New Tertiary Mollusca from Timaru District, South Canterbury, New Zealand.

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RECENT collecting has enabled the writer to add considerably to the faunal lists of one or two fossil localities in the district around Timaru. The most up-to-date lists available are those given in the *N.Z. Geological Survey Palaeontological Bulletin* No. 8 (1921). This Bulletin lists 32 species from the beds at Sutherlands, Tengawai River; but in an earlier list Gudex (*Trans. N.Z. Inst.*, vol. 50, pp. 244-62; 1918) gives 64 species of molluscs from that locality. In one day's collecting, however, the present writer succeeded in doubling the number of records from the outcrop at Sutherlands, bringing the number up to 121 species, which is in excess of that recorded from White Rock River.

The horizon is undoubtedly the same as that at White Rock River, not many miles distant, for the faunas of these two localities are almost identical. The state of preservation of the fossils at Sutherlands is, however, in marked contrast with that of the shells from the beds at White Rock River, at which locality it is rare to find a shell that has not been worn. Obviously the conditions of deposition differed at these two stations, sedimentation having proceeded a good deal more quietly at Sutherlands, while at the present White Rock River station the accumulating sediments must have been travelling under the impulse of a powerful current. Probably, then, the White Rock River fauna is not representative of the one, if any, that existed at that particular station, but is a record of molluscs that lived under more favourable conditions on some adjacent part of the ancient sea-floor, where the accumulating sediments were not being rapidly transported.

At Holme Station, near the lower end of Pareora Gorge, there is an outcrop along the hillside near the road, and in lithology and fauna the beds here are closely similar to those at Sutherlands, the brown sands again having interstratified bands of a calcareous nature. The beds are not as well exposed as those along the Tengawai, and a large collection was not attempted.

The brown sands with an Awamoan fauna outcrop also in bluffs on the left side of Opihi River, about three miles above its confluence with Tengawai River at Pleasant Point. The molluscs here are often rather decomposed, and the outcrop is not easy to collect from owing to deep, stagnant pools along one of the flood channels of the river close against the base of the cliffs.

The blue clays exposed on the left bank of Pareora River at the lower end of Pareora Gorge, about half a mile upstream from the outcrop of Awamoan beds at Holme Station, are the stratigraphic equivalent of the blue clays so well exposed along the Otaio River

further south (Gudex, *Trans. N.Z. Inst.*, vol. 50, p. 244; 1918). Their fauna contains many Awamoan species, but the presence of such species as *Zexilia dalli* (Suter), *Globisinum crassiliratum* Finlay, *Austrofusus affiliatus* Finlay, *Parasyrinx subalta* (Marshall and Murdoch), *Poirieria primigena* Finlay, *Acuminia biplex* (Hutton), and a number of undescribed forms, points to a connection with the Hutchinsonian fauna at Otiake. This resemblance has already been remarked on by Thomson, from information furnished him by Finlay (*N.Z. Journ. Sc. and Techn.*, vol. 8, No. 3, p. 155; 1926).

The writer wishes to acknowledge his indebtedness to Dr H. J. Finlay for criticism and for the loan of material.

Genus CARDIUM Linné, 1758.

Type: *Cardium costatum* Linné.

Cardium gudexi n. sp. (Figs. 7, 14).

Shell large, of very heavy build, strongly inflated, considerably attenuated posteriorly. Anterior end evenly and broadly convex; posterior end narrowly rounded below, very lightly convex above; beaks almost at anterior fourth, incurved, flattened in the plane of the hinge, directed forward. Ventral margin very strongly dentate. Sculpture of 38 broad, flat radial ribs, separated over centre of valve by linear grooves; on posterior area ribs not so well defined and grooves a little more open. As a result of decortication towards the beaks the radials stand out clearly, separated by flat-floored grooves whose width is less than that of the ribs. The whole are crossed by a system of fine, slightly wavy striae, those in the grooves faintly convex ventrally; those on the ridges convex dorsally. Muscular impressions strongly incised, the posterior one the larger; pedal retractor scar separate, narrowly elongate dorso-ventrally. Hinge with two cardinal teeth, the dorsal one slightly anterior to beak; lower cardinal much larger, slightly behind beak, arising at edge of hinge-plate and elongated antero-dorsally. Cardinals separated by a channel opening into a very deep triangular pit anterior to lower cardinal. Anterior laterals separated by a broad, deep pit; lower one large and heavy, upper almost completely broken away. Posterior lateral tooth near remote end of hinge-plate; nymph broad and strong.

Height, 85 mm.; length, 96 mm.; thickness (one valve), 40 mm.

Locality: Sutherlands, Tengawai River, South Canterbury (Awamoan).

Type (a single right valve) in writer's collection.

This species is a near relative of *C. spatiosum* Hutton, with which it agrees very closely in shape of valve. The adult *spatiosum*, however, is more elongate, a good deal larger, and has tuberculate ribs and much wider grooves. *Gudexi* is obviously distinct from *C. strangi* Laws in shape of valve and in possessing much more massive hinge characters; the whole shell is of much heavier build than *strangi*, and has only 38 ribs as against 50.

Subgenus TRACHYCARDIUM Mörch, 1853.
Type: *Cardium isocardia* Linné.

Cardium (Trachycardium) cantuariense n. sp. (Figs. 1, 4, 5).

Shell large, well inflated, fragile; anterior end strongly convex above, rapidly retreating postero-ventrally below; posterior end descending almost straight. Whole dorsal margin straight and horizontal in one specimen; in another shell the anterior dorsal margin straight and gently descending. Beaks at middle, directed forwards a little, well incurved. Posterior margin arched outwards from plane of contact of valves (as in a specimen of *C. greyi* Hutton from Oneroa, Waiheke Island), so that valves appear to have been gaping. Sculpture of 62 low, flat radial ribs, separated by very narrow, almost linear grooves. On posterior part of valves the ribs are ill-formed, and it is the margin of this area that has been referred to above as being depressed below plane of contact of valves. Anterior, ventral, and posterior margins all dentate. Muscular impressions very weakly shown, posterior one large and circular, anterior one large and oval with its long axis vertical. Hinge very light, scarcely any differentiation into hinge-plate; teeth also small (for size of shell) and light of build. Right valve with two cardinal teeth, the lower one immediately below beak, high and conical, the upper cardinal a little in front of beak, oblique, low behind, and more elevated in front. The anterior side of the lower cardinal rises as a vertical wall bounding the very deep socket in which the main cardinal of left valve articulates. Left valve with large peg-like anterior cardinal; posterior dorsal cardinal broken away; the laterals distant from beak, elongated, light, narrow; posterior one arising from margin of valve, which is here not appreciably thickened into a hinge-plate.

