Art. LVII.—*The Wanganui System.*

By Captain F. W. Hutton, F.G.S.

[*Read before the Philosophical Institute of Canterbury, 6th August*, 1885.]

Plates XII., XIII.

Dr. von Hochstetter, in 1864, placed the Wanganui River beds with his Hawke's Bay series, in the younger of the two groups into which he divided our tertiary rocks;[1] and he considered them to be of pliocene age. He did not, however, visit the district, and gave no list of fossils obtained from there.

In 1867, Mr. J. Buchanan, of the Geological Survey, made a large collection of fossils from between Wanganui and the Patea, and he divided the rocks into a lower blue clay and upper sandy beds.[2] These fossils were examined by Dr. Hector, who placed the upper sandy beds in the post-tertiary, and the lower blue clay in his upper tertiary or Struthiolaria beds, together with the blue clays of Awatere, Motunau, Awamoa, and other places.[3]

On a re-examination of these fossils, in 1872, I followed Dr. Hector in keeping the upper beds in the pleistocene, but separated the blue clay of Shakespeare Cliff from the other beds associated with it as a separate and younger formation, under the name of the Wanganui Formation.[4] This I considered to be pliocene, and the Awatere series to be upper miocene.

In 1875, Mr. A. McKay referred to the Wanganui Formation some conglomerates and highly fossiliferous sands with pumice overlying the Napier limestone, between Cape Kidnappers and the Mariatotara River.[5]

In 1876, Mr. S. H. Cox ascertained that a considerable thickness of marine strata, with abundance of fossils, mostly recent, were superimposed upon the Napier or Scinde Island limestone, in Hawke's Bay.[6] He gave a list of these fossils, which Dr. Hector pronounced to be the same as those from the upper beds at Wanganui, and he placed the rocks in the Wanganui Formation.[7]

In 1877, Mr. A. McKay traced these beds from the Manawatu Gorge to Napier,[8] giving them the name of Rotella beds. In

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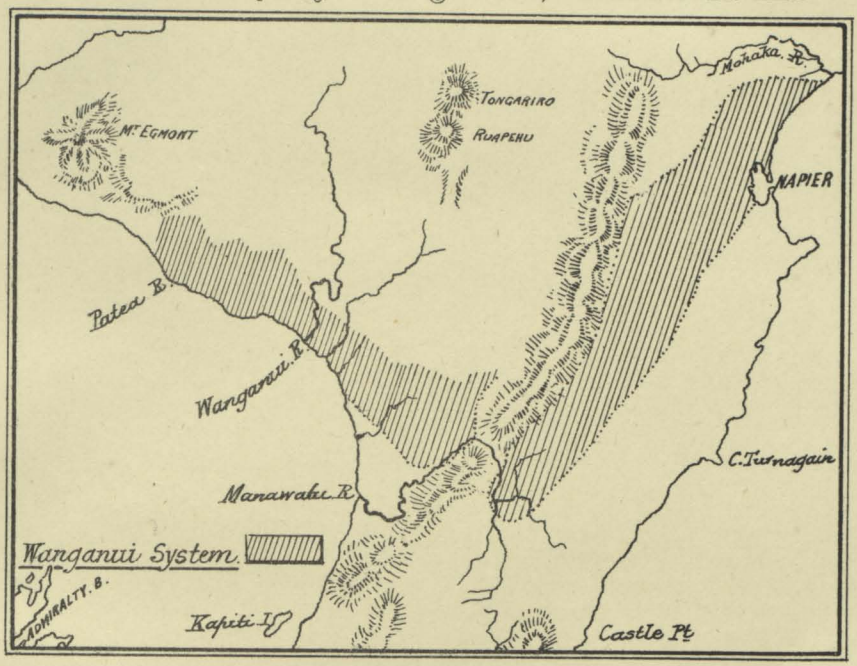
1 "Reise der *Novara*," Geologischer, Theil I., p. xl.
2 "Trans. N.Z. Inst.," vol. ii., p. 163.
3 "Catalogue of the Colonial Museum," Wellington, 1870, p. 172.
4 "Cat. Tert. Moll. and Echin. New Zealand," Wellington, 1873; and "Quart. Jour. of the Geol. Soc. of London," vol. xxix., p. 373.
5 "Rep. Geol. Expl.," 1874–76, pp. 44 and 49.
6 "Rep. Geol. Expl.," 1874-76, p. 96.
7 "Rep. Geol. Expl.," 1874-76, pp. viii. and x.
8 "Rep. Geol. Exp.," 1876-77, p. 79.



Shakespeare's Cliff

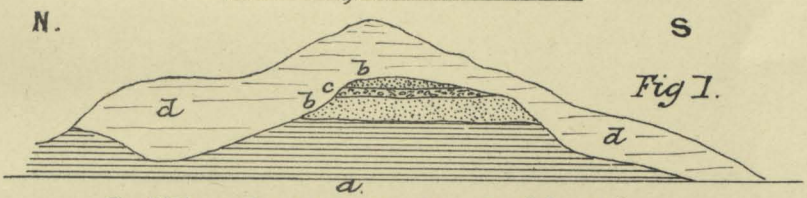


Fig 1.

d. Silt and gravel. b. Sand. (fossils)
c. Conglomerate. a. Blue clay. (fossils.

Putiki Point.

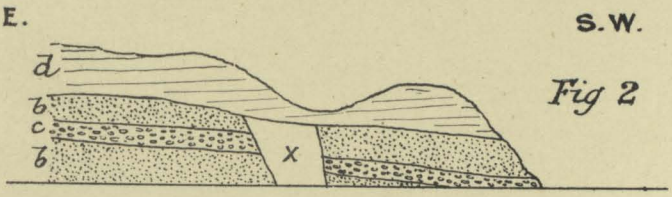


Fig 2

d. Silt and gravel. b. Sand with fossils.
c. Conglomerate X. Slipped ground. (Fault).

To accompany Paper by F.W. Hutton.

the same year, Dr. Hector, in his new classification of formations, considered the upper beds at Wanganui to be pliocene; and he grouped them with the Hawke's Bay beds as the Kereru Rotella beds, subsequently called the Kereru series.[1] The blue clay of Shakespeare Cliff was now called the Wanganui series, and put into the upper miocene. Indeed, the Director of the Geological Survey has never acquiesced in my view that the Shakespeare Cliff clay is younger than the miocene. He has always considered it as upper miocene, placing it formerly with the Awatere series, but last year with the Te Aute limestone; the Awatere series being now made lower miocene.[2] It will thus be seen that the terms "Wanganui formation" or "Wanganui series" have been used sometimes for the upper sandy beds, sometimes for the underlying blue clay.

In January, 1884, I examined the Wanganui District, and came to the conclusion that the upper sandy beds cannot be separated from the blue clay; that all are of pliocene age, and very different, palæontologically, from the Awatere series or the Te Aute limestone. Accordingly, in a paper read to the Geological Society of London, in January, 1885, I proposed a Wanganui system to include both; distinguishing the beds at Wanganui as the Putiki series, those at Hawke's Bay as the Petane series, and those on the west side of the Ruataniwha Plains, in Waipawa County, as the Kereru series;[3] at the same time saying that these series were geographical only, and did not represent different epochs of time. I had not room in that paper to give all the evidence on which I relied for proving that these series formed a distinct system well marked off, both palæontologically and stratigraphically, from the older Pareora system; and the object of the present communication is to furnish this, together with other evidence, which I obtained during a visit to Hawke's Bay last January. However, in order to save space, I have not thought it necessary to give separate lists of the fossils from each locality, but have contented myself with one list of all the species known from the Wanganui system, with the localities in which each has been found. Kereru I have not visited, and have no list of fossils from there; but, according to Mr. McKay, they are the same as those found at Matapiro Station, on the Ngaruroro River. Of course my visits, both to Wanganui and to Hawke's Bay, were far too short to allow me to work out the stratigraphical relations of all the different beds; but I think that what I have seen, together with the large collections of fossils that I have examined, will be sufficient to lay the foundation for a correct classification of the beds, and will enable local geologists to work out the details.

[1] "Rep. Geol. Exp.," 1876-77, p. 4.
[2] "Rep. Geol. Expl.," 1883, p. 13.
[3] "Quart. Jour. Geol. Soc.," vol. xli., p. 211.

Wanganui District.

The beds near the mouth of the Wanganui River were, I believe, first described by the Hon. W. Mantell in the "Quarterly Journal of the Geological Society of London,"[1] but, unfortunately, I am unable to refer to his papers. In 1867, Mr. J. Buchanan examined the district for the Geological Survey of New Zealand. The results of his researches, together with a section of Shakespeare Cliff, were published in 1869 in the "Transactions of the N.Z. Institute."[2] He divided the rocks into "an upper sandy and lower clay stratum, and separated by a deposit of sand of varying thickness, being at least 12 feet at Shakespeare Cliff, at Wanganui, the whole covered by a heavy deposit of sands and gravels containing a cemented gravel bed, also of variable thickness, the material from which is in common use for the construction of roads throughout the district."

