ART. II.—*The Geology of the Neighbourhood of Kakanui.*

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INTRODUCTION.

PREVIOUS geological work in the Oamaru coastal district has resulted in somewhat discordant conclusions. McKay (1877) has assumed an unconformity to exist between the Cretaceo-tertiary and Tertiary series, but he relies on differences of dip and on volcanic action as evidencing the existence of a land surface. It is pretty well agreed now, however, that the greater part, if not all, of the volcanic rocks in the district were ejected beneath the sea. Difference of dip at widely separated points carries no weight where the rocks have been folded and faulted as at Oamaru Cape, where McKay seeks to establish his unconformity. The supposed stratigraphical break, therefore, between a Tertiary and a Cretaceo-tertiary system does not exist, and there is no palaeontological ground for the recognition of the latter system so far as the Oamaru district is concerned.

Hutton (1887) placed a break between the Oamaru limestone and the overlying greensand in certain localities where a nodular band, described in detail below, is found to occur—viz., at All Day Bay and Deborah—but other observers except McKay have refused to recognize the unconformity Hutton did not rely on palaeontological evidence, and included both the greensand and limestone in his Oamaru system, but inferred an unconformity from the waterworn surface of the limestone and the difference of dip The evidence will be discussed in detail below.

Park (1905) introduced an altogether new interpretation of the succession when he stated that two limestones existed in the Oamaru district, separated by the Hutchinson Quarry and Awamoa beds, the lower being termed the Oamaru stone and the upper the Waitaki stone. It is certain that the limestone of the Devil's Bridge, which he calls the Waitaki stone, is not underlain, as he states, but overlain by glauconitic sandstone—the Hutchinson Quarry beds. The rocks underlying the limestone may be seen to the north at Brockman's Hill, and consist of tuff and a sill of dolerite dipping beneath the limestone—that is to say, the limestone of the Devil's Bridge has the usual stratigraphical position of the Ototara limestone, forming the middle member of the Oamaru system. It is only in the neighbourhood of Kakanui that Park shows the two limestones in superposition in the same section, and I shall endeavour to show below that he has misread the sequence. There are two limestones represented in the same section on the south side of the Kakanui River, but they are separated by volcanic rocks, and the upper limestone is followed by the Hutchinson

Quarry beds and the Awamoa blue clay. The complete sequence in the Oamaru coastal district, east of the Waiareka Valley, is as follows:—

Top.	Blue clay	Awamoa beds.
	Shell-bed . .	
	Greensand with *Pachymagas parki*	Hutchinson Quarry beds.
	Greensand with *Aetheia gaulteri*	
	Nodular bed with *Isis dactyla* and *Mopsea hamiltoni*	
	Limestone . .	Ototara limestone
	Brecciated pillow lava and tuff	
	Mineral breccia .	
	Marl .	
	Limestone	
	Fine brown tuff .	Waiareka tuffs
	Tachylite tuff (fine) .	
	Diatomaceous earth . .	
	Tuff	

In the following detailed accounts of sections in the neighbourhood of Kakanui the lists of fossils are the result of determinations of specimens collected afresh by myself, with a few additional brachiopods collected by Dr. Thomson The species marked with an asterisk have been determined by Mr H Suter in the case of *Mollusca* and by Dr. Thomson in the case of *Brachiopoda*, the remainder being determined by myself. The lists take no account of earlier determinations, and must not be regarded as complete lists, but rather as illustrations of the fauna Much promising work still remains to be done before the distribution of the fossils can be accurately known.

Detailed Account of Sections

(1) *All Day Bay*

This bay is situated in the extreme north-east of the Otepopo Survey District, and the section to be described is exposed on the southern side

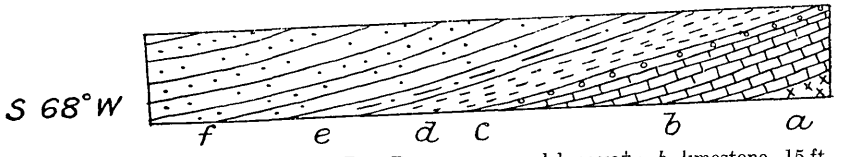

Fig. 1.—Section north end of All Day Bay. *a*, mineral breccia†; *b*, limestone, 15 ft thick; *c*, concretionary greensand band, 18 in thick; *d*, greensand, *e*, greensand; *f*, blue clay

of Kakanui Point. The point consists of a mass of volcanic breccia, and has been described by Thomson (1906) The section exposed on the coast immediately south of the point is shown in fig. 1.‡