Dimensions (the valves are not a pair); Right valve, height, 89 mm.; width, 101 mm.; thickness, 34 mm. Left valve (corresponding dimensions), 91 mm., 95 mm., 29 mm.

Locality: Sutherlands, Tengawai River, South Canterbury (Awamoan).

Types (odd right and left valves) in writer's collection.

This is no doubt the shell identified at the above locality as *C. greyi* Hutton (*N.Z. Geol. Surv. Pal. Bull.* No. 2, p. 56). It is not uncommon at Sutherlands, but it is difficult to collect. It is a close relation of *C. greyi*, but differs in having broader, lower, and flatter ribs with narrow interstices, which decrease in width ventrally and do not become wider as in *C. greyi*. The adult is smaller than that of Hutton's species, and the whole shell is a good deal less massive, the hinge and teeth being much lighter. The teeth, in fact, appear unduly small in contrast with the size of the valve. The species just described has been compared with a specimen of *C. greyi* from Oneroa, Waiheke Island, Auckland.

Genus ANGULUS Megerle, 1811.

Type: *Tellina lanceolata* Linné.

Subgenus PERONIDIA Dall, 1900.

Type: *Tellina albicans* Gmelin (*nitida* auct.).

Angulus (Peronidia) artus n. sp. (Figs. 11, 12, 13).

This is a very closely related ancestor of the Recent *A. edgari* (Iredale). It differs in having greater length relative to height, the posterior end being more produced and the postero-dorsal margin less rapidly descending; anterior end more narrowly rounded, and antero-dorsal margin a little straighter. The cardinal teeth of both species are the same, but the laterals are longer and more lamellar in the Miocene shell. The dorsal boundary of sinus arises at mid-anterior edge of posterior adductor, trends antero-dorsally about parallel with postero-dorsal margin of valve, and then suddenly bends around to run parallel with antero-dorsal margin of shell. The angle formed by change in direction of dorsal margin of sinus is high up and almost vertically beneath beaks in *A. edgari,* but lower, more obtuse and posterior to beaks in the new species. Fine internal radiations present in both species; in addition to these there are three low, wide, radial corrugations, seen only internally, and traversing a narrow zone of valve immediately anterior to the twisted posterior end. Left valve more convex than right valve. Sculpture of low, concentric ridges, closely packed together; towards posterior and over the angulation they become raised, narrow lamellae (seen only on a paratype).

Height (right valve), 16.5 mm.; length, 30 mm. Left valve (corresponding dimensions), 19.5 mm.; 34 mm.

Locality: Sutherlands, Tengawai River, South Canterbury (Awamoan).

Type and several paratypes in writer's collection.

Angulus (Peronidia) tumens n. sp.

Closely allied to the preceding species and intermediate between it and the Recent *A. edgari.* The ratio of length to height is not so great as that for *artus,* but greater than that for *edgari.* The characters of pallial sinus and hinge are identical in both the fossil species, but the ventral edge of valve is more convex in *tumens,* and its right valve is typically more inflated than that of either *artus* or *edgari.*

Height (right valve), 18.0 mm.; length, 29 mm.

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

Type and a number of paratypes in collection of Dr H. J. Finlay, Dunedin.

The characters separating *artus* from *tumens* are admittedly of subspecific significance only, but for the purposes of palaeontology it seems wisest to avoid the use of a trinomial.

The writer's thanks are due to Dr Finlay for permission to describe this species.

Genus FINLAYELLA n. gen.

Type: *Finlayella sinuaris* Laws.

This genus is provided to accommodate *F. sinuaris* n. sp. (described below) and *F. imbellica* (Marwick) from the Chatton sands. Several undescribed fossil species are also known.

Maoritellina was proposed by Finlay (*Trans. N.Z. Inst.*, vol. 57, p. 466; 1926) for *T. charlottae* E. A. Smith, but Marwick (*N.Z. Geol. Surv. Pal. Bull.* No. 13, p. 74; 1931) has pointed out that this genus is based on a misconception of *T. urinatoria* Suter. In the same place (loc. cit., p. 75) Marwick has described species agreeing well with Suter's figure of *M. charlottae*. In the absence of actual specimens of *charlottae* it is difficult to be sure of true *Maoritellina*, but the group seems to consist of flattened, moderately produced shells without rostral twist or lateral teeth. *Imbellica* and the present species are much more convex and trigonally ovate, and have distinct lateral teeth and rostral twist, and are evidently not *Maoritellinas*.

But the most curious feature of these two species, a feature that has led without hesitation to the creation of a new genus, and one so far seen in no other Tellinids, is the asymmetrical development of the pallial sinus in the right and left valves respectively (see description of species below). Three pairs of valves were collected, five valves at Sutherlands and one at White Rock River, and this peculiar feature of the sinus is found to be quite constant for each set.

The writer is pleased to name this genus in honour of Dr H. J. Finlay, of Dunedin.