In 1874, Mr. C. W. Purnell read a paper to the Wellington Philosophical Society "On the Wanganui Tertiaries."[3] He divides the beds into three groups. "The oldest fossiliferous stratum within a radius of four or five miles from the town of Wanganui is the tuff [with pumice] in the cliffs on the east bank of the river [at Kaimatera]; the next oldest, the blue clay, at Shakespeare Cliff; and the youngest, the beds overlying the blue clay and those at the Landguard Bluff." Mr. Purnell, however, mistook ordinary clay for "volcanic mud," and he considered the recent alluvial deposits of the river, containing pumice, to pass under the blue clay at Shakespeare Cliff.

In 1875, Mr. Kirk made a collection of fossils from Wanganui for the Wellington Museum.[4]

In 1882, I received from Mr. S. H. Drew, of Wanganui, a collection of fossils made in the neighbourhood, with the request that I would name them for him. It contained several new species, which I described in the "Trans. N.Z. Inst.," vol. xv., p. 410. In 1883, I again received another and much larger collection, which also contained some new forms, and I came to the conclusion that it would be advisable to publish a new list of all the mollusca which had been recorded from this interesting locality. However, before doing so, I wished to examine the district myself. Accordingly, in January, 1884, I paid a visit to Wanganui, and, under Mr. Drew's guidance, spent three days in examining the sections near the town, and one day at Patea, with the following results.

The base of Shakespeare Cliff, which stands on the left bank of the river, opposite to the town of Wanganui, is formed

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1 "Quart. Jour. Geol. Soc.," vol. iv., p. 239, and vol. vi., p. 332.
2 "Transactions," vol. ii., p. 163.
3 "Trans. N.Z. Inst.," vol. vii., p. 453.
4 "Rep. Geol. Expl.," 1881, p. 123, Nos. 206-208.

of blue clay (Pl. XII., fig. 1, *a*), about 40 feet thick, and full of fossils. A layer of yellow sand (*b*) rests upon this clay, apparently quite conformably; it is about 20 feet thick, and contains broken shells. Then comes a thin bed of sand, about 4 feet thick, with abundance of fossils. Then another bed of sand, about the same thickness, followed by a bed of gravel (*c*) cemented by iron oxide. This is followed by a bed of dark green sand (*b*). All these belong to the Wanganui system; they have suffered much denudation, and are overlain quite unconformably by a series of silts and gravels (*d*) which are unfossiliferous.

At Landguard Bluff, or Putiki, near the mouth of the river on the left bank, the blue clay is not seen, but the upper beds are largely developed. The lowest stratum is yellow sand with broken shells, followed by sand with shells (Fig. 2, *b*), sands and clay, cemented gravel (*c*), and greensand, as at Shakespeare Cliff. But above the greensand is another bed of sand with shells (*b*) and white clay. At the point forming the Bluff, there is a fault of about 30 feet (*x*), caused apparently by a land slip. Round the point some small beds of lignite lie on the cemented gravel. The upper beds are denuded, and overlain unconformably by unfossiliferous silt and gravels, as at Shakespeare Cliff.

The Wanganui system in this district may therefore be represented as follows, the known thickness being between 150 and 200 feet :—

Putiki Series, near Wanganui.

9. White clay, about 4 feet.
8. Sand, about 12 feet.
7. Sand with fossils, about 5 feet.
6. Greensand, current bedded, about 25 feet.
5. Cemented gravel, from 10 to 20 feet.
4. Sand with clay, from 4 to 50 feet.
3. Sand with fossils, from 4 to 10 feet.
2. Sand with broken shells, from 12 to 20 feet.
1. Blue clay with fossils, 40 + feet. Bottom not known.

No pumice has been found in any of these beds. The blue clay is quite conformable to the upper beds, and contains the same fossils. I know 133 species of mollusca from the blue clay, all but 21 of which also occur either in the upper beds or in the Petane series. But of these 21, thirteen are still living in the New Zealand seas, and must therefore have been living when the upper beds were being deposited, although their remains have not yet been found in them. This leaves eight species out of 133, as distinctive of the blue clay, and of these only one—*Vermetus moniliferus*—is found in the Pareora system. This small difference between the fossils of the blue clay and those of the upper beds is easily accounted for by difference of station;

it is much less than the difference between the upper beds and the Petane series. The number of species from the upper sandy beds is 156, of which 72 per cent. are recent; while of the 133 species from the blue clay, 77 per cent. are recent. Evidently we cannot disconnect the blue clay from the upper beds.

On the sea coast at Patea, south of the mouth of the river, blue clay with fossils passes up gradually into a blue micaceous sandy clay, apparently unfossiliferous. Upon this lies about 12 feet of yellow sand; then cemented gravel 4 feet thick, followed by gray sands, and then red and yellow sands. The upper beds form the cliff, and not being very accessible, I did not examine them closely, but I could find no fossils in the tumbled blocks. The sequence is remarkably like that at Wanganui. The yellow sand is distinctly separated from the blue micaceous clay upon which it rests, but without any appearance of unconformity. The number of species obtained from the blue clay is 26, of which 77 per cent. are recent. Three species of Pareora shells, not known from any other part of the Wanganui system, have been found in the blue clay at Patea. They are *Oliva neozelanica*, *Struthiolaria cingulata*, and a species of *Cucullæa* (fragments).

On the left bank of the Wanganui River, about four miles above the town, a very good section is seen at Kaimatera Cliff; but the beds here differ much from those at Putiki Point. The lowest beds seen are a series of sands and silts (Pl. XIII., fig. 3, *a*), without fossils. These are overlain, apparently unconformably, by a bed of sand with shells and numerous small fragments of pumice. This is followed by a thick series of sands much current-bedded (*b*); this again by a loosely cemented gravel-bed (*c*). Over this comes another bed of sand with fossils; the whole being covered unconformably by unfossiliferous silt and gravel (*d*), as at Wanganui. These beds, *b* and *c*, may be called the Kaimatera beds. We obtained, in a few hours, 47 species of shells from these sands, 44 of which, or 93 per cent., were recent. The three supposed extinct species are *Trophon expansus*, *Trochita inflata*, and *Risella melanostoma*. Of these, the two first are closely allied to living species, and the third is abundant in Australia and Tasmania; consequently, I think that these beds are of pleistocene age, and should be kept out of the Wanganui system. Whether the apparent unconformity between *a* and *b* is a real one or not I cannot say, as the upper beds are much current-bedded, and the exposed section is two short to place much dependence on.

Hawke's Bay District.

Dr. Hector was the first to report on this district. He described the tertiary rocks from the Upper Mohaka to Petane,

and considered that that portion lying between Pohui and the Mangapikopiko (=Purohutangihia) Range was an older formation underlying unconformably the limestones of Te Waka and the Purohutangihia.[1]

In 1876, Mr. S. H. Cox considered that the whole of the tertiary rocks from Pohui to Napier formed a single comformable series, which might possibly be divided into upper and lower.[2] In the same year, Mr. Percy Smith recognised an unconformity near Pohui, between the Mangaharuru sandstone and the overlying beds to the south.[3]

In 1877, Mr. A. McKay gave a section along the Ngaruroro River,[4] which, as well as the geological map of the neighbourhood, appears to be very correct in all the places examined by me.

Last January I spent a fortnight in Hawke's Bay, and, accompanied by Mr. A. Hamilton, who had previously sent me many fossils, I examined the section from the Upper Mohaka to Petane, the country about Puketapu, and the valley of the Ngaruroro River, from Hastings to Kikowheru Creek, on Mr. Walter Shrimpton's station of Matapiro. I made the following observations.

In the Upper Mohaka, where the road from Napier to Lake Taupo crosses the river, the rocks are grey or brown argillaceous sandstone (Fig. 4, *a*), containing the following fossils :—*Struthiolaria tuberculata*, *S. sulcata*, and a species of *Cucullæa*. They may be referred with safety to the Pareora system. These beds are very thick, more than 800 feet, and are overlain by a thick stratum of hard shelly limestone (*b*) forming the Te Waka Range, and known as the Pohui limestone. At the Mohaka the beds dip to the S.E., at an angle of 25°, but at Pohui they flatten to S.S.E. 10°.

South of Pohui, we came across a newer series of rocks, resting uncomformably on the denuded surface of the Pohui limestone and the underlying sandstones. This is the commencement of the Petane series. It dips here about S.S.E. 15°, and at Petane not more than 6° to the S.S.E., but a slight anticlinal fold occurs before reaching Petane (fig. 4). The rocks of the series are as follows, in descending order :—

5. Two or more thick bands of limestone, with beds of calcareous sand (Petane limestone), sometimes passing into blue clay (*f*).
4. Brown sandstones, with a band of conglomerate (*e*).
3. Blue clay, known locally as "papa," (*d*).