† The "mineral breccia" was so termed by Thomson on account of the abundance of fragments of hornblende, feldspar, olivine, augite, garnets, &c, which it contains It is easily distinguished on this account from the other basaltic breccias and tuffs of the Oamaru district.

‡ The nature of this section has altered since my visit in 1903, probably by heavy seas removing gravel fallen down from the cliffs on to the beach, and it is now much clearer. This explains the difference between Mr Uttley's account, with which I agree entirely, and my earlier account, and probably also explains how Hutton could think there was an unconformity —J A T.

The breccia dips S. 60° W. at an angle of 8°, but the upper beds gradually flatten and the blue clay becomes almost horizontal.

The limestone is rather fine in texture, and contains cleavage fragments of minerals similar to those in the underlying breccia, but the junction appears quite conformable. In its upper portion the limestone becomes glauconitic, and gradually assumes the character of bed *c*. The fossils obtained from the base of the limestone were: *Aetheia gaulteri* (Morris), *Hemithyris* cf. *H. squamosa* (Hutt.), *Terebratulina suessi* (Hutt.), *Epitonium rugulosum lyratum* (Zittel). Sharks' teeth occur in abundance at the base.

The concretionary greensand (*c*) marks the change of conditions on the sea-bottom which brought about the deposition of the more glauconitic beds above. It is essentially a mixture of limestone and greensand, and where it forms the present sea-beach the waves have removed the looser sands and the surface is irregular and nodular. Minerals that occur in the breccia are still present here, though sparingly. Fossils are abundant, but, unfortunately, mainly as casts, and this has rendered specific identification difficult The following were obtained here: **Turbo* sp, **Struthiolaria* sp., **Polinices ovatus* (Hutt.)?, **Cypraea ovulatella* Tate?, *Epitonium rugulosum lyratum* (Zittel), **Siphonalia* sp nov., **Lapparia corrugata* (Hutt.)?, **Euthria media* (Hutt.), *Pecten polymorphoides* Zittel, *Lima lima* (L.), *Aetheia gaulteri* (Morris), **Hemithyris* cf. *H. squamosa* (Hutt), *Terebratulina suessi* (Hutt), *Terebratula oamarutica* Boehm, **Terebratula* sp. nov.

Beds *d* and *e* are glauconitic greensands 10 ft. thick, but they have been separated, as the upper band (*e*) is very much indurated, and does not contain the same variety of fossils as bed *d*. I obtained the following fossils from the lower greensand: *Epitonium browni* (Zittel), *Aetheia gaulteri* (Morris), **Hemithyris* cf. *H. squamosa* (Hutt.), *Terebratula* sp.

Two forms which are very abundant both in the concretionary greensand and in the lower portion of the greensand (*d*) are *Mopsea hamiltoni* (Thomson) and *Isis dactyla* Ten.-Woods

The hardened band (*e*) contains *Pachymagas parki* (Hutt.).

The blue clay (*f*) is not very fossiliferous in its lower portions, but higher in the section a number of fossils were obtained which would seem to correlate the bed with the Awamoa horizon. Although the change from the greensands below is very gradual, the exposure of *f* farther along the beach clearly shows that the bed is lithologically similar to the blue clay of the Awamoa Creek deposits. A list of fossils from bed *f* collected by Professor Marshall and myself has been published by Professor Marshall in the last volume of the "Transactions of the New Zealand Institute" (vol 47, p 384)

It will be seen from the above description that there is a gradual transition from the limestone through greensands to the typical Awamoa blue clay, and that the beds are conformable throughout. The horizons *b*, *c*, *d*, *e*, and *f* are clearly recognizable in many other parts of the district. The limestone is probably only the upper portion of the Ototara limestone, the continuous deposition of which was interrupted by volcanic action which resulted in the accumulation of the mineral breccias at Kakanui, the volcanic rocks of Oamaru Creek, and much of Oamaru Cape.