Finlayella sinuaris n. sp. (Figs. 2, 3, 6).*

Shell small, fragile, well rounded over anterior end, strongly angled posteriorly. Beaks a little posterior. Antero-dorsal margin slightly curved; postero-dorsal one straight, descending more rapidly than antero-dorsal one. Posterior end bent to right. Sculpture of fine, dense concentric growth-lines, and in addition four or five sharp, distant lamella-like threads, regularly spaced and developed all around margins, and converging to beaks. Posterior flattened area carries several low, wide radial undulations. Right hinge wider in front than behind; it has two triangular cardinals, the posterior one bifid; the cardinals separated by a deep pit immediately below umbo; lateral teeth thin and sharp, anterior one arises nearer umbo than does posterior one. Left hinge with a narrow, vertical cardinal equally bifid and with wide triangular depressions on each side; hinge-plate not differentiated from margins of valves. Pallial sinus of right valve wide, sharply rounded at extremity, reaching a little over halfway across valve; that of left valve wide, very deep, bluntly rounded at extremity, reaching almost to anterior adductor scar. Valve margins smooth.

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* *Finlayella* has a Pliocene representative in *Macoma subtriquetra* Bartrum and Powell, a Waitotaran fossil from Kaawa Creek.

Height, 7.0 mm.; length, 9.2 mm.; thickness (one valve), about 1.2 mm.

Localities: Sutherlands, Tengawai River, South Canterbury (type and several paratypes); White Rock River, South Canterbury (a single left valve). These are Awamoan horizons.

Type in writer's collection.

The posterior angulation is more marked in this species than in *F. imbellica* (Marwick) and the shell is less equilateral.

Genus CONOMINOLIA Finlay, 1926.

Type: *Heliacus conicus* Marshall.

Conominolia woodsi n. sp. (Figs. 31, 39).

Shell small, spire elevated, conical; umbilicus rather narrow, strongly penetrating; shell ornamental with spiral cinguli. Spire stepped at sutures, its outlines straight usually, but in some shells a little convex. Protoconch polygyrate and pointed, nucleus very small; embryo unsculptured, probably of about two volutions, but brephic stage not definitely marked off from embryonic. The first post-nuclear whorl is marked by three weak spirals; the second still has three, but they are finely beaded; the next whorl carries four and the next five, the cinguli being now more conspicuously beaded. The body-whorl bears six spirals above periphery, and eight on the base, the eighth bordering the umbilicus, and being more strongly nodulated. All spirals are thin and sharply elevated, and are separated by wide, faintly concave interstices; the first spiral below suture is always the weakest. The beads on the cinguli occur where these cords are crossed by the quite distinct, evenly-spaced lines of growth, which are retracted from upper suture. Umbilicus perspective, unsculptured except for one or two spirals immediately below the nodulated peripheral cord. Base lightly convex. Aperture subrhombic; pillar obliquely set and sinuous. Height of spire about twice that of aperture.

Height, 4.5 mm.; diameter (greatest), 4.0 mm.

Localities: Sutherlands, Tengawai River, South Canterbury (type); White Rock River, South Canterbury; Holme Station, Pareora River; Opihi River; Target Gully shell-bed, Oamaru; Ardgowan shell-bed, Oamaru. All these are Awamoan horizons.

Type in writer's collection.

This is a very common fossil at Sutherlands and at White Rock River. The shells from the former locality are on the whole larger than the White Rock River ones, and have the spire somewhat more elevated.

The species is distingushed from *C. vixincisum* (Marwick) from Chatton, by its much stronger development of spiral corrugations and lack of any strong cord on periphery of body-whorl. *C. vixincisum* has a relatively much narrower umbilicus. Most of the Chatton shells are decorticated specimens, and it is rare to find one that has the outer layer preserved.

C. sulcatina (Suter) from the tuffs at Kakanui is a larger species, has six as against one spiral within the umbilicus, the spirals unequal and considerably stronger on the base than elsewhere, and more numerous (about 10 as against 6 in *woodsi*) above periphery of body-whorl.

C. conica (Marshall), the genotype, has upper spiral of whorls strongly beaded, the others much less so; the spirals are more numerous, about 6 as against 3 or 4 in *woodsi.*

Named in honour of Mr A. J. Woods, M.A., of Dunedin Training College.

Genus POLINICES Montfort, 1810.

Type: *Polinices albus* Montfort (= *Natica mammillaris* Lamk. = *Natica brunnea* Link).

Subgenus *Polinella* Marwick, 1931.

Type: *Uber obstructus* Marwick.

Polinices (Polinella) fryei n. sp. (Fig. 30).

Shell large, of fairly heavy build, not as elongate as *P. obstructus,* and body-whorl more swollen. Spire about half height of aperture, acuminate. Whorls 4½, the last two enlarging very rapidly, lightly convex, but body-whorl straight just below suture. Apertural callus not spread widely, descending somewhat narrowly over umbilical region, but not as narrow as that of *P. obstructus.* Funicular swelling present, but umbilicus well open anteriorly, though soon closing behind. Posterior end of callus separated from outer lip by a deep, narrow channel. Callus with two grooves, the lower one not distinct as result of abrasion; upper one placed almost exactly as is that of *P. obstructus,* the lower running horizontally across callus from a point near top of funicle, and not so low, therefore, as is that of the genotype.

Height, 41 mm.; diameter, 34 mm.

Locality: White Rock River, South Canterbury (Awamoan).

Type (unique) in writer's collection.

P. modestus (Marwick) is a much smaller species with almost flat spire-whorls and umbilicus entirely covered by callus.

Named in honour of Mr N. A. Frye, B.A., its discoverer.

Genus UBERELLA Finlay, 1928.

Type: *Natica vitrea* Hutton.

Uberella acerva n. sp. (Fig. 32).

Shell large for this genus, obliquely oval, spire rather elevated, stepped, whorls strongly convex. Protoconch with large nucleus, paucispiral. Whole surface covered by weak spiral lines, some finer than others, the strongest forming a subsutural ridge. Axial growth-ridges oblique, retrocurrent from upper suture, strong around subsutural border and over whole surface of last whorl towards outer lip. Suture abutting. Callus of aperture narrow, widest above and

tapering downwards, a little swollen where bordering umbilicus, which is distinctly open but not wide. Outer lip strongly antecurrent to suture.

Height, 11 mm.; diameter, 9.0 mm.

Localities: Sandy clays above limestone, Blue Cliffs, South Canterbury (type); blue clays on left bank of Pareora River below lower end of Pareora Gorge. Both of these are Hutchinsonian horizons.