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1 "Rep. Geol. Expl.," 1870-71, p. 158.
2 "Rep. Geol. Expl.," 1874-76, p. 97.
3 "Trans. N.Z. Inst.," vol. ix., p. 565.
4 "Rep. Geol. Expl.," 1876-77, p. 83, and sec. No. 5.

2. Grey and brown sandstone, with several bands of conglomerate (*c*).
1. Bluish argillaceous sandstone (*c*).

The whole series is estimated by Mr. Percy Smith to be 4,500 feet in thickness. I could detect no pumice in any of these beds, but it occurs in abundance at Titiokura Saddle, between Pohui and the Mohaka,[1] and at other places in beds lying unconformably on the Petane series, as has already been pointed out by Mr. Cox. I know 174 species of mollusca from the upper beds (4 and 5), of which 65 per cent. are recent.

At Puketapu, on the Tutaekuri River, the Petane limestone is largely developed, and can be well studied on both banks of the river at Moteo, a little above Puketapu. Here, amongst other shells, we found a broken and worn fragment of *Pecten triphooki*, which is now in my collection. It is doubtful whether this is a rolled fragment derived from the Napier limestone, or whether it lived during the Wanganui period. If the latter be correct, other specimens will, no doubt, be found. Below the limestone comes a calcareous sandstone, and a little higher up the river this is seen to be underlain by sands and shingle-beds, with fossils, like those at Petane. There is no appearance of the blue clay here; neither could we find the pumice sands, mentioned by Mr. McKay as occurring under the limestone at Puketapu.[2]

At Matapiro Station, on the Ngaruroro River, the limestones and calcareous sands (Pl. XIII., fig. 5, *c*) belonging to the Petane series, which form the tops of the hills, are underlain by a thick bed of sandy clay (*b*); and below this, in the bed of the Kikowheru Creek, occur beds of fine gravel, sand, and thin beds of clay (*a*), dipping S.E. at angles varying from 25° to 6°. These contain abundance of fossils. We collected 96 species, of which 71 per cent. are recent. In some very limited spots the sands are pale yellowish-white and of small specific gravity. These patches may be formed of decomposed pumice, although I could not recognise pumice with certainty by means of a lens. No doubt they are the pumice sands mentioned by Mr. McKay as occurring sparingly in Kikowheru Creek.[3]

Relation to the Pareora System.

No junction between the Wanganui system and the Pareora system has as yet been observed on the western side of the Wellington Provincial District, although the Pareora system undoubtedly exists up the Waitotara River. But on the eastern

[1] These pumice beds are very different from those which *overlie the river gravels* in the Mohaka Valley.
[2] "Rep. Geol. Expl.," 1876-77, p. 84.
[3] "Rep. Geol. Expl.," 1876-77, p. 83.

N. —Kaimatera Cliff.— S.

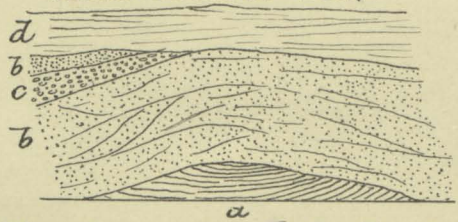
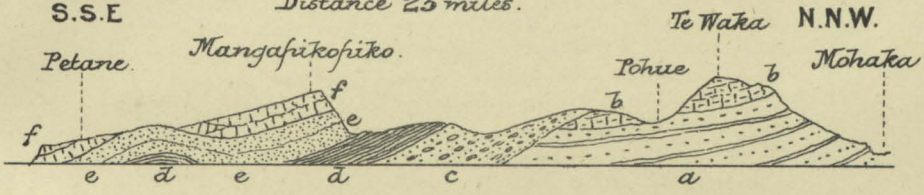


Fig 3.

d. Silt and gravel. b. Sand with pumice (Fossils).
c. Conglomerate. a. Putiki series?

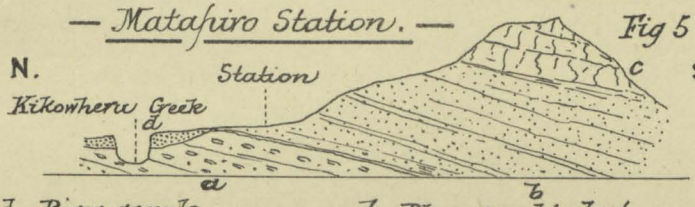
—Petane to the Upper Mohaka.— Fig 4.

S.S.E Distance 23 miles. N.N.W.



f. Petane limestone &c. c. Brown & bluish Sandstone.
e. Brown Sandstone. b. Pohue or Te Aute limestone.
d. Blue clay. a. Grey & brown Sandstone.
a. and b. belong to the Parcora System.

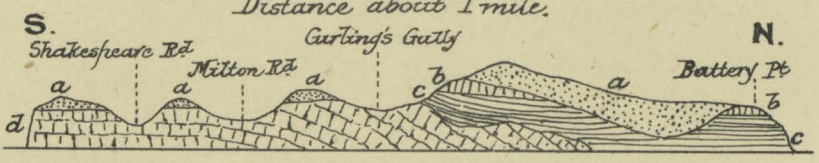
— Matafiro Station. — Fig 5



d River gravels. b. Blue sandy clay.
c. Petane limestone &c. a. Sands & gravels.

—Section through Scinde Island.—

Distance about 1 mile.



a. Brick earth, or loam, with Pumice..... Pleistocene.
b. Limestone } Petane Series ..... Pliocene.
c. Sandstone }
d. Scinde Id Limestone & Ahuriri Series..... Miocene.

To accompany Paper by F.W. Hutton.

side of the Wellington Provincial District, and in Hawke's Bay, several junctions occur.

1. At Pohui, on the Napier and Taupo Road, an unconformity exists, as was first pointed out by Mr. Percy Smith. (*See* fig. 4.) According to Mr. Percy Smith, this unconformity is very plain some 12 or 14 miles north of the road, where the lowest beds of the Petane series, called "Middle Papa" by Mr. Smith, dipping at an angle of about 10°, abut against the steep face of the "Maungaharuru sandstone" (Pareora system) at an angle of 29° 30′. "This unconformity," Mr. Smith says, "is a marked feature in viewing the country anywhere near the line of strike of the beds, where the older strata . . . are seen dipping at a considerable angle, forming hills which are quite characteristic and different in shape to the Papa hills of the overlying formation."[1]

2. At Napier, the unconformity between the two systems is quite clear; but this I have described in another paper read this year to the Institute ("On the Geology of Scinde Island").

3. Further south, Mr. McKay has shown complete unconformity between the two systems at Mount Vernon, near Waipukurau.[2]

4. In the East Wairarapa the pliocene beds on the east side of Palliser Bay, which probably belong to the Wanganui system, are said by Mr. McKay to be unconformable to the upper miocene rocks (Pareora system) upon which they rest.[3]

5. Again, Dr. Hector has shown that the pliocene (Wanganui) and miocene (Pareora) systems are unconformable at Oneira in Taranaki.[4]

We may, therefore, confidently assert that there is a wide spread unconformity between these two systems, and that they are separated by a period of elevation during which denudation was active.

Of the 279 species of mollusca known from the Wanganui system, 179 are not found in the Pareora or older rocks. While of 233 species found in the Pareora system, 130 are not found in the Wanganui system, nor in the seas of New Zealand.[5] The palæontological break is, therefore, well marked. The principal characteristics of the Wanganui system are the presence of *Trophon*, *Columbella*, *Turricula*, and *Mytilicardia;* as well as the

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1 "Trans. N.Z. Inst.," vol. ix., p. 568, pl. xiii., sec. No. 2. In section No. 1 of this paper, No. 7 (Middle Papa) should evidently be No. 9 (gritty sandstone). No. 7 apparently thins out to the south before reaching Pohui, as mentioned by Mr. Smith on page 569.

2 "Rep. Geol. Expl.," 1878-79, p. 72.

3 "Rep. Geol. Exl.," 1878-79, p. 84.

4 "Rep. Geol. Expl.," 1866-67, p. 2, and section.

5 The discrepancy between these numbers is owing to three species of recent mollusca occurring in the Pareora system, none of which have as yet been found in the Wanganui system.

absence of *Peristernia*, *Nassa*, *Mitra*, *Conus*, and *Limopsis*, all of which occur in the Pareora system. Also, in the Wanganui system, the species of *Turritella*, *Dentalium*, *Cytherea*, *Cardium*, *Pecten*, and *Ostrea*, are small in comparison with the large species of each of these genera found in the Pareora system.

Divisions of the Wanganui System.

