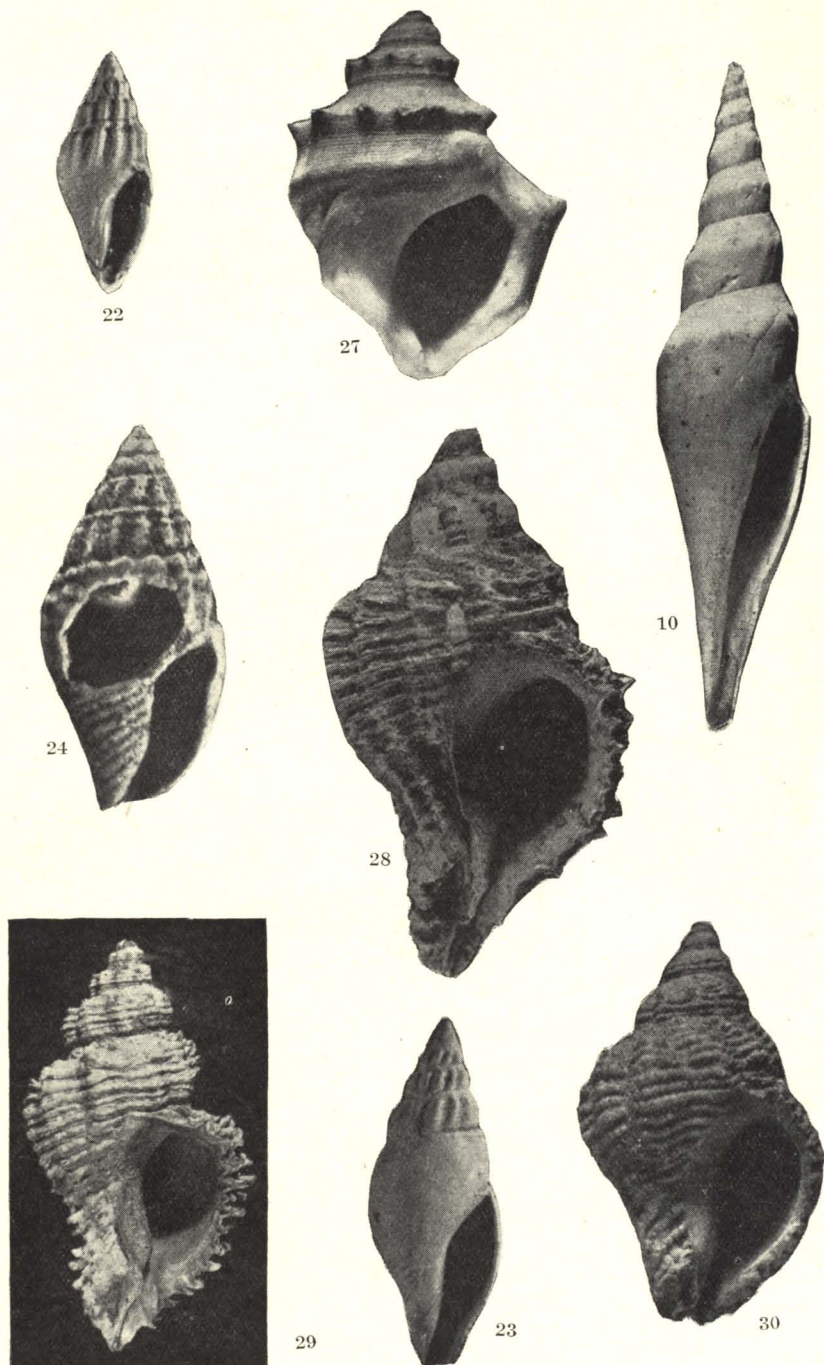


FIG. 10.—*Zemacies elatior* Finlay, Ardgowan, $\times 0.8$. FIG. 22.—*Rugobela tenuicostata* n.sp. Holotype, $\times 3.3$. FIG. 23.—*Rugobela semilaevigata* n.sp. Holotype, $\times 3.3$. FIG. 24.—*Zafra opihienensis* Laws. Holotype, $\times 12.3$. FIG. 27.—*Struthiolaria (Callus-aria) otaiotica* n.sp. Holotype, $\times 1.6$. FIG. 28.—*Murexsul proavitus* n.sp. Holotype, $\times 1.5$. FIG. 29.—*Murexsul progenitor* n.sp. Holotype, $\times 1.3$. FIG. 30.—*Murexsul leidorupis* n.sp. Holotype, $\times 2.7$.

cut in rapidly to axis of shell. There are about seven fine threads at extreme anterior of shell, and these trend spirally towards columella. A single weak plait is present on angulation at junction of parietal wall and columella (seen only on immature specimens). Columella flexed to left below. Outer lip with a broad, low, unsculptured varix; within there are several denticles; the posterior ones the larger.

Height, 5.5 mm.; width, 2.5 mm. (holotype).

Localities—Pukeuri, type and many paratypes; Rifle Butts, six shells; Awamoa Creek, one shell. These are Awamoan horizons near Oamaru.

Type in writer's collection.

Named in honour of Dr H. J. Finlay, of Dunedin, who also has separated out this species.

This is Suter's "*Alcira* n.sp." (*N.Z. Geol. Surv. Bull.*, No. 20, pp. 89, 93; 1918) referred to by Finlay (*Trans. N.Z. Inst.*, vol. 57, p. 431; 1926) as one of the undescribed Tertiary species of *Zemitrella*. The writer has also two new Pliocene species from Nukumarū.