Type and many paratypes in writer's collection.

This species comes nearest to *U. pseudovitrea* (Finlay), but differs in being of larger size and in having more tabulated whorls, stronger spiral sculpture and wider umbilicus, with swelling on callus of umbilical border.

At Otiake there occurs a new species which has a more widely open umbilicus and less distinct funicle.

Genus HYALOSCALA de Boury.

1889. *Rev. Scal. d'Italie,* 14, p. 90.

Type: *Scalaria clathratula* A. Adams.

Hyaloscala muricata n. sp. (Figs. 19, 36).

Shell small, elongately conic, of about 7 post-nuclear whorls. Whorls strongly convex; suture well cut in. Sculpture of numerous, very oblique, thin, sharply raised lamellae, retrocurrent from upper suture, and about 30 on last whorl. Each rib is muricated just before reaching summit of whorl. The lamellae are continued to suture and twisted over just before reaching it. No spiral sculpture present. Embryo broken off. Aperture circular, peristome continuous, but thin over parietal wall. Columella arcuate. Ribs continued over base to umbilical region.

Height (estimated), 5.5 mm.; width, 2.0 mm.

Localities: Sutherlands, Tengawai River, South Canterbury (type); Ardgowan shell-bed, Oamaru (a fragment). Both are Awamoan horizons.

Type in writer's collection.

This species comes near to the Recent *H. jukesianum* (Forbes), but is slenderer and has thinner, closer, more oblique and muricated summits to axials. There is no trace of a fasciole swelling around the inner lip.

This is the first Tertiary representative of true Scalidae to be recorded from New Zealand, and since, so far as the writer knows, no Pliocene form has yet been found, *jukesianum* may possibly be exclusively a Recent development. As the Miocene species is rare, however, the possibility of a Pliocene representative cannot entirely be ruled out.

Genus EULIMA Risso, 1826.

Type: *Turbo politus* Linné.

Eulima otaioensis n. sp. (Fig. 25).

Shell large, elongate, conic, imperforated, surface shining. Outlines of spire straight. Protoconch not well seen, slightly tilted. Post-embryonic whorls 13½, early ones flat, later ones bulging below and overhanging succeeding volutions. Growth-lines fairly distinct and regularly spaced, antecurrent from upper suture. Over lower half of last few whorls the growth-lines are latticed at right angles by oblique, low, rather indistinct, raised lines, situated more than their own width apart. Varices oblique, sporadic. There are several faint spirals around periphery of last whorl, that on the periphery being the strongest. Aperture widely rounded in front, sharply angled behind; outer lip sinuous, thin, sharp; columella set vertically, arcuate, expanded at insertion.

Height, 19 mm.; width, 5 mm.

Locality: Sandy clays above limestone, Blue Cliffs, South Canterbury (Hutchinsonian).

Type (unique) in writer's collection.

This shell is extremely closely allied to the Australian *E. donae* Ten.-Woods, from which it differs mainly in size, the adult of *E. donae* being considerably larger. The Australian shell further has subsutural part of whorls more excavated and the swelling of lower portion more pronounced and wider; varices not so oblique; and the oblique lines crossing growth-lines are thin, wavy, irregular, and appear more like cracks in the outer layer of the shell. Fig. 24 represents a specimen of *E. donae* from the Janjukian beds at Gellibrand River, Victoria.

E. waihaoensis Allan, a Tahuian species from McCullough's Bridge, has periphery of body-whorl more sharply rounded, whorls flat and not overhanging, and suture quite indistinct.

Genus COMINELLA H. and A. Adams, 1853.

Type: *Buccinum maculosum* Gmelin.

Subgenus ACOMINIA Finlay, 1926.

Type: *Buccinum adspersum* Bruguière.

Cominella (Acominia) scirrifer n. sp. (Figs. 29, 33).

Shell of moderate size and of heavy build, periphery of whorls carinated. Spire a little less in height than aperture plus canal, its outlines straight. Whorls very much embracing, so that suture reaches up to the nodulated periphery, over which it undulates, obscuring the lower half of each nodule. Whorls excavated a little above carina, sometimes flat though. A wide subsutural swollen band is present, becoming more prominent and heavy on last whorl. Whole surface covered by flat, slightly wavy spiral cords, separated by interstices usually narrower than the cords; about 10 cords on shoulder, 11 on base between periphery and fasciole. Peripheral

tubercles are distinct rounded knobs, 10 or 11 on penultimate whorl; only 7 on body-whorl, as they become obsolete towards aperture, i.e., over about last third of whorl. Fasciole strongly developed; a thick, heavy ridge arises just below middle point of inner lip and twists anteriorly to end at the deep notch of the canal. Between this ridge and the columella there is a fairly deep, wide depression, which narrows and steepens posteriorly to enter a small umbilicus. Lines of growth distinct, sinuous in conformity with curve of outer lip. Protoconch (tip decollated) of about two apparently smooth turns, only a little swollen.

Height, 34 mm.; width, 23 mm.

Locality: Sutherlands, Tengawai River, South Canterbury (Awamoan).

Type and a paratype in writer's collection.

This is probably the shell identified by Suter as *C. carinata* (Hutton) in the list of fossils from Sutherlands (*N.Z. Geol. Surv. Pal. Bull.* No. 8, p. 56, 1921). The angled periphery set with tubercles differentiates this species from others of similar build. It is probably nearest to *Acominia crassinodosa* Marwick (*N.Z. Geol. Surv. Pal. Bull.* No. 13, p. 116; 1931), but differs at sight in many respects, notably in having many and closer spirals on shoulder, taller spire, straight outline below periphery of body-whorl, and less heavy parietal callus.

Genus ZAFRA A. Adams, 1860.

Type: *Zafra mitriformis* A. Adams.