The following ten or eleven species of Pareora mollusca have been found in the Petane series, but not at Wanganui nor at Patea:—*Siphonalia nodosa* var. *conoidea*; *Pleurotoma pagoda*, *Natica gibbosa*, *Struthiolaria frazeri*, *Trochita alta*, *Turritella ambulacrum*, *Venus meridionalis*, *Cardita patagonica*, *Perna*, sp. ind.; *Pecten triphooki* (?), *Pecten semiplicatus*. I therefore suppose that this series is older than the blue clay of Shakespeare Cliff. This opinion is confirmed by the percentage of living species found in the beds, which is 65 to 71 per cent. in the Petane series, and 72 to 77 per cent. in the Putiki series. We may therefore provisionally divide the Wanganui system into two series, which may perhaps overlap in time:—

2. *Putiki Series*, including the blue clay of Shakespeare Cliff and Patea.

1. *Petane Series*, from the River Esk to the Ngaruroro.

The Kaimatera beds should be separated from both these series, and referred probably to the pleistocene period.

The position of the Kereru series still remains uncertain, as no list of fossils from that locality has as yet been published. According to Mr. McKay,[1] and to Mr. Cox,[2] the series contains considerable quantities of pumice sand, and possibly, therefore, it is on the same horizon as the Kaimatera beds.

The value of taking the percentage of recent species of mollusca in a tertiary rock, as a test of its relative age, has sometimes been called in question. This has arisen, I think, from a misconception of the limits of the method. If it be true that species have gradually changed, or that they have been gradually introduced into an area—which no one disputes—then it must be true that, in each epoch, the nearer we approach to the present time the nearer must be the resemblance between the fauna of the epoch and that of the present time. Indeed, the same holds good if, instead of assuming gradual change, we assume that the ancient fauna was altered by successive migrations into the area; for it is evident that the percentage test would be of great value here in ascertaining the relative ages of the various migrations; for each migration would bring many species similar to or allied to those now living, consequently the percentage system is of the greatest importance in testing

[1] "Rep. Geol. Expl.," 1876-77, p. 82.
[2] "Rep. Geol. Expl.," 1882, p. 3.

the relative ages of any two sets of beds belonging to the same biological province. But it does not follow that this method can be trusted for correlating with accuracy sets of beds in widely distant areas. On the contrary, different districts have undergone different physical changes, and we have therefore every reason to suppose that alterations in floras and faunas would proceed with unequal rapidity in different parts of the world. At the same time, as the replacement of a whole marine fauna can rarely be sudden, it follows that the percentage system has some value even here. But it must always be used in conjunction with a comparison of the specific forms of the two areas. And here, again, it is only the wide ranging oceanic, or deep sea species—such as sharks, cephalopods, and a few bivalves—which should be depended upon for evidence, but these wide ranging forms are of the very greatest value in correlating strata all over the world.

In the present case we have no wide ranging species that can help us in determining the European equivalent of the Wanganui system, and the percentage of recent species is our only resource. All geologists, however, would, I think, allow that it belongs to pliocene, the only question being: to what part of the pliocene should it be referred? and this may be left for the present undecided. Excluding the Kaimatera beds there are 278 species of mollusca known from the system, and of these 63 per cent. only are recent. This percentage is, however, likely to be increased, as many of the supposed extinct species are minute, and may have been overlooked as living forms. The reason the percentage of recent species is less in the whole system than in any of its separate series or beds, is that the recent species are more abundant individually, and more widely distributed, than the extinct forms, which are usually rare and local. The following genera, found in the Wanganui system, are not known to live in the seas of New Zealand:—*Ringicula, Oliva, Sigaretus, Eulima, Eulimella, Admete, Cerithium, Risella, Lutraria, Loripes, Macrodon, Cucullæa* (?), *Perna;* but probably those genera which contain minute species only will yet be detected.

Of the localities attached to the species in the following list, "Putiki" means the upper sandy beds of the Wanganui system in the neighbourhood of Wanganui. "Shakespeare Cliff" means the blue clay at Shakespeare Cliff, and on the sea coast near Wanganui. "Petane" means the district round Petane, including Napier and Puketapu.

Descriptions of the corals and Bryozoa from Wanganui will be found in the "Palæontology of New Zealand," part iv., by the Rev. J. Tenison-Woods (Wellington, 1880). A few Bryozoa from

Petane are mentioned by Mr. Waters in the "Quarterly Journal of the Geological Society of London," vols. xxxix. and xl., and a list by Mr. G. R. Vine, junr., of the Foraminifera from Petane, is given by Mr. A. Hamilton, in the "Transactions of the New Zealand Institute," vol. xiii., p. 393.

Mollusca of the Wanganui System.

CEPHALOPODA.

1. *Sepia*, sp.
   Petane. Two small delicate mucrones, apparently belonging to this genus.

GASTROPODA.

Pulmonata.

2. *Patula coma*, Gray, in Dieffenbach's "New Zealand," vol. ii., p. 263.
   Petane.
3. *Therasia thaisa*, Hutton, "Trans. N.Z. Inst.," vol. xvi., p. 182.
   Petane; Matapiro.
4. *Amphibola avellana*, Chemnitz, "Conch. Cab.," vol. v., f. 1919, 1920.
   Napier.

Opisthobranchiata.

5. *Ringicula uniplicata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 313.
   Petane.
6. *Tornatina pachys*, Watson, "Lin. Soc. Jour.," vol. xvii., p. 331.
   Wanganui; Petane; Shakespeare Cliff.
7. *Tornatella alba*, Hutton, "Cat. Marine Moll. of N.Z.," p. 51 (*Buccinulus*).
   Shakespeare Cliff; Wanganui.
8. *Tornatella kirki*, Hutton, "Cat. Marine Moll. of N.Z.," p. 51 (*Buccinulus*).
   Shakespeare Cliff. Rare. Perhaps a variety of the last species.
9. *Cylichna striata*, Hutton, "Cat. Marine Moll. of N.Z.," p. 52.
   Petane. Found also in the Pareora system.

Protobranchiata.

10. *Murex angasi*, Crosse, "Jour. de Conch.," vol. xi., p. 86, pl. 1 (*Typhis*); *T. zealandica*, Hutton, "Cat. Tert. Moll. of N.Z.," p. 2.
    Shakespeare Cliff.

11. *Murex neozelanicus*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool., ii., p. 529, pl. 36, f. 5–7.
Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

12. *Murex octagonus*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool., ii., p. 531, pl. 36, f. 8–9.
Shakespeare Cliff; Wanganui.

13. *Murex espinosus*, Hutton, "Trans. N.Z. Inst.," vol. xviii.
Petane; Matapiro.

14. *Trophon ambiguus*, Philippi, Abbild., *Fusus*, pl. 1, f. 2.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff.

15. *Trophon cretaceus*, Reeve, "Conch. Icon.," *Fusus*, f. 48.
Wanganui; Shakespeare Cliff. A large series of specimens have led me to think that this species is distinct from the last. It is distinguished by the more numerous spiral ribs.

16. *Trophon stangeri*, Gray, (*Fusus*), "Dieff. N.Z.," vol. ii., p. 230.
Wanganui; Kaimatera.

17. *Trophon cheesemani*, Hutton, (*Purpura*), "Trans. N.Z. Inst.," vol. xv., p. 131.
Wanganui; Kaimatera.

18. *Trophon duodecimus*, Gray, in "Dieff. N.Z.," vol. ii., p. 230.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff.

19. *Trophon crispus*, Gould, (*Fusus*), "Pro. Bost. Soc. Nat. Hist." vol. iii., p. 141.
Wanganui; Petane; Matapiro; Shakespeare Cliff. Still living at Terra del Fuego. Our species may be distinct.

20. *Trophon expansus*, Hutton, "Trans. N.Z. Inst.," vol. xv., p. 410.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff.

21. *Trophon plebeius*, Hutton, (*Fusus*), "Cat. Marine Moll. of N.Z.," p. 9.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff.

22. *Polytropa striata*, Martyn, "Univ. Conch.," pl. 7 (*Buccinum*).
Kaimatera.

23. *Fusus australis*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool., ii., p. 495, pl. 34, f. 9–14.
Wanganui; Kaimatera; Shakespeare Cliff.

24. *Fusus spiralis*, Adams, "Pro. Zool. Soc.," 1855, p. 221.
Petane; Shakespeare Cliff.

25. *Taron dubius*, Hutton, (*Trophon*), "Jour. de Conch.," xxvi., p. 13.
Wanganui.

26. *Siphonalia mandarina*, Duclos, "Mag. Zool.," viii.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

27. *Siphonalia caudata*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. ii., p. 503, pl. 34, f. 20–21.
Wanganui. Found also in the Pareora system. Perhaps a variety of the last.

28. *Siphonalia dilatata*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. ii., p. 498, pl. 34, f. 15–16. *Fusus subreflexus*, Sowb. in "Darwin's Geol. Obs. in S. America."
Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

29. *Siphonalia nodosa*, Martyn, "Univ. Conch.," *Buccinum*, pl. 5. *S. nodosa*, var. B. (Hutton), is the young.
Kaimatera; Shakespeare Cliff; Patea; Petane; Matapiro. Found also in the Pareora system.

