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One point often crops up in the examination of various fossil localities in the Tertiary rocks of New Zealand. In some strata there is a great predominance of gasteropods, while in others the lamellibranchs are far more numerous. So far as observations have gone up to the present time, this striking difference does not appear to be due to the depth of the water or to any other of the ordinary conditions that control the deposition of sediment.

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ART. XXI.—*Some Tertiary Mollusca, with Descriptions of New Species.*

By P. MARSHALL, M.A., D.Sc., F.G.S., F.N.Z.Inst., Hector and Hutton Medallist, and R. MURDOCH.

[Read before the Waunganui Philosophical Society, 3rd December, 1919; received by Editor, 31st December, 1919; issued separately, 10th June, 1920.]

Plates VI-X.

ADDITIONAL collections made at Waipipi and Nukumarū have produced several new species, and have also brought to light others not previously recorded from these horizons. These localities are not so accessible as the Castlecliff series, and have not been so carefully collected. Further, the Waipipi beds are not fossiliferous throughout, but fossils are restricted to short sections. One of the finest of these is rather below half-tide level and only available after certain weather conditions. During one visit it was sea-swept clean, and there was a most striking display of *Pectens*, *Cardium*, *Limas*, and other large forms. Almost without exception the collections hitherto made have not been assigned to any definite locality, with the result that Shakespeare Cliff, which was regarded as the equivalent of all the sands and blue clays of the district, is credited with species which do not occur therein. The coastal cliff from Castlecliff to Kai Iwi and thence to Nukumarū and Waipipi presents a perfectly unbroken series of beds older than those of Shakespeare Cliff. The faunal change, as might be expected, is very gradual, and it is only when horizons fairly distant are compared that a marked distinction is evidenced. Faunal lists from several horizons are recorded on pages 120-25 of this volume.

Hampden was visited by Dr. Marshall, who secured a number of undescribed species, several of which are too fragmentary to deal with, and it is abundantly evident that much collecting has yet to be done in that series of beds before a full knowledge of the fauna is obtained.

*Rissoina obliquecostata* n. sp. (Plate VI, fig. 1.)

Shell small, ovato-elongate, deeply impressed sutures and oblique axial riblets. Whorls six (the protoconch missing), rounded and narrowly shouldered, the last slightly produced at the anterior end. Sculpture consists of about twenty-nine narrow axial riblets, in width about half that of the interspaces, on the sutural shelf they are rather less pronounced, form a

spiral threadlets adorn the lower whorls throughout, that margining the suture comparatively large and with a sharply defined lower margin, a few minute threads on its flattened surface, on the last about fifty, those above the angle very slender, below with here and there an alternate larger and smaller threadlet, about equal to the grooves in width. Aperture: Outer lip imperfect; posterior sinus extending from the angle to the sutural cord; columella almost straight; callus thin, not obscuring the spiral sculpture.

Length, 22 mm.; width, 7 mm.

Locality, Hampden. Collected by Dr. Marshall.

Type to be presented to the Wanganui Museum.

Of this form there is only one example. Its nearest kin are perhaps *S. sertula*, *S. obliquecostata*, and *S. moilar*.

***Borsonia* (*Corderia*) *zelandica* Marshall. (Plate VI, fig. 8.)**

*Volutoderma zelandica* Marshall, *Trans. N.Z. Inst.*, vol. 51, p. 230, p. 17, figs. 4 and 5, 1919.

The material from which this species was described consists of two rather badly preserved specimens collected by Dr. Marshall at Hampden. The sculpture can be followed fairly well, and the position and form of the posterior sinus is clearly indicated by the well-marked growth-striae. The outer lip being broken away gives a somewhat marked prominence to the two small plaits on the columella, and this may in a measure have influenced the late Mr. Suter when he recommended its inclusion in *Volutoderma*. We offer a figure of the aperture restored as indicated by the lines of growth.

***Conus* (*Leptoconus*) *armoricus* Suter. (Plate VI, fig. 9.)**

*N.Z. Geol. Surv. Pal. Bull. No. 5*, p. 61, pl. 12, fig. 25, 1917.