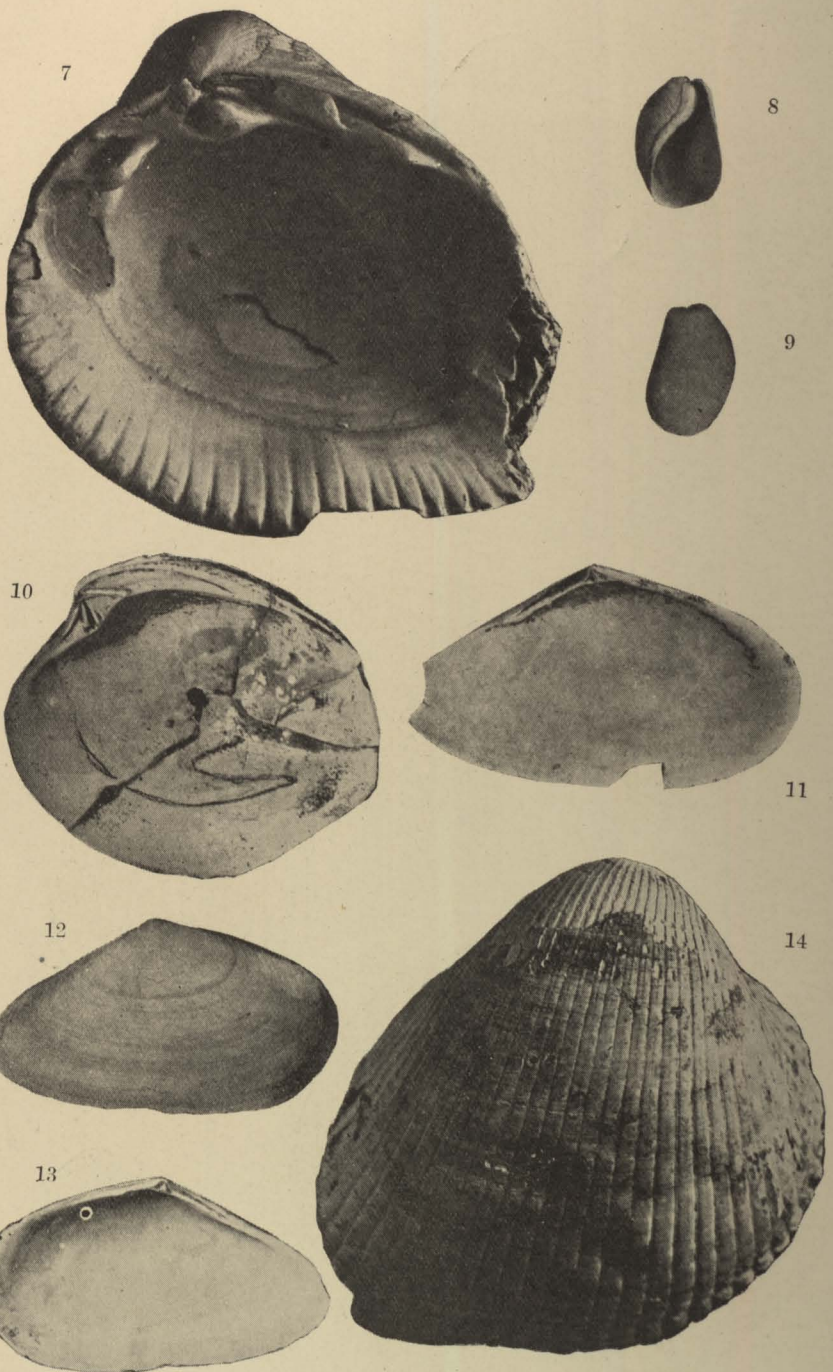
Zafra opihiensis n. sp.

Shell very small, spire conic, a little higher than aperture plus canal. Suture not very distinct, margined below by a swollen spiral band. Whorls very faintly convex. Outline of spire straight. Sculpture of axial ribs and spiral ridges. Axials (11 or 12 on penultimate whorl) extending across whole width of spire-whorls, but becoming obsolete below periphery of last whorl and towards outer lip; axials nodulated where crossed by the heavier spirals. Interspaces about same width as axials. The spirals are four in number on penultimate and antepenultimate whorls, the upper two strong and nodulating the axials. On body-whorl the two strong upper ones are still present, and several very faint spirals below them over centre of whorl; on the base there are 11 quite strong, regular spirals separated by grooves somewhat narrower than the ridges. Protoconch polygyrate and pointed. There are about four post-embryonic volutions. Aperture narrow, wider behind; a wide canal in front. Outer lip straight above, then bent round towards axis of shell to form side of anterior canal; five denticles within, becoming more prominent towards posterior. Columella ridged vertically by outer margin of callus; this ridge is a little nodulated where basal spirals pass under it. Columellar folds 2, the stronger below and only a faint swelling above; both well inside aperture.

Height, 4 mm.; width, 2 mm.

FIGS. 1, 4, 5.—*Trachycardium cantuariense* n. sp.; types, × 0·8.
FIGS. 2, 3, 6.—*Finlayella sinuaris* n. gen. et sp., × 3·2.

Face p. 324.]



FIGS. 7, 14.—*Cardium gudexi* n. sp.; holotype, × 0.8.
FIGS. 8, 9.—*Scaphander scapha* n. sp.; holotype, × 3.3.
FIG. 10.—*Bassina speighti* (Suter), × 1.1.
FIGS. 11, 12, 13.—*Angulus (Peronidia) artus* n. sp.; types, × 1.6.