Var. *conoidea*, Hutton; *S. nodosa*, var. D., Hutton, "Cat. Tert. Moll. of N.Z."
Petane; Matapiro. Found also in the Pareora system. Possibly the same as *Purpura conoidea*, Zittel.

30. *Siphonalia subnodosa*, Hutton, "Trans. N.Z. Inst.," vol. ix., p. 596, pl. xvi., f. 7 (*Cominella*); *S. nodosa*, var. C., Hutton, "Cat. Tert. Moll. of N.Z."
Shakespeare Cliff; Matapiro. Found also in the Pareora system.

31. *Siphonalia* (?) *cingulata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 315.
Shakespeare Cliff; Petane.

32. *Pisania lineata*, Martyn, "Univ. Conch.," *Bucc.*, pl. 48.
Wanganui; Kaimatera; Petane; Shakespeare Cliff. Found also in the Pareora system.

Var. *traversi*, Hutton, "Cat. Marine Moll. of N.Z.," p. 9 (*Fusus*).
Wanganui.

33. *Pisania striatula*, Hutton; *Cominella striata*, Hutton, "Trans. N.Z. Inst.," vol. vii., p. 458; not *Pisania striata*, Gml.
Wanganui; Petane; Matapiro; Shakespeare Cliff.

34. *Pisania drewi*, Hutton, "Trans. N.Z. Inst.," vol. xv., p. 410.
Wanganui; Petane.

35. *Cominella maculata*, Martyn, "Univ. Conch.," *Bucc.*, pl. 49.
Wanganui; Matapiro (a large variety). Found also in the Pareora system.

36. *Cominella maculosa*, Martyn, "Univ. Conch.," *Bucc.*, pl. 8.
Petane.

37. *Cominella virgata*, Adams, "Gen. Moll.," pl. 16, f. 6*a*.
Shakespeare Cliff; Kaimatera.

38. *Cominella antarctica*, Reeve, "Conch. Icon.," *Buccinum*, f. 30.
Petane; Matapiro.

39. *Cominella accuminata*, Hutton; *C. elongata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 315, pl. 18, f. 5; not *C. elongata*, Dunker.
Shakespeare Cliff.

40. *Cominella lurida*, Philippi, "Zeitschrift f. Malak." 1848, p. 137.
Wanganui; Petane; Matapiro; Shakespeare Cliff.

41. *Cominella nassoides*, Reeve, "Conch. Icon.," *Buccinum*, f. 12.
Petane.

42. *Cominella huttoni*, Kobelt, "Cat. d. Gattung," *Cominella*, p. 233.
Matapiro.

43. *Oliva neozelanica*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 314, pl. 18, f. 1.
Patea. Found also in the Pareora system.

44. *Ancillaria australis*, Sowb., "Sp. Conch.," 1830, pl. 7, f. 44–46.
Kaimatera; Wanganui; Patea; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

45. *Ancillaria lata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 325.
Patea; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

46. *Columbella varians*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 314, pl. 18, f. 2.
Petane; Shakespeare Cliff.

47. *Columbella choava*, Reeve, "Conch. Icon.," f. 239.
Wanganui; Petane; Shakespeare Cliff.

48. *Columbella pisaniopsis*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 314.
Petane; Matapiro.

49. *Columbella cancellaria*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 314.
Wanganui; Petane.

50. *Columbella angustata*, Hutton, "Trans. N.Z. Inst.," vol. xviii.
Petane.

51. *Marginella translucida*, Sowb., "Thes. Conch.," vol. i., p. 376.
Wanganui; Petane; Matapiro. Found living in Australia. This may be the *M. propinqua* (Tate), referred to by Mr. T. W. Kirk in "Trans. N.Z. Inst.," vol. xiv., p. 409.

52. *Marginella attenuata*, Reeve, "Conch. Icon.," f. 116; *M. hectori*, Kirk, "Trans. N.Z. Inst., vol. xiv., p. 409.
Petane. Found living in Australia.

53. *Marginella angasi*, Brazier, "Jour. de Conch.," 1870, p. 304.
Wanganui. Found living in Australia.

54. *Voluta pacifica*, Solander, "Cat. Portland Mus.," No. 4039
Shakespeare Cliff; Patea; Petane; Matapiro; Wanganui. Found also in the Pareora system.

Var. *elongata*, Swainson, "Exot. Conch.," pl. 20, 21.

Wanganui. Found also in the Pareora system.

55. *Voluta gracilis*, Swainson, "Exot. Conch.," pl. 42, 43.
Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

56. *Turricula rubiginosa*, Hutton, (*Mitra*), "Cat. Marine Moll. of N.Z." p. 20.
Wanganui; Petane.

57. *Turricula marginata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 315, pl. 18, f. 4.
Wanganui.

58. *Turricula planata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 315, pl. 18, f. 3.
Wanganui.

59. *Turricula lincta*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 326.
Petane.

60. *Terebra tristis*, Deshayes, "Pro. Zool. Soc.," 1859.
Shakespeare Cliff; Kaimatera; Patea; Petane.

61. *Terebra costata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 315, pl. 18, f. 6.
Wanganui; Petane; Matapiro. Found also in the Pareora system.

62. *Pleurotoma pagoda*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 5.
Petane; Matapiro. Found also in the Pareora system.

63. *Pleurotoma albula*, Hutton, "Cat. Marine Moll. of N.Z." p. 12.
Petane; Matapiro. Found also in the Pareora system.

64. *Pleurotoma nexilis*, Hutton, "Trans. N.Z. Inst." vol. xvii., p. 317, pl. 18, f. 9. (*Clathurella* ?)
Wanganui; Petane.

65. *Pleurotoma buchanani*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 4.
Wanganui; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

66. *Pleurotoma neozelanica*, Smith, "Ann. and Mag. Nat. Hist.," series 4, vol. xix., p. 492.
Petane; Shakespeare Cliff.

67. *Pleurotoma tuberculata*, Kirk, "Trans. N.Z. Inst.," vol. xiv., p. 409.
Petane.

68. *Pleurotoma plicatella*, Hutton, "Trans. N.Z. Inst." vol xviii.
Wanganui.

69. *Drillia maorum*, Smith, "Ann. and Mag. Nat. Hist.," series 4, vol. xix., p. 497.
Petane.

70. *Drillia lævis*, Hutton, "Cat. Marine Moll. of N.Z.," p. 12.
Petane; Shakespeare Cliff.

71. *Drillia alabaster*, Reeve, "Pro. Zool. Soc.," 1843, p. 181.
Wanganui; Matapiro. Found living in Australia.

72. *Drillia wanganuiensis*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 4.
Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system. Much like *P. subæqualis*, Sowb., in Darwin's "Observations on the Geology of S. America."

73. *Drillia æquistriata*, Hutton, "Trans. N.Z. Inst.," vol. xviii.
Petane.

74. *Drillia protensa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 317 (*Daphnella*).
Petane.

75. *Daphnella lymneiformis*, Kiener, *Pleurot.* 62, t. 22, f. 3.
Shakespeare Cliff.

76. *Daphnella striata*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 5 (*Bela*).
Petane; Shakespeare Cliff. Found also in the Pareora system.

77. *Daphnella lacunosa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 317.
Shakespeare Cliff.

78. *Clathurella dictyota*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 316, pl. 18, f. 8.
Wanganui; Petane.

79. *Clathurella sinclairi*, Smith, "Ann. and Mag. Nat. Hist.," series 5, vol. xiv., p. 320.
Wanganui; Petane; Shakespeare Cliff.

80. *Clathurella hamiltoni*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 316, pl. 18, f. 7.
Petane; Matapiro; Wanganui (small variety).

81. *Clathurella abnormis*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 316.
Petane.

82. *Triton spengleri*, Lamarck, "Anim. sans Vert., ed. 2, vol. ix., p. 627.
Wanganui. Found also in the Pareora system.

83. *Cassis pyrum*, Lamarck, "Anim. sans Vert.," ed. 2, vol. x., p. 33.
Wanganui; Shakespeare Cliff.

84. *Natica neozelanica*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. ii., p. 237, pl. 66, f. 11, 12.
Wanganui; Kaimatera; Patea; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

85. *Natica gibbosa*, Hutton, "Trans. N.Z. Inst.," vol. xviii.
Matapiro. A single specimen, found by Mr. Hamilton.

86. *Natica ovata*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 9.
Wanganui; Patea. Found also in the Pareora system.

87. *Natica australis*, Hutton, (*Luvatia*), "Jour. de Conch.," vol. xxvi., p. 23.
Wanganui; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

88. *Natica vitrea*, Hutton, "Cat. Marine Moll. of N.Z.," p. 21.
Shakespeare Cliff.

89. *Natica lævis*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 317, pl. 18, f. 10.
Petane; Shakespeare Cliff.

90. *Sigaretus undulatus*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 318, pl. 18, f. 11.
Petane; Shakespeare Cliff.

91. *Sigaretus cinctus*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 318, pl. 18, f. 12.
Wanganui.