As no description of the protoconch is recorded, we offer the following: The specimen has a total of nine and a half whorls, three and a half of which comprise the smooth protoconch, which is sharply conical and slightly oblique; whorls convex, with somewhat impressed sutures, the initial half-turn minute and somewhat laterally disposed, the third comparatively high, the last half narrowing and merging into the post-embryonic form.

Length, 21 mm.; width, 11 mm. (dimensions of specimen).

Locality, Pakaurangi Point, Kaipara Harbour. Collected by Dr. Marshall.

***Conus* (*Leptoconus*) *armoricus* var. *pseudoarmoricus* n. var. (Plate VI, fig. 10.)**

Shell small, spire low, gradated, the body elongated and sharply tapering. Whorls six, excluding the protoconch, which is missing; each whorl with a pronounced rim-like ridge, which overhangs and partly conceals the suture, giving to the volution a distinctly concave appearance; the last whorl immediately below the ridged shoulder slightly contracted. Sculpture: On the spire-whorls four or five small spiral threadlets, on the anterior area of the last about twelve well marked and obliquely ascending; above these a few ill-defined lines which probably are continued to the crown; axial growth-striae irregular, on the spire distinctly curved, indicating a fairly deep sinus. Aperture narrow; the margins almost parallel; outer lip imperfect.

Length, 18 mm.; width, 10 mm.

Locality, Hampden. Collected by Dr. Marshall.

Type to be presented to the Wanganui Museum.

Differs from *C. armoricus* by the spiral threadlets on the spire, the rim-like ridge which overhangs the sutures, and the accompanying concavity of the whorls. The material consists of a single example. *C. armoricus* is recorded from Komiti Point,\* Kaipara Harbour, and it is interesting to find a form so nearly akin in the Hampden beds.

**Melina zealandica** Suter. (Plate X, fig. 20; Plate IX, fig. 21.)

For all references see *N.Z. Geol. Surv. Pal. Bull. No. 5*.

A description derived from very fragmentary materials is given in the above-mentioned publication, pages 68, 69. Plate viii, fig. 4, is a part of the hinge; plate xiii, fig. 1, is the large fragment from Shrimpton's, and not *Ostrea mackayi*, and fig. 2 is the latter species.

The species is not uncommon in the Nukumarū and Waipipi beds; numerous large fragments, including an almost complete hinge of a right valve, were obtained. Another example of hinge partly embedded in rock has both valves locked in natural position. Attached to a mass of rock a complete valve was noted, which was much eroded, but presented an approximate indication of the general outline. From this, aided by large fragments, we derive the figure of the restored shell.

The shell is apparently subquadrate, somewhat swollen, the umbo near to the anterior end, the anterior ear small with the margin immediately below prominently inflexed. The ventral margin and posterior end may to some extent have been completely eroded, as the lamellar structure would lend itself to this, but it does not appear to have been prominently winged. The hinge is massive and wide, with four or five conspicuous resilifers. The length of the hinge exceeds 140 mm., and several measurements indicate that the united valves are not less than 90 mm. in diameter.

**Amphidesma (Taria) crassiformis** n. sp. (Plate X, figs. 22, 23.)

Shell of medium size, massive, triangular; beaks almost at the posterior end which is abruptly truncated, strongly and acutely angled; the anterior dorsal margin long, downward sloping and almost straight, the anterior end narrow and rounded, ventral margin slightly curved; the posterior truncation is slightly concave as it approaches the lip-margin, and on the end there are two, usually three, feebly-raised curved ridges. The median area of the valves and towards the ventral margin sometimes has a slightly concave appearance. Sculpture is irregular shallow concentric corrugations with fine striae, the latter on the posterior end pronounced. Hinge conspicuously massive; right valve with deeply excavate sockets above the laterals, the posterior much the shorter; in the left valve the anterior lateral elongated and with a double tubercle on its crest, the right short high and triangular; cardinals in both lamellar and oblique. Adductor-scars, pallial line, and sinus deeply impressed, the sinus short and with a broadly rounded apex. Lip-margins smooth.

Length, 80 mm.; height, 60 mm.

Locality, Nukumarū, in blue sandy clay.

Type to be presented to the Wanganui Museum.

Material consists of three valves, a right and left of which are almost perfect. Readily distinguished by its massiveness and the abrupt heavy truncation.