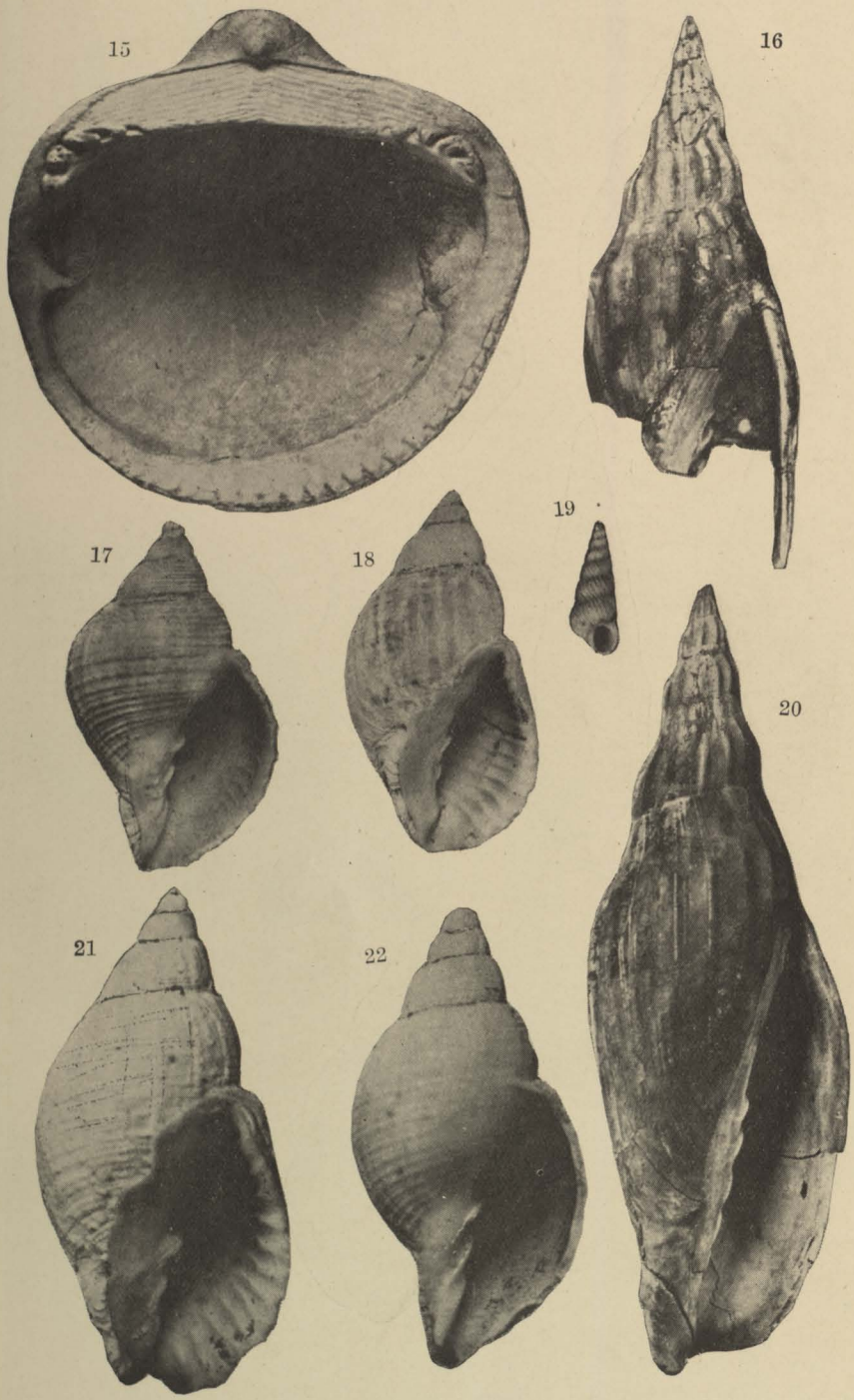
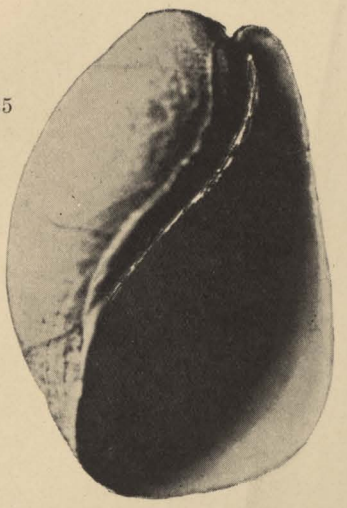


FIG. 15.—*Glycymeris thomsoni* Marwick, × 0·8.
FIG. 16.—*Spinomelon otaioensis* Laws; holotype, × 1·0.
FIG. 17.—*Maorivetia brevirostris* (Hutton), juvenile, × 1·5.
FIG. 18.—*Aphera (?) scopalveus* Finlay, Ardgowan, × 2·3.
FIG. 19.—*Hyaloscala muricata* n. sp.; holotype, × 3·1.
FIG. 20.—*Spinomelon evelynae* n. sp.; holotype, × 0·7.
FIG. 21.—*Aphera (?) scopalveus* Finlay, topotype, × 2·1.
FIG. 22.—*Maorivetia brevirostris* (Hutton), juvenile, × 3·2.

FIG. 23.—*Maorivetia brevirostris* (Hutton), × 1.1.
FIG. 24.—*Eulima donae (Tennison-Woods)*, × 2·1.
FIG. 25.—*Eulima otaioensis* n. sp.; holotype, × 3·2.
FIG. 26.—*Zeacuminia cantuariensis* n. sp.; holotype, × 2·4.
FIG. 27.—*Spinomelon evelynae* n. sp., juvenile, × 1·1.
FIG. 28.—*Zeacuminia cantuariensis* n. sp.; paratype, × 2·4.
FIG. 29.—*Cominella (Acominia) scirrifer* n. sp.; holotype, × 1·0.
FIG. 30.—*Polinices (Polinella) fryei* n. sp.; holotype, × 1·1.
FIG. 31.—*Conominolia woodsi* n. sp.; holotype, × 3·2.
FIG. 32.—*Uberella acerva* n. sp.; holotype, × 3·3.
FIG. 33.—*Cominella (Acominia) scirrifer* n. sp.; holotype, × 1·5.
FIG. 34.—*Cronia tengawaica* n. sp.; holotype, × 3·2.