(2) *Kakanui River (Right Bank).*

Thomson (1906, pp. 485, 486, fig 2) has given a section of the beds exposed here. In the bed of the river at very low water a small isolated outcrop

of volcanic rock is exposed, of which he makes no mention. The exact locality is where the line of road bounding the townships of Riverview and Kakanui South would strike the river if produced. It is about 300 yards west of the outcrop of the lower limestone of his section, and dips in the same direction and at the same angle The rock is breccia, but of a different nature from the mineral breccia higher in the section It has a fine tufaceous matrix with vesicular masses of basalt, together with tachylyte tuff similar to the glass tuffs that are closely associated with the deposits of diatomaceous earth in the Waiareka Valley, which in the latter locality always lie below the limestone and never above it. As much confusion has arisen in the past through the erroneous correlation of the various volcanic rocks of the Oamaru district, it has been thought advisable to mention this isolated outcrop, for the dip of the beds is exactly the same as the more easterly beds, and, although no actual junction is seen, they undoubtedly form part of the same series

The lower limestone is impure and tufaceous, but similar in texture to the typical Oamaru building-stone. It is 35 ft. thick, but the base is not seen. A few brachiopods were collected from the upper 6 ft of this rock, and the following were identified: **Terebratula oamarutica* Boehm and *Terebratulina suessi* (Hutt.).

The limestone is followed by a pure-white foraminiferal marl 24 ft. thick, which contains occasional lines of rounded volcanic pebbles. This bed is capped by 6 in. of limestone, which is followed by 56 ft of fragmental volcanic rocks The lowest 16 ft. is a fine volcanic ash, brown to black in colour, but it does not show any minerals The upper 40 ft is very conspicuous from the great abundance of minerals that it contains Overlying these tufaceous beds is a limestone of unknown thickness, but the thickness exposed is about 35 ft The limestone contains in its lower part much very fine tufaceous matter, and is very friable The highest 5 ft of the limestone is more like the building-stone, and it is much harder and more compact than the more tufaceous portion immediately below From the tufaceous limestone the following species were obtained *Eptonium rugulosum lyratum* (Zittel), *Pecten aldingensis* Tate, *P dendyi* Hutt, *P delicatulus* Hutt, *Aetheia gaulteri* (Morris), **Hemithyris* sp. nov, *Terebratula oamarutica* Boehm, *Terebratulina suessi* (Hutt.), **Neothyris* sp. nov, *Magella carinata* Thomson.

This assemblage of fossils clearly correlates this limestone with the Kakanui Quarry limestone, to be described in the next section

(3) *Sea-coast near Kakanui Township.*

The section to be described is seen on the coast for about a mile north of Kakanui Quarry, and has been described and figured by Hutton (1887, p 420, pl xxvi, sec. iv), Park (1905, pp 509, 510, figs 3, 4), and Thomson (1906, p 484, fig. 1) Hutton and Thomson agree in their interpretation of the stratigraphy, but Park differs from both these observers. The present writer is satisfied that the latter's interpretation of the succession is due to some error, and as Park in his section (p 510, fig 4) shows two separate limestones (Oamaru and Waitaki stones), which he asserts are separated by the Hutchinson Quarry and Awamoa beds—an altogether new interpretation of the Tertiary sequence at Oamaru—a rather detailed description will be necessary.

Park's first section (1905, p. 509, fig. 3) represents the southern limb of a syncline (see fig. 2), and the second (*loc. cit.*, p. 510, fig. 4) cuts the northern limb of the same syncline at right angles. I have given my own interpretation of this section in fig. 3, which represents the same line of section as Park's section at Trig. T.

The reference numbers of the beds in figs. 2 and 3 are the same as those given by Park in his sections. This, perhaps, will facilitate a comparison of the sections.