92. *Eulima treadwelli*, Hutton; *E. micans*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 318; not of Tenison-Woods.
Wanganui.

93. *Eulima media*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 318, pl. 18, f. 13.
Wanganui.

94. *Turbonilla neozelanica*, Hutton, "Cat. Marine Moll. of N.Z.," p. 22 (*Chemnitzia*).
Wanganui; Petane.

95. *Eulimella deplexa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 318.
Wanganui.

96. *Eulimella obliqua*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 318.
Petane.

97. *Aclis costellata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 319, pl. 18, f. 14.
Wanganui.

98. *Odostomia sulcata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 319, pl. 18, f. 15.
Wanganui; Shakespeare Cliff.

99. *Odostomia georgiana*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 319, pl. 18, f. 16.
Petane; Shakespeare Cliff.

100. *Odostomia lactea*, Angas, "Pro. Zool. Soc.," 1867, p. 112, pl. 13, f. 11.
Wanganui; Petane; Matapiro; Shakespeare Cliff.

101. *Odostomia fasciata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 320.
Wanganui.

102. *Odostomia sheriffii*, Hutton, "Trans. N.Z. Inst.," vol. xv., p. 411.
Wanganui.

103. *Odostomia rugata*, Hutton; *O. plicata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 319, pl. 18, f. 17; not of Montfort.
Wanganui; Petane. Found also in the Pareora system.

104. *Trivia neozelanica*, Kirk, "Trans. N.Z. Inst.," vol. xiv., p. 409.
Petane; Matapiro.

105. *Cancellaria trailli*, Hutton, "Cat. Marine Moll. of N.Z.," p. 26.
Wanganui; Petane.

106. *Cancellaria lacunosa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 320.
Petane.

107. *Admete ambigua*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 320, pl. 18, f. 18.
Wanganui.

108. *Trichotropis inornata*, Hutton, "Cat. Marine Moll. of N.Z., p. 26.
Petane; Matapiro; Shakespeare Cliff.

109. *Cerithium cancellatum*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 12.
Petane; Shakespeare Cliff. Found also in the Pareora system.

110. *Bittium terebelloides*, Martens, "Critical List of N.Z. Moll.," p. 26.
Wanganui; Petane.

111. *Bittium cinctum*, Hutton, "Trans. N.Z. Inst.," vol. xviii.
Wanganui; Petane.

112. *Cerithidea bicarinata*, Gray, in "Dieff. N.Z.," vol. ii., p. 241.
Wanganui; Kaimatera; Patea; Napier; Matapiro.

113. *Cerithidea tricarinata*, Hutton, "N.Z. Journal of Science," vol. i., p. 477.
Petane; Matapiro.

114. *Struthiolaria papulosa*, Martyn, "Univ. Conch.," pl. 54.
Wanganui; Shakespeare Cliff.

115. *Struthiolaria frazeri*, Hutton, "Trans. N.Z. Inst.," vol. xvii, p. 329.
Matapiro. Found also in the Pareora system.

116. *Struthiolaria vermis*, Martyn, "Univ. Conch.," pl. 53.
Wanganui; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

117. *Struthiolaria cingulata*, Zittel, "Reise der *Novara*," Palæ., p. 35, taf. xv., f. 2.
Patea. A single specimen, collected by Mr. Buchanan. Found also in the Pareora system.

118. *Trochita neozelanica*, Lesson, "Voy. *Coquille*," Zool., vol. ii., p. 395.
Wanganui; Kaimatera; Patea; Napier; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

119. *Trochita inflata*, Hutton, "Trans. N.Z. Inst.," vol. xv., p. 411.
Wanganui; Kaimatera; Shakespeare Cliff.

120. *Trochita scutum*, Lesson, "Voy. *Coquille*," Zool., vol. ii., p. 395.
Wanganui; Petane; Matapiro; Shakespeare Cliff; Kaimatera.

121. *Trochita alta*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 329.
Petane; Matapiro. Found also in the Pareora system.

123. *Crepidula costata*, Sowb., "Gen. Shells," f. 3.
Wanganui; Patea; Petane; Matapiro; Shakespeare Cliff.

124. *Crepidula monoxyla*, Lesson, "Voy. *Coquille*," Zool., vol. ii., p. 391.
Wanganui; Kaimatera; Patea; Napier; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

125. *Crepidula unguiformis*, Lamarck, "Anim. sans Vert.," ed. 2, vol. viii., p. 642.
Wanganui; Petane; Shakespeare Cliff. Found also in the Pareora system.

126. *Hipponyx uncinatus*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 14.
Shakespeare Cliff.

127. *Turritella rosea*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 136, pl. 55, f. 24–26.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

128. *Turritella ambulacrum*, Sowb., in Darwin's "Geol. Obs. on S. America," p. 257, pl. 3, f. 49; *T. bicincta*, Hutton, "Cat. Tert. Moll.," p. 13.
Petane; Matipiro. Found also in the Pareora system.

129. *Turritella tricincta*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 13.
Wanganui; Kaimatera; Petane; Matapiro; Shakespeare Cliff. Found also in the Pareora system.

130. *Turritella pagoda*, Reeve, "Conch. Icon.," f. 60.
Wanganui; Shakespeare Cliff. Found also in the Pareora system.

131. *Eglisia planostoma*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 320, pl. 18, f. 19.
Wanganui; Petane.

132. *Rissoa emarginata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 320, pl. 18, f. 20.
Wanganui; Petane.

133. *Rissoa semisulcata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 231.
Wanganui; Petane.

134. *Rissoa rugosa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 231.
Petane.

135. *Rissoa impressa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 231.
Petane.

136. *Rissoa annulata*, Hutton, "N.Z. Journal of Science," vol. ii., p. 173.
Wanganui; Petane.

137. *Rissoa gradata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 321, pl. 18, f. 21.
Wanganui; Petane.

138. *Rissoa rugulosa*, Hutton, "Cat. Marine Moll. of N.Z.," p. 28.
Petane.

139. *Potamopyrgus corolla*, Gould, "Pro. Bost. Soc. Nat. Hist.," vol. ii.
Matapiro.

140. *Potamopyrgus antipodus*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 241.
Matapiro.

141. *Risella melanostoma*, Gml., in Linné's "Syst. Nat.," ed. 13, p. 3581, No. 90.
Wanganui; Kaimatera.

142. *Vermetus moniliferus*, "Hutton, Cat. Tert. Moll. of N.Z.," p. 13.
Shakespeare Cliff. Found also in the Pareora system.

143. *Vermetus neozelanicus*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 293.
Shakespeare Cliff.

144. *Xenophora conchiliophora*, Born.
Petane. A doubtful determination. Found also in the Pareora system.

145. *Scalaria zelebori*, Frauenfeld, "Reise der *Novara*," Moll., pl. 1, f. 6; *S. intermedia*, Hutton, "Cat. Tert. Moll. of N.Z.," p. 10.
Wanganui; Petane; Shakespeare Cliff. Found also in the Pareora system.

146. *Scalaria nympha*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 321.
Petane.

147. *Scalaria* (?) *corulum*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 322, pl. 18, f. 22.
Wanganui.

148. *Turbo smaragdus*, Martyn, "Univ. Conch.," pl. 73, 74.
Napier.

149. *Turbo granosus*, Martyn, "Univ. Conch.," *Trochus*, pl. 37.
Wanganui.

150. *Imperator imperialis*, Chemnitz, "Conch. Cab.," vol. v., p. 13, f. 1714, 1715.
Wanganui; Shakespeare Cliff.

151. *Rotella neozelanica*, Hombron and Jacquinot, "Voy. Pole Sud," Zool. v., p. 53, pl. 14, f. 5, 6.
Wanganui; Kaimatera; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

152. *Trochus viridis*, Gml., from Chemn. "Conch. Cab.," vol. v., f. 1643, 1644.
Wanganui.

153. *Trochus conicus*, Hutton, "Trans. N.Z. Inst.," vol. xv., p. 411.
Shakespeare Cliff.

154. *Trochus tiaratus*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 256, pl. 64, f. 6–11.
Wanganui; Kaimatera; Shakespeare Cliff; Petane; Matapiro.

155. *Trochus chathamensis*, Hutton, "Cat. Marine Moll. of N.Z.," p. 36.
Wanganui.

156. *Zizyphinus decarinatus*, Perry, "Conch.," *Trochus*, pl. 47, f. 2.
Wanganui.

157. *Zizyphinus ponderosus*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 322.
Wanganui.

158. *Zizyphinus selectus*, Chemnitz, "Conch. Cab.," vol. xi., f. 1896, 1897.
Kaimatera; Shakespeare Cliff; Petane.

159. *Zizyphinus hodgei*, Hutton, "Trans. N.Z. Inst.," vol. vii., p. 458, and fig.
Shakespeare Cliff; Petane; Matapiro.