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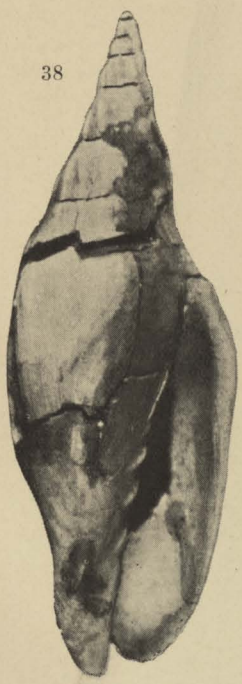

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FIG. 35.—*Scaphander scapha* n. sp.; holotype, × 9·6.
FIG. 36.—*Hyaloscala muricata* n. sp.; holotype, × 9·6.
FIG. 37.—*Cronia tengawaica* n. sp.; holotype, × 2·0.
FIG. 38.—*Spinomelon otaioensis* Laws; topotype, 0·8.
FIG. 39.—*Conominolia woodsi* n. sp.; holotype, × 10·2.

Locality: Opihi River, South Canterbury (Awamoan). The outcrop is about three miles above the confluence of the Opihi and Tengawai Rivers, in bluffs on the left side of the river.

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

This species resembles *Z. darwini* Angas as figured by Hedley (*P.L.S.N.S.W.*, 39, p. 740, Pl. 83, Fig. 74) from Queensland.

An undescribed related species with taller spire, lacking the subsutural spiral tumidity of *opihiensis* and possessing other differences in sculpture, occurs in the shell-bed at Target Gully, Oamaru.

A figure of this shell will be supplied in a later paper.

Genus CRONIA H. and A. Adams, 1853.
Type: *Thais amygdala* Kiener.

Cronia tengawaica n. sp. (Figs. 34, 37).

Shell small, solid, turriculate. Spire a little less in height than aperture plus canal. The sculpture consists of prominent rounded, distant axial ribs (10 on body-whorl), a little over their own width apart, extending entirely across spire-whorls, though weaker on the shoulder, and reaching almost to anterior end of base. Spiral cords are strongly developed. On spire-whorls the strongest cord is on the carina which is about central; on body-whorl there are two especially prominent cords, one at the periphery and the other just below. The penultimate whorl has 8 spirals; the body-whorl carries 6 on the shoulder (the third one above periphery stronger than the others), and about 7 main ones below periphery, with a number of interstitial riblets. The axials are nodulated where crossed by cords, the strongest nodulations being on the keel. The cords in places are slightly scaly where crossed by growth-lamellae. Aperture much as in *C. pseudamygdala,* narrowly oval, channeled behind; a short, moderately wide, deep canal in front. Inner lip depressed, callused thinly. There is a wide, shallow groove on columella just below point of origin of fasciole, which is moderately strong. Outer lip with 8 quite prominent denticles a little inside. Nuclear whorls absent.

Height (estimated), 18 mm.; width, 10 mm.

Locality: Sutherlands, Tengawai River, South Canterbury (Awamoan).

Type (unique) in writer's collection.

The shell resembles *Lepsiella* somewhat, but has not been referred to that genus because of the deep notch of the anterior canal. It is more like *Cronia* in sculpture and general appearance, but has more shouldered whorls, stronger denticles within outer lip, and more ridged pillar. It is not smooth enough for *Agnewia,* and has no internal lirations as has that genus, so that in the meantime it seems best placed in *Cronia.*

The present shell has been compared with specimens of *C. pseudamygdala* (Hedley) from Sydney, from which it differs mainly in being a smaller shell with sutures not so high up, spire more stepped, and pillar more excavated. Both species are closely similar in sculpture, and carry 10 axials on the body-whorl.

Cronia along with other genera of the Thaididae is typically a littoral genus. So far the only other fossil species belonging to this family to be recorded from New Zealand are *Lepsiella intermedia* and *L. maxima,* both members of the Hutchinsonian fauna at Oneroa, Waiheke Island, described recently by Powell and Bartrum (*Trans. N.Z. Inst.,* vol. 60, p. 438; 1929).

VOLUTIDAE.

The following Volutes have been recently obtained from the blue clays at Blue Cliffs, Otaio River, South Canterbury.

Waihaoia (Teremelon) aff. *tumidior* (Finlay) and *awamoaensis* Marwick.

Spinomelon turrita (Suter). Topotypes.
„ sp. (also from Opihi River and Sutherlands).
„ n. sp. aff. *henryi* Laws.
„ *otaioensis* Laws. Topotype.
„ *evelynae* n. sp. (described below).
Metamelon aff. *prominima* Laws and *inermis* (Finlay).
Alcithoe cf. *lepida* Marwick and *reflexa* Marwick.
„ n. sp. aff. *scopi* Marwick.

Spinomelon evelynae n. sp. (Figs. 20, 27).

Shell large, spire three-quarters height of aperture. Embryo of two smooth turns, calcarella erect and sharp. Post-nuclear whorls about six, convex, with a wide, sloping, lightly concave shoulder; height of whorl relatively greater than that of *S. parki* (Suter). Body-whorl long, narrow, contracting slowly over base; fasciole prominent. Whorls strongly embracing and suture very tangential. Axial ribs 14 on upper whorls, 16 on last whorl; they are thin, moderately elevated, distant, and almost obsolete on shoulder of later whorls, but distinct across entire width of early post-nuclear whorls; on body-whorl the axials extend about half distance towards anterior end. Aperture and canal much as in *S. parki.* Columella a good deal less swollen over plaited portion than is that of *parki,* and the folds are six in number (posterior one very weak) and not so prominent. Outer lip convex, reflected, ascending penultimate whorl a little. Inner lip widely spread in characteristic *Spinomelon* fashion.

Height, 140 mm.; width, 43 mm.

Locality: Blue Cliffs, Otaio River, South Canterbury, blue sandy clays above limestone (Hutchinsonian).

Type and a number of fragmentary and juvenile paratypes in writer's collection.

This species is a very close relative of *S. parki,* but it is a more slender shell with higher spire, less swollen pillar with rather weaker folds, and has well developed axials persisting to outer lip. Fig. 27 represents a juvenile shell, and shows well the much greater elongation of this species.

Named in honour of my wife.

Spinomelon otaioensis Laws (Figs. 16, 38).

This species, which was described, but not figured, in a paper previously published*, is now illustrated. Fig. 38 is that of a shell, more complete than the type, which has been collected quite recently.