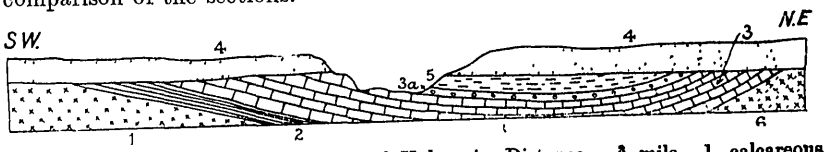

FIG. 2.—Section along sea-cliff north of Kakanui. Distance = ¾ mile. 1, calcareous tuff, fossiliferous; 2, blue micaceous tuff bed; 3, limestone; 3*a*, nodular band; 4, sand; 5, greensand; 6, breccia.

The lowest bed exposed near the quarry is a very calcareous tuff (1), which contains a considerable variety of fossils, but the latter are difficult to extricate owing to the great hardness of the rock. The following forms were collected: **Turbo marshalli* Thomson, **Turritella carlottae* Watson, **Epitonium browni* (Zittel), **E. rugulosum lyratum* (Zittel), **Siphonalia turrita* Suter, **S. conoidea* (Zittel), *S. costata* (Hutt.), *Lapparia* sp., **Dentalium solidum* Hutt., **Pecten polymorphoides* Zittel, **P. aldingensis* Tate, **P. delicatulus* Hutt, *Lima angulata* Sow., *Venericardia difficilis* var. *benhami* Thomson, **Chione meridionalis* (Sow.), *Aturia australis* McCoy, *Aetheia gaulteri* (Morris), **Hemithyris* sp. nov., *Terebratula oamarutica* Boehm, **Terebratula* sp. nov., *Terebratulina suessi* (Hutt.), **Neothyris* sp. nov.

Overlying the tuff is a less calcareous blue micaceous tuff bed (2) about 14 ft. in thickness, from which I obtained the following fossils: *Turbo marshalli* Thomson, *Turritella carlottae* Watson, *Dentalium solidum* Hutt., *Aetheia gaulteri* (Morris), *Terebratulina oamarutica* (Hutt), **Terebratula* sp. nov., *Pentacrinus* sp.

The limestone (3) is about 20 ft. thick, and very pure. It makes excellent material for the lime-kiln, but it is too hard for building purposes. It is very fossiliferous in parts, and from the quarry near the road (Everett's Quarry) the following species were identified: *Aturia australis* McCoy, *Pecten aldingensis* Tate, *Venericardia* sp., **Thecidellina hedleyi* Thomson, **Aetheia gaulteri* (Morris), **Hemithyris* sp. nov., **Terebratula oamarutica* Boehm, *Terebratulina suessi* (Hutt.), **Rhizothyris rhizoida* (Hutt.), **Neothyris* sp nov., *Magella carinata* Thomson, **Terebratella oamarutica* Boehm, **Mopsea hamiltoni* Thomson

Towards the top the limestone becomes glauconitic and much less pure, and at the surface the glauconite sand and the limestone are so much intermingled that the bed assumes the concretionary—or, rather, nodular—structure (3*a*) similar to the beds at All Day Bay. Some of the nodules are brown, and are invariably covered with a thin, much darker, shining brown veneer † Fragments of minerals and small pieces of volcanic rock occur in this nodular bed (3*a*) Fossils are abundant, but mainly as

† Dr. Thomson informs me that Mr. B. C. Aston has determined this veneer to be phosphatic.

casts, and identification has been rendered difficult. The following forms occurred: **Trochus conicus* Hutt. ?, **Astraea* sp. aff. *sulcata* (Martyn), **Turbo* sp., **Cypraea ovulatella* Tate, *Euthria media* (Hutt), **Olivella neozelanica* (Hutt.), **Lapparia corrugata* (Hutt) ?, **Cardium* sp aff *C brachytomum* Suter, **Cardium* sp., **Arca decussata* (Smith), **Pecten polymorphoides* Zittel, **Lima jeffreysiana* Tate, **L angulata* Sow, **L lima* (L), *Aetheia gaulteri* (Morris), **Hemithyris* cf *H squamosa* Hutt, **Terebratula* sp *Mopsea hamiltoni* (Thomson) and *Isis dactyla* Ten.-Woods are very abundant here, and they pass up into the overlying greensand (5)