160. *Zizyphinus punctulatus*, Martyn, "Univ. Conch.," pl. 37.
Shakespeare Cliff; Petane. Found also in the Pareora system.

161. *Cantharidus tenebrosus*, Adams, "Pro. Zool. Soc," 1851, p. 170.
Shakespeare Cliff; Petane. Found also in the Pareora system.

162. *Cantharidus sanguineus*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 238 (*Gibbula*).
Wanganui; Petane.

163. *Cantharidus pupillus*, Gould, "Pro. Bost. Soc. Nat. Hist.," vol. iii., p. 91.
Shakespeare Cliff; Petane.

164. *Monilea-egena*, Gould, "Pro. Bost. Soc. Nat. Hist.," vol. iii., p. 84 (*Solarium*).
Wanganui; Kaimatera; Shakespeare Cliff; Petane; Matapiro.

165. *Monodonta æthiops*, Gmelin, after Chemnitz, "Conch. Cab.," vol. v., f. 1820–1.
Wanganui; Kaimatera.

166. *Monodonta melaloma*, Menke, "Moll. Novæ Holl.," No. 50., p. 14.
Wanganui.

167. *Monodonta sulcata*, Wood.
Wanganui.

168. *Monodonta subrostrata*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 238.
Petane.

169. *Cyclostrema obliquata*, Hutton, "Trans. N.Z. Inst.," vol. xviii.
Wanganui.

170. *Scissurella mantelli*, Woodward, "Pro. Zool. Soc.," 1859, p. 202, pl. 46.
Petane.

171. *Haliotis rugoso-plicata*, Chemnitz, "Conch. Cab.," vol. x., p. 311.
Matapiro.

172. *Fissurella monilifera*, Hutton, "Cat. Marine Moll. of N.Z.," p. 42.
Shakespeare Cliff; Petane.

173. *Emarginula striatula*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 332, pl. 68, f. 21, 22.
Wanganui; Kaimatera; Shakespeare Cliff; Petane. Found also in the Pareora system.

174. *Parmophorus intermedius*, Reeve, "Pro. Zool. Soc.," 1842, p. 50.
Shakespeare Cliff; Petane; Matapiro.

175. *Acmæa corticata*, Hutton, "Man. N.Z. Moll.," p. 89.
Wanganui.

176. *Acmæa flammea*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 354, pl. 71, f. 15–24.
Shakespeare Cliff; Petane.

177. *Chiton pellis-serpentis*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 381, pl. 74, f. 17–22.
Shakespeare Cliff.

178. *Acanthochiton neozelanica*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 400, pl. 73, f. 5–8.
Petane.

SCAPHOPODA.

179. *Dentalium conicum*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 1.
Wanganui; Shakespeare Cliff; Patea; Petane. Found also in the Pareora system.

180. *Dentalium nanum*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 1.
Shakespeare Cliff; Petane; Matapiro.

181. *Dentalium ecostatum*, Kirk, "Trans. N.Z. Inst.," vol. xiii., p. 306.
Shakespeare Cliff; Petane. Found also in the Pareora system.

LAMELLIBRANCHIATA.

182. *Barnea similis*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 254.
Matapiro; Kaimatera.

183. *Pholadidea tridens*, Gray, in "Dieffenbach N.Z.," vol. ii. p. 254.
Wanganui.

184. *Saxicava australis*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. v., p. 153.
Petane.

185. *Panopæa neozelanica*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 547, pl. 83, f. 7–9.
Wanganui; Petane; Matapiro. Found also in the Pareora system.

186. *Corbula erythrodon*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. vi., p. 138.
Wanganui; Shakespeare Cliff; Petane; Matapiro; Kaimatera.

187. *Corbula neozelanica*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 511, pl. 85, f. 12–14.
Wanganui.

188. *Anatina angasi*, Sowerby.
Shakespeare Cliff.

189. *Thracia vitrea*, Hutton, "Cat. Marine Moll. of N.Z.," p. 61; *T. granulosa*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 19.
Wanganui.

190. *Myodora striata*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 537, pl. 83, f. 10.
Wanganui; Shakespeare Cliff; Petane.

191. *Myodora neozelanica*, Smith, "Pro. Zool. Soc.," 1880, p. 584, pl. 53, f. 5.
Wanganui.

192. *Myodora subrostrata*, Smith, "Pro. Zool. Soc.," 1880, p. 584, pl. 53, f. 6.
Wanganui. Found also in the Pareora system.

193. *Myodora antipoda*, Smith, "Pro. Zool. Soc.," 1880, p. 585, pl. 53, f. 7.
Shakespeare Cliff.

194. *Myodora boltoni*, Smith, "Pro. Zool. Soc.," 1880, p. 585, pl. 53, f. 9.
Matapiro.

195. *Mactra discors*, Gray, "Mag. Nat. Hist.," 1837, p. 371.
Wanganui; Shakespeare Cliff; Patea; Matapiro. Found also in the Pareora system.

196. *Mactra æquilatera*, Deshayes, "Pro. Zool. Soc.," 1853, p. 17; *M. elegans*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 19 (juv.)

197. *Mactra scalpellum*, Deshayes, "Pro. Zool. Soc.," 1854, p. 335.
Wanganui; Petane.

198. *Mactra lavata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 321.
Petane.

199. *Hemimactra notata*, Hutton, "Cat. Marine Moll. of N.Z.," p. 64.
Wanganui; Petane.

200. *Hemimactra elongata*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 518, pl. 83, f. 1, 2; *M. inflata*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 18.
Petane. Found also in the Pareora system.

201. *Hemimactra ovata*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 251; *M. rudis*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 19.
Wanganui; Shakespeare Cliff; Patea; Kaimatera.

202. *Hemimactra crassa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 322.
Wanganui.

203. *Lutraria solida*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 19.
Wanganui; Petane; Matapiro. Found also in the Pareora system.

204. *Cæcella neozelanica*, Deshayes, "Pro. Zool. Soc.," 1854, p. 335; *Darina pusilla*, Hutton, "Cat. Marine Moll. of N.Z.," p. 64.
Patea; Matapiro. Found also in the Pareora system.

205. *Zenatia acinaces*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 545, pl. 83, f. 5, 6.
Wanganui; Shakespeare Cliff; Patea; Petane. Found also in the Pareora system.

206. *Paphia neozelanica*, Chemnitz (*Mya*), "Conch. Cab.," vol. vi., f. 19, 20.
Wanganui; Shakespeare Cliff; Petane; Matapiro; Kaimatera. Found also in the Pareora system.

207. *Paphia ventricosa*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 252.
Kaimatera.

208. *Paphia spissa*, Reeve, "Conch. Icon.," *Mesodesma*, f. 18.
Wanganui; Kaimatera.

209. *Psammobia stangeri*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 253.
Wanganui; Petane; Matapiro. Found also in the Pareora system.

210. *Psammobia lineolata*, Gray, in "Yate's N.Z.," p. 309.
Wanganui; Patea; Matapiro. Found also in the Pareora system.

211. *Hiatula incerta*, Reeve, "Conch. Icon.," *Soletellina*, f. 13.
Matapiro. Found also in the Pareora system.

212. *Tellina alba*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 500, pl. 81, f. 1–3.
Wanganui. Found also in the Pareora system.

213. *Tellina glabrella*, Deshayes, "Pro. Zool. Soc.," 1854, p. 366.
Wanganui; Shakespeare Cliff; Kaimatera.

214. *Tellina disculus*, Deshayes, "Pro. Zool. Soc.," 1854, p. 360.
Wanganui; Shakespeare Cliff; Petane; Matapiro.

215. *Tellina subovata*, Sowerby, in "Conch. Icon.," f. 166.
Wanganui; Petane.

216. *Tellina angulata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 322.
Wanganui.

217. *Tellina retiaria*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 322.
Shakespeare Cliff.

218. *Venus oblonga*, Hanley, in Wood's "Index Test.," Supp.
Wanganui; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

219. *Venus yatei*, Gray, in "Yate's N.Z.," p. .
Wanganui; Petane; Matapiro.

220. *Venus stutchburyi*, Gray, in Wood's "Index Test." Supp.
Wanganui; Petane; Matapiro; Kaimatera. Found also in the Pareora system.

221. *Venus meridionalis*, Sowb., in Darwin's "Geol. Obs. on S. America," p. 250, pl. 2, f. 13; *V. vellicata*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 21.
Petane; Found also in the Pareora system.

222. *Venus mesodesma*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 532, pl. 84, f. 17, 18.
Wanganui; Shakespeare Cliff; Patea; Matapiro; Kaimatera. Found also in the Pareora system.

223. *Venus sulcata*, Hutton, "Trans. N.Z. Inst.," vol. vii., p. 458, and fig.
Shakespeare Cliff; Matapiro. Found also in the Pareora system. Probably a large variety of the last species.

224. *Venus gibbosa*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 21.
Wanganui; Shakespeare Cliff. Probably another variety of *V. mesodesma*.