***Zemitrella mahoenuica* n.sp. (Fig. 26).**

Shell very small, biconic, height of spire slightly over half that of aperture; post embryonic volutions four in number. Protoconch damaged. Whorls very lightly convex; suture slightly above periphery, more distinct than that of *haroldi* n.sp. Spire-whorls unsculptured save for a single, distinct incised line as a submargin to suture. Body-whorl broadly convex in a single sweep from suture to base, where it very slowly retreats to axis of shell; base only very lightly excavated. Basal threads much as in *haroldi*. Aperture long and narrow, filled with hard matrix. Shell strongly variced near outer lip. Base of columella flexed a little to left.

Height, 3.9 mm.; width, 1.7 mm.

Locality, Mahoenui beds, Awakino River. Blue argillaceous sandstone about one mile east of tunnel at north entrance to Awakino Gorge (Hutchinsonian).

Type (unique) in writer's collection.

The shorter spire with its more stepped outline, more fusiform body and submarginated suture differentiate this species from *Z. haroldi* n.sp. In shape it seems to resemble Dr Marshall's figure of *Z. inconspicua*, from Pakaurangi Point, but the sculpture is different and the body longer.

Genus *STRUTHIOLARIA* Lamarck.

Type: *Buccinum papulosum* Martyn.

Subgenus *CALLUSARIA* Finlay.

Type: *Struthiolaria callosa* Marwick.

***Struthiolaria (Callusaria) otaioica* n.sp. (Fig. 27).**

Shell small, squat, spire not considerably elevated, of about three and a-half adult whorls enlarging rapidly. Closely related to *S. spinosa* Hector, but the spire is depressed and the suture higher up

on whorls, which are appreciably broader relative to height than are those of *spinosa*. Further, the tubercles are more numerous and not so prominent; *spinosa* carries ten tubercles on body-whorl and nine on penultimate whorl, whereas the new species has fourteen and twelve respectively. *Otaioica* has the inner lip considerably more arcuate and the outer lip more spread out laterally behind, so that the aperture is not so narrow as that of Hector's species.

Height, 30 mm.; width, 23 mm. (holotype). Corresponding dimensions of small adult *spinosa*, a topotype, 40 mm., 27 mm.

Locality, Blue Cliffs, South Canterbury (Hutchinsonian).

Type and a fragmentary paratype in writer's collection.

Genus MUREXSUL Iredale.

Type: *Murex octogonus* Quoy and Gaimard.

Murexsul proavitus n.sp. (Fig. 28).

Shell large, whorls convex, not strongly angled, shoulder not clearly differentiated. This is undoubtedly an ancestor of the Pliocene and Recent *M. octogonus*, to which in general form it bears a striking resemblance. The apex and first few whorls are absent, and most of the spire-whorls decorticated. Later whorls of spire have three spiral cords below subangulation, two on the shoulder; body-whorl with thirteen cords below shoulder and two or three above. There are 12 axial varices on last whorl, spaced at intervals equal to their own width. Distinguished from *octogonus* by the following characters:—Smaller aperture with less expanded outer lip, and inner lip more thickly callused and much less deeply excavated; more numerous and much closer axials, which are continued with little or no decrease in strength right over shoulder to suture; body-whorl not so excavated below, the wide spiral depression of *octogonus*, which in that species bears weaker spiral cords with smaller spines, being absent, so that the anterior portion of body tapers more regularly. The heavy varices crossing the shoulder are particularly characteristic.

Height (estimated), 49 mm.; width, 29 mm. (holotype).

Locality, shell-bed, Ardgowan (Awamoan).

Type and a fragmentary paratype in writer's collection.

Murexsul pregenitor n.sp. (Fig. 29).

This is another Awamoan species representing the stock from which the Recent genotype has been derived. The spire is distinctly stepped, the whorls strongly and widely tabulated at summits, convex below that; thus more like *octogonus* than *proavitus* n.sp. The body-whorl has thirteen spiral cords below shoulder and four or five weak ones on tabulation; spire-whorls with five cords below shoulder. The apex is decollated. There are nine axial varices on the body, more closely spaced than those of *octogonus*, but rather more distant than those of *proavitus*, from which it is also distinguished by the strongly tabulated whorls, fewer axials, lack of heavy varices on shoulder, and five as against three spiral cords below

shoulder of spire-whorls. In features of aperture it is closely similar to the Ardgowan species. The more strongly differentiated shoulder and absence of spiral depression rapidly contracting the base provide a ready means of separation from *octogonus*.

Height, 41.0 mm.; width, 20 mm. (holotype).

Locality, Awamoa Creek, near Oamaru (Awamoan).

Type in writer's collection.

These two Awamoan species are evidently closer to *octogonus* than are the Hutchinsonian ones from Clifden, described by Finlay (*Trans. N.Z. Inst.*, vol. 61, pp. 72-74; 1931).

***Murexsul lividorupis* n.sp. (Fig. 30).**

Shell small, spire of less height than aperture plus canal, not stepped; whorls about four in number, evenly convex. Spiral sculpture of seventeen regular scaly cords on body-whorl, rather weaker above periphery; six or seven on whorls of spire; a few interstitial spirals on base. Axials (nine on last whorl) low, broad, convex, the interspaces of less width; axials extending across entire whorl, flexed anteriorly above. Inner lip callused, not strongly excavated; outer lip broken back; anterior portion of canal also broken off. The low, rounded axial corrugations, the regular, scaly spirals over whole surface, and the lack of shoulder on whorls are distinctive.

Height (estimated), 20 mm.; width, 12 mm.

Locality, Blue Cliffs, South Canterbury (Hutchinsonian).

Type (sole specimen) in writer's collection.