Bed 5 is of unknown thickness, as it is unconformably overlain by quartz sand. It is a glauconitic foraminiferal greensand, and is fossiliferous. The species were: *Epitonium browni* (Zittel), **Siphonalia nodosa* (Martyn) ?, *Teredo heaphyi* Zittel, **Pecten delicatulus* Hutt, **P polymorphoides* Zittel, **Lima angulata* Sow., **L. bullata* Born, *Aetheia gaulteri* (Morris), *Terebratulina suessi* (Hutt.), **Pachymagas parki* (Hutt), *Isis dactyla* Ten.-Woods, *Mopsea hamiltoni* (Thomson)

Bed 6, which underlies the limestone at the northern end of the beach about due east of Trig. T, is a somewhat coarse calcareous mineral breccia. In its upper portions it is interstratified with limestone bands, and limestone occupies vertical cracks in the breccia forming dykes These limestone bands contain *Terebratula oamarutica* The breccia itself in its upper 20 ft. is very fossiliferous, but there is a noticeable absence of brachiopods. A collection included the following forms: *Turbo marshalli* Thomson, *Turritella carlottae* Watson, *Crepidula* sp, **Polinices laevis* (Hutt) ?, **Cypraea ovulatella* Tate, *Siphonalia turrita* Suter ?, **Siphonalia costata* Hutt ?, *Arca* sp, **Glycimeris laticostata* Q & G, *Pecten delicatulus* Hutt, **P williamsoni* Zittel ?, *P hutchinsoni* Hutt, **Lima* sp. aff. *angulata* Sow, *L jeffreysiana* Tate, *L bullata* (Born), **Venericardia australis* Lamk., **V. difficilis* Desh. var. *benhami* Thomson, **Diplodonta zelandica* (Gray), **Chione chiloensis truncata* Suter, **C. crassa* Q & G, *Dosinia caerulea* (Reeve), *Cardium* sp., **Mesodesma subtriangulatum* (Gray), *Siphonium planatum* Suter.

Fig. 3 represents the same line of section as that shown by Professor Park (*loc cit*, fig 4, p 510) The reference numbers of the beds are the same as those used in Park's figures

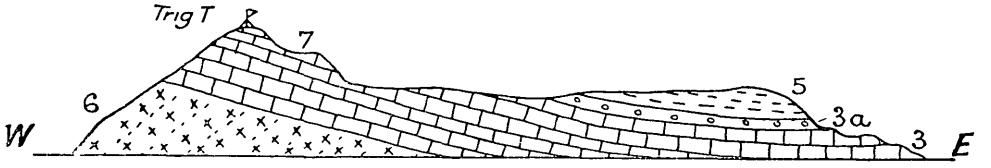

FIG. 3.—Trig T to the sea 3, limestone, 3*a*, nodular band; 5, greensand; 6, mineral breccia; 7, limestone.

The section runs E–W, with a flattening dip to the sea. Bed 6 is the mineral breccia which is exposed in the fields to the west of Trig T. The limestone (7) on which the trig station has been erected is the Waitaki stone of Professor Park. This calcareous band can be traced as a continuous ridge from the station to Kakanui Quarry in a southerly direction, and from the quarry to the sea-beach

Professor Park in his fig. 3 (p. 509) shows this beach outcrop (bed 3). Now, it has been shown above (see fig. 2) that this outcrop of limestone is continuous along the coast, and covered by greensand (5) as far as a point directly east of Trig. T; and Professor Park evidently interprets the coastal section in the same way, for he shows 3 and 5 in their proper position. How, then, can bed 7 (Waitaki stone) be at a different horizon from bed 3 (Oamaru stone), as his section (fig. 4) shows? Palaeontological evidence is not wanting to support the contention that there is but one limestone horizon, for in the road-cutting near the farmhouse near Trig. T I found the following fossils in the limestone, and these are certainly the fossils that occur at Kakanui Quarry: *Terebratula oamarutica* Boehm, *Aetheia gaulteri* (Morris), **Hemithyris* sp nov., *Terebratella oamarutica* Boehm, *Terebratulina suessi* (Hutt.), *Magella carinata* Thomson

I searched carefully for the basalt flow (bed 6), but could find none, although the mineral breccia is present beneath the limestone everywhere in this locality

If the evidence detailed above is accepted, it is impossible that Professor Park's classification of the Tertiaries in the Oamaru district can stand (see "Geology of New Zealand," 1910, Whitcombe and Tombs, p. 120). The sequence in the present locality, at all events, does not show two limestones separated by greensands (Hutchinson Quarry and Awamoa beds).