\* *C. armoricus* occurs at Pakaurangi Point, not Komiti Point, which is some two miles distant.

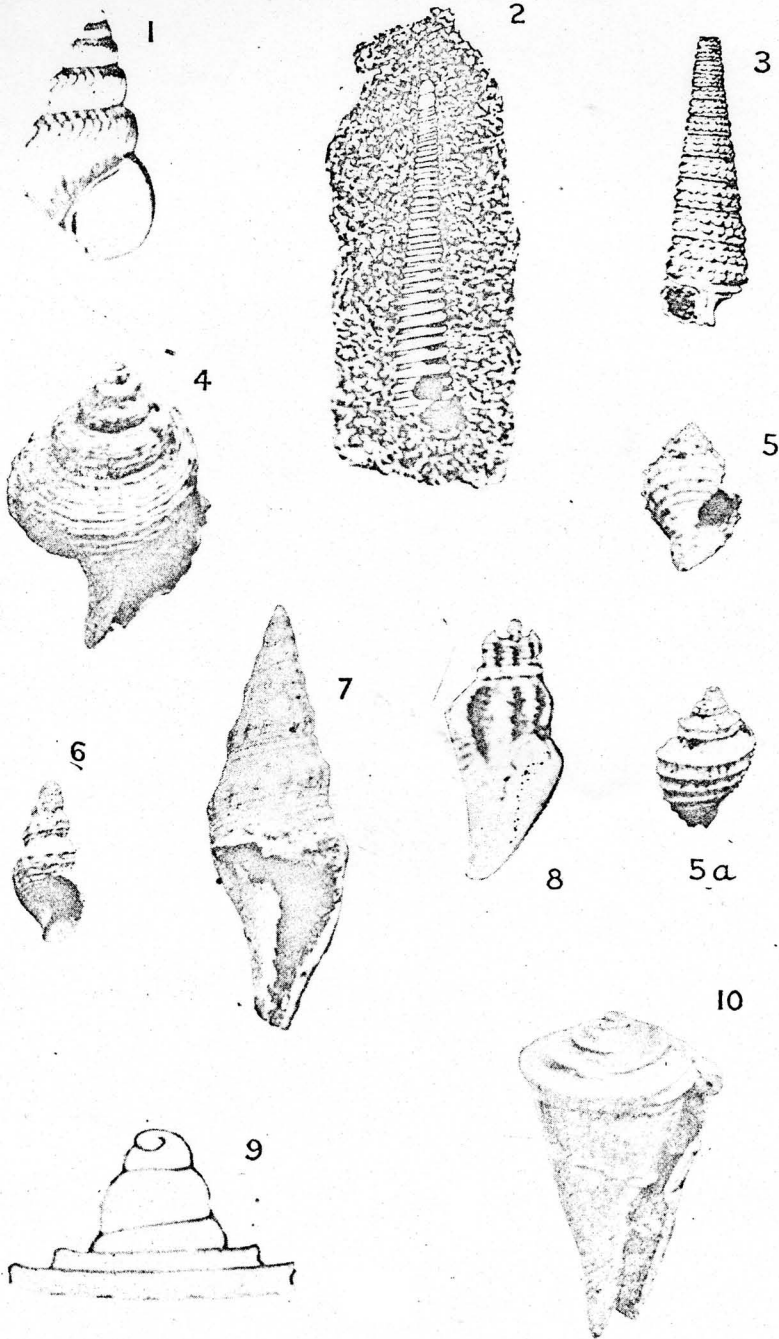


FIG. 1.—*Rissoina obliquecostata* n. sp.  
 FIG. 2.—*Scila attenuissima* n. sp.  
 FIG. 3.—*Triphora aoteaensis* n. sp.  
 FIG. 4.—*Siphonalia senilis* n. sp.  
 FIGS. 5, 5a.—*Admete suteri* n. sp.  
 FIG. 6.—*Admete anomala* n. sp.

FIG. 7.—*Surcula hampdenensis* n. sp.  
 FIG. 8.—*Borsonia zelandica* Marshall.  
 FIG. 9.—*Conus armoricus* Suter (protoconch).  
 FIG. 10.—*Conus armoricus* var. *pseudoarmoricus* n. var.