ZEACUMINIA Finlay, 1930.

Type: *Terebra sulcata* Marshall.

Zeacuminia cantuariensis n. sp. (Figs. 26, 28).

Related to *Z. pareoraensis* (Suter), with which it is associated at both the localities given below. It is, however, typically a stouter shell with a wider body-whorl. It is immediately separable from *Z. pareoraensis* by the nature of its axials, which are very fine, almost hair-like, closer, and much more numerous. On the penultimate whorl there are 32 to 34 axial ribs as against 20 in *pareoraensis*.

Height, 26 mm.; width, 7 mm.

Localities: Sutherlands, Tengawai River, South Canterbury (type); White Rock River, South Canterbury (two specimens).

Type and nine paratypes in writer's collection.

Z. pareoraensis is very plentiful at both of the above localities, White Rock River being the type locality for this species. Suter (*N.Z. Geol. Surv. Pal. Bull.* No. 5, p. 62; 1917) also records it from Blue Cliffs, but it was not found by the writer, who spent two days collecting at that locality. *Z. biplex* (Hutton) was, however, found to be quite common there.

Genus SCAPHANDER Montfort, 1810.

Type: *Bulla lignaria* Linné.

Scaphander scapha n. sp. (Figs. 8, 9, 35).

Shell small, fragile, narrower behind, wide across anterior, not umbilicate. Spire involute, apical pit fairly wide and deep; body-whorl embracing, and hiding all earlier volutions. Aperture very narrowly channelled behind, widely open and rounded in front; parietal wall covered by a thick callus; columella long, thin, arcuate. Sculpture of about 40 spiral cords (often arranged in pairs) separated by interstices whose width is subequal to that of cords.

Height, 5.5 mm.; diameter, 3.5 mm.

Localities: Sutherlands, Tengawai River, South Canterbury (type); Ardgowan shell-bed, Oamaru (a fragment). Both of these are Awamoan horizons.

Type and a paratype in writer's collection.

This species cannot be confused with *S. malleatus* Marwick, the only other one so far described from New Zealand. A related species occurs in the Ototaran beds at Chatton, and a larger, taller, and quite distinct species has been obtained from the Awamoan beds at Holme Station, Pareora Gorge.

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* *Trans. N.Z. Inst.*, vol. 62 (1932), p. 193.

Globisinum marwicki Laws. (*Trans. N.Z. Inst.*, vol. 61, p. 551; 1930.)

This species was founded on a single specimen from White Rock River. Two other specimens have since been collected, one at Holme Station, Pareora Gorge, and another at Sutherlands.

Maorivetia brevirostris (Hutton). (*Trans. N.Z. Inst.*, vol. 9, p. 596; 1877.)

This species occurs very abundantly at both White Rock River (the type locality) and at Sutherlands; it has also been collected at Holme Station, Opihi River, Dyer's Run (near Mt. Harris). In North Otago it is not uncommon at Ardgowan and at Target Gully. The holotype is a badly worn shell, as are most of the specimens from the type locality. Fig. 23 represents a very perfect shell collected at Sutherlands, and may be regarded practically as a topotype.

Aphera (?) scopalveus Finlay. (*Trans. N.Z. Inst.*, vol. 56, p. 246; 1926.)

Dr Marwick (*N.Z. Geol. Surv. Pal. Bull.* No. 13, p. 121; 1931) has stated his belief that this species is but the juvenile form of *M. brevirostris* (Hutton). The writer has recently collected two shells at Ardgowan, and one at Target Gully, all of which agree exactly with Dr Finlay's *A. scopalveus*. The development of apertural callus and thickened, corrugated outer lip show at once that these shells are adult. Differences from *M. brevirostris* other than that of sculpture are not wanting. *A. scopalveus* has constantly a smaller and sharper protoconch; the last whorl is less convex with a perceptible flattening out of body-whorl above towards the aperture (i.e., the outer lip expands below); the body-whorl is not rapidly contracted to axis below periphery; and there is no wide, deep channel above the fasciole. There seems, then, no necessity to consult the sculpture in order to establish specific distinction between these two forms. Figs. 17 and 22 represent juveniles of *M. brevirostris* inserted for comparison with *A. scopalveus* (Figs. 18, 21).

Bassina speighti (Suter) (Fig. 10).

The types come from the lower Gorge of the Waipara (lower horizon), and they are embedded in matrix. Dr Marwick in his revision of the Veneridae records the species from several North Island localities, the only South Island record being a fragment from Chatton. The writer has collected several specimens from Sutherlands, South Canterbury, and one of these, a complete right valve, is figured here, as Marwick's drawings represent only fragments. It will be seen that the pallial sinus is narrower, more acutely angled, and much longer than that of the Recent species, *B. yatei*. Dr Finlay has *speighti* also from Target Gully shell-bed and from horizon 8, Clifden, Southland (two broken specimens).

Height, 39 mm.; length, 45 mm.

Dosinia lambata Gould.

This Recent species has an extended range in time, for Dr Marwick records it from the beds at Trig. Z, Otekaike, Waitaki Valley (*Trans. N.Z. Inst.*, vol. 57, p. 584, 1927). Recently several good specimens have turned up at Sutherlands. Close comparison of these with Pliocene and Recent shells provides no means of making a good separation, the only observable differences being that the Miocene shells are rather less inflated, of lighter build, and a little more produced posteriorly. In the characters of hinge and sinus they all agree entirely.

Glycymeris robusta Marwick.

In addition to a large number of specimens of *G. huttoni* Marwick, collected at Sutherlands, six fine valves agreeing very closely with topotypes of *G. robusta* were obtained. *G. robusta* was found also at Opihi River and at a small outcrop on the right bank of the Otaio River, about two miles downstream from the blue clays at Blue Cliffs. The fauna and lithology at this restricted outcrop are a repetition of those at Sutherlands and at Holme Station.

Glycymeris thomsoni Marwick (Fig. 15).

A fine large specimen of this species has been collected at Otiake. It has been compared with topotypes of *thomsoni* from Chatton, and is here figured.