(4) *Three Roads.*

I have given this name to a locality one mile north-east of Trig. T. It is just where the mineral breccia crops out on the coast for the last time going north.

The section given above (fig. 2) showed the beds which formed the northern limb of the syncline dipping south. The mineral breccia then extends about a mile along the coast to the present locality. Its strike-lines are clearly traceable on the beach at low tide, swinging round in sweeping curves from a N.E.–S.W to a N.W.–S.E. strike at the present locality. The mineral breccia here has much the same nature as that described in the last section, though it is finer in texture. Thin veins of limestone penetrate the breccia near the surface. From the highest portion exposed I collected the following fossils: *Turbo marshalli* Thomson ?, *Lima* sp. aff. *angulata* Sow., *Ostrea* sp., *Venericardia australis* Lamk., *Diplodonta zelandica* (Gray), *Chione chiloensis truncata* Suter, **Dosinia caerulea* (Reeve), *Mesodesma subtriangulatum* (Gray)

Although the fossils are not numerous here, it is pretty evident that the above are similar to those found near Trig. T; in the present locality, therefore, the breccia collected from represents the upper portion. About 200 yards from the outcrop of breccia on the beach, in a cutting in the road that runs east and west, another small section is exposed, showing a glauconitic nodular band 6 in thick. Cleavage fragments of hornblende were scattered sporadically throughout the limestone, and the nodules are characterized by the peculiar brown sheen that usually covers the exterior. I collected the following species from this bed: **Pecten polymorphoides* Zittel, *Dentalium solidum* Hutt., *Aetheia gaulteri* (Morris), **Terebratula oamarutica* Boehm, *Terebratulina suessi* (Hutt.), *Isis dactyla* Ten.-Woods.

Overlying this bed is a calcareous glauconitic greensand, but the thickness could not be estimated. In the highest part of the exposure I collected *Pecten delicatulus* Hutt. and *Pachymagas parki* (Hutt.).

The beds dip N. 40° E. at an angle of 18°. As shown above, the nodular band is in this locality again followed by greensands In the lower layers of the latter, for some distance above the junction, I obtained no fossils, and possibly the species detailed here represent the horizon of band *e* in the All Day Bay section, the lower unfossiliferous portion representing band *d*. About 15 chains north-east of this locality a channel sunk for drainage purposes reveals very fine glauconitic sand, and, although an area of only two or three square yards has been exposed, I collected the following species: *Malletia australis* Q. & G., *Nucula hartvigiana* Phil., *Pecten* (*Pseudamussium*) *huttoni* Park, *Lima colorata* Hutt., *Limopsis aurita* (Brocchi), *Venericardia australis* Lamk., *Macrocallista assimilis* (Hutt.), *Crassatellites obesus* A. Ad

This bed represents the Awamoa horizon, and the dip of the beds at Three Roads is such as to take them beneath these beds.

Analysis of Fossil Lists.

I have to thank Dr. Thomson for drawing up the following table showing the range of the various species within the Kakanui district.

1. Tuffs, &c., below the Kakanui limestone (Lower Ototaran).
2. Kakanui limestone (Upper Ototaran).
3. Hutchinson Quarry beds of Kakanui district (Hutchinsonian).
4. Awamoa beds of All Day Bay (see Marshall, 1915, p. 384) and Three Roads (Awamoan)

	1	2	3	4
Corals.				
Isis dactyla Ten.-Woods	.	..	×	.
Mopsea hamiltoni (Thomson)	.	×	×	..
Brachiopoda.				
Aethia gaulteri (Morris)	×	×	×	
Hemithyris cf. *H squamosa* (Hutt.)		×	×	.
Hemithyris sp. nov.	×	×	.	.
Magella carinata Thomson		×		.
Neothyris sp. nov.	×	×		.
Pachymagas parki (Hutt.)			×	.
Rhizothyris rhizoida (Hutt.)		×		.
Terebratella oamarutica Boehm		×		
Terebratula oamarutica Boehm	×	×	×	
Terebratula sp. nov.	×		×	..
Terebratulina suessi (Hutt.)	×	×	×	.
Thecidellina hedleyi Thomson		×	.	.
Mollusca.				
Ancilla novaezelandiae (Sow.)		.	.	×
Arca novae-zealandiae Smith			?	
Astraea aff. *sulcata* (Martyn)			×	
Aturia australis McCoy	×	×	..	.
Cardium aff *brachytonum* Sut		.	×	.
Chione chiloensis truncata Sut	×			
Chione crassa (Q. & G.)	×	..		.
Chione meridionalis (Sow.)	×	.		
Corbula pumila Hutt.		..	.	×
Crassatellites obesus A. Ad	.			×
Cypraea ovulatella Tate	×	.	..	×
Dentalium mantelli Zitt.		.	.	×
Dentalium solidum Hutt.	×	..	×	.
Diplodonta zelandica (Gray)	×	.	.	.
Dosinia caerulea (Reeve)	×	.	.	.
Epitonium browni (Zitt.)	×	.	×	×

—	1	2	3	4.
MOLLUSCA—*continued*				
Epitonium rugulosum lyratum (Zitt.)	×	×	×	..
Euthria media (Hutt.)	..	..	×	..
Glycymeris laticostata (Q. & G.)	×	..	..	..
Lapparia corrugata (Hutt.)	..	..	?	×
Lima angulata Sow	×	..	×	..
Lima bullata (Born)	×	..	×	..
Lima colorata Hutt	..	..	..	×
Lima jeffreysiana Tate	×	..	×	..
Lima lima (L.)	..	..	×	..
Limopsis aurita (Brocchi)	..	..	.	×
Limopsis zitteli Iher.	..	..	.	×
Macrocallista assimilis (Hutt.)	..	..	..	×
Mangilia rudis (Hutt.)	..	..	..	×
Marginella conica Harris	..	..	..	×
Marginella harrisi Cossman	..	..	..	×
Mesodesma subtriangulatum (Gray)	×	..	..	..
Murex octogonus Q. & G.	..	..	..	×
Nucula hartvigiana Pfr.	..	..	..	×
Olivella neozelanica (Hutt.)	..	..	×	..
Pecten aldingensis Tate	×	×	..	..
Pecten delicatulus Hutt	×	×	×	..
Pecten dendyi Hutt.	..	×	..	..
Pecten hutchinsoni Hutt	×	..	..	..
Pecten huttoni Park	..	..	..	×
Pecten polymorphoides Zitt.	×	..	×	..
Pecten williamsoni Zitt.	?	..	..	..
Phalium achatinum pyrum (Lamk.)	..	..	..	×
Placunanomia zelandica (Gray)	..	..	..	×
Polinices gibbosus (Hutt.)	..	..	..	×
Polinices laevis (Hutt.)	?	..	..	..
Siphonalia conoidea (Zitt.)	×	.	..	..
Siphonalia costata (Hutt.)	×	..	..	..
Siphonalia nodosa (Mart.)	..	..	?	..
Siphonalia turrita Sut.	×	..	..	..
Siphonium planatum Sut	×	..	..	..
Teredo heaphyi Zitt	..	..	×	..
Trochus conicus (Hutt.)	..	?	?	..
Turbo marshalli Thomson	×	..	..	..
Turbonilla oamarutica Sut.	..	..	..	×
Turris altus (Harris)	..	..	.	×
Turritella carlottae Wats.	×	.	..	..
Turritella cavershamensis Harris	..	..	..	×
Typhis McCoyi Ten.-Woods	..	..	..	×
Venericardia australis Lamk.	×	..	..	×
Venericardia difficilis benhami (Thomson)	×	..	..	..
Verillum apicale (Hutt.)	..	..	..	×

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