225. *Cytherea assimilis*, Hutton, (*Chione*), "Cat. Tertiary Moll. of N.Z.," p. 21.
Wanganui; Shakespeare Cliff. Found also in the Pareora system.

226. *Cytherea multistriata*, Sowb., "Thes. Conch.," vol. i., p. 628, pl. 36, f. 177.
Wanganui; Shakespeare Cliff; Petane. Found also in the Pareora system.

227. *Dosinia australis*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 249.
Shakespeare Cliff; Patea; Matapiro.

228. *Dosinia subrosea*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 249.
Wanganui; Shakespeare Cliff; Patea; Matapiro. Found also in the Pareora system.

229. *Dosinia grayi*, Zittel, "Reise der *Novara*," Palæ., p. 45, taf. xv., f. 11.
Wanganui; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

230. *Dosinia limbata*, Gould, "Pro. Bost. Soc. Nat. Hist.," vol. iii., p. 277.
Wanganui; Shakespeare Cliff. Found also in the Pareora system.

231. *Tapes intermedia*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 526, pl. 84, f. 9, 10.
Wanganui; Petane; Matapiro. Found also in the Pareora system.

232. *Cardium striatulum*, Sowerby, "Pro. Zool. Soc.," 1840.
Wanganui; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

233. *Chamostræa albida*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. vi., p. 585.
Shakespeare Cliff. Found also in the Pareora system.

234. *Lucina dentata*, Wood, "Gen. Conch.," p. 195, pl. 46, f. 7.
Wanganui; Shakespeare Cliff; Patea; Petane; Matapiro. Found also in the Pareora system.

235. *Loripes concinna*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 323.
Shakespeare Cliff; Petane. Found also in the Pareora system.

236. *Mysia ampla*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 323.
Wanganui.

237. *Mysia neozelanica*, Gray, in "Dieffenbach's N.Z.," vol. ii. p. 256.
Wanganui; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

238. *Mysia globularis*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. vi., p. 231.
Wanganui.

239. *Kellia robusta*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 323.
Petane.

240. *Kellia effossa*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 323.
Petane.

241. *Cardita australis*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. vi., p. 383.
Wanganui; Shakespeare Cliff; Petane; Matapiro; Kaimatera. Found also in the Pareora system.

242. *Cardita difficilis*, Deshayes, "Pro. Zool. Soc.," 1852, p. 103, pl. 17, f. 16, 17; *V. intermedia*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 24.
Wanganui; Petane; Matapiro. Found also in the Pareora system.

243. *Cardita patagonica*, Sowb., in Darwin's "Geol. Obs. in S. America," p. 251, pl. 2, f. 17; *V. intermedia* var. *B.*, Hutton, "Cat. Tert. Moll. of N.Z.," p. 24.
Petane; Matapiro. Found also in the Pareora system.

244. *Mytilicardia tasmanica*, Ten.-Woods, "Pro. Roy. Soc. Tasmania," 1875, p. 161.
Shakespeare Cliff; Kaimatera.

245. *Mytilicardia trigonopsis*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 324.
Wanganui; Petane.

246. *Nucula nitidula*, Adams, "Pro. Zool. Soc.," 1856, p. 51.
Wanganui; Shakespeare Cliff; Petane; Kaimatera.

247. *Leda concinna*, Adams, "Pro. Zool. Soc.," 1856, p. 48.
Wanganui.

248. *Leda fastidiosa*, Adams, "Pro. Zool. Soc.," 1856, p. 49; *L. semiteres*, Hutton, "Trans. N.Z. Inst.," vol. ix., p. 598.
Petane. Found also in the Pareora system.

249. *Solenella australis*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 471, pl. 78, f. 5–10; *Nucula ornata*, Sowb., in Darwin's "Geol. Obs. in S. America," p. 251, pl. 2, f. 19.
Petane. Found also in the Pareora system.

250. *Arca decussata*, Sowerby, "Pro. Zool. Soc.," 1833, p. 18.
Wanganui; Shakespeare Cliff; Petane; Kaimatera. Found also in the Pareora system.

251. *Macrodon* (*Scaphula*?) *lanceolata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 332.
Petane.

252. *Cucullæa attenuata* (?), Hutton, "Cat. Tertiary Moll. of N.Z.," p. 28.
Patea. Found also in the Pareora system.

253. *Pectunculus laticostatus*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 466, pl. 77, f. 4–6, and 1, 2.
Wanganui; Shakespeare Cliff; Patea; Petane; Matapiro. Found also in the Pareora system.

254. *Pectunculus striatularis*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. vi., p. 493.
Wanganui; Petane; Matapiro.

255. *Mytilus magellanicus*, Lamarck, "Anim. sans Vert.," 2nd ed., vol. vii., p. 37.
Wanganui; Shakespeare Clift; Petane. Found also in the Pareora system.

256. *Mytilus latus*, Chemnitz, "Conch. Cab.," vol. viii., f. 747.
Shakespeare Cliff; Petane; Matapiro.

257. *Modiola australis*, Gray, in "King's Voyage," vol. ii., p. 477.
Wanganui; Shakespeare Cliff; Matapiro. Found also in the Pareora system.

258. *Crenella impacta*, Hermann; Reeve, "Conch. Icon.," *Modiola*, f. 64.
Shakespeare Cliff; Petane.

259. *Lithodomus striatus*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 26.
Shakespeare Cliff. A single specimen, collected by Mr. Buchanan.

260. *Perna*, sp. ind.
Petane; Matapiro. Found also in the Pareora system at Castle Point.

261. *Pinna neozelanica*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 259.
Wanganui; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

262. *Lima crassa*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 33; *L. zealandica*, Sowb., "Pro. Zool. Soc.," 1876, p. 754.
Wanganui; Shakespeare Cliff; Kaimatera. Found also in the Pareora system.

263. *Lima angulata*, Sowb., "Thes. Conch.;" Reeve, "Conch. Icon.," f. 13.
Wanganui; Shakespeare Cliff.

264. *Lima bullata*, Born.; Sowb., "Thes. Conch.," vol. i., p. 22, f. 33.
Shakespeare Cliff; Petane.

265. *Pecten semiplicatus*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 30.
Napier. Found also in the Pareora system at Castle Point.

266. *Pecten laticostatus*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 250.
Wanganui; Shakespeare Cliff; Petane.

267. *Pecten neozelanicus*, Gray, in "Dieffenbach's N.Z.," vol. ii., p. 260.
Wanganui; Shakespeare Cliff; Petane; Matapiro; Kaimatera. Found also in the Pareora system.

268. *Pecten triphooki* (?), Zittel, "Reise der *Novara*," Palæ., p. 52, pl. xi., f. 4.
Moteo, near Puketapu. Found also in the Pareora system.

269. *Pecten radiatus*, Hutton, "Cat. Marine Moll. of N.Z.," p. 82.
Wanganui; Shakespeare Cliff; Petane. Perhaps a variety of the last.

270. *Pecten convexus*, Quoy and Gaimard, "Voy. *Astrolabe*," Zool. iii., p. 443, pl. 76, f. 1–3.
Wanganui; Shakespeare Cliff; Petane, Matapiro. Found in the Pareora system at Castle Point.

271. *Anomia alectus*, Gray, "Pro. Zool. Soc.," 1849, p. 117.
Wanganui; Shakespeare Cliff; Petane. Found also in the Pareora system.

272. *Anomia undata*, Hutton, "Trans. N.Z. Inst.," vol. xvii., p. 324.
Petane. Found also in the Pareora system.

273. *Anomia stowei*, Hutton, "Cat. Marine Moll. of N.Z.," p. 83.
Petane; Matapiro.

274. *Ostrea edulis*, Linné.
Wanganui; Shakespeare Cliff; Petane; Matapiro. Found also in the Pareora system.

275. *Ostrea corrugata*, Hutton, "Cat. Tertiary Moll. of N.Z.," p. 35.
Shakespeare Cliff. A single specimen, collected by Mr. Buchanan.

BRACHIOPODA.

276. *Waldheimia lenticularis*, Deshayes, "Mag. Zool.," 1841, t. 41.
Wanganui. Found also in the Pareora system.

277. *Waldheimia ovalis*, Hutton, "Trans. N.Z. Inst.," vol. xviii. Shakespeare Cliff; Napier. Found also in the Pareora system at Castle Point.

278. *Terebratella cruenta*, Dillwyn; Reeve, "Conch. Icon.," f. 20. Shakespeare Cliff.

279. *Terebratella rubicunda*, Solander; Reeve, "Conch. Icon.," f. 27.
Shakespeare Cliff; Petane; Kaimatera. Found also in the Pareora system.

280. *Rhynchonella nigricans*, Sowb., "Thes. Conch.," vol. i., p. 342.
Wanganui; Shakespeare Cliff; Petane; Kaimatera. Found also in the Pareora system.

Art. LVIII.—*On the Age of the Napier Limestones.*

By A. McKay.

[*Read before the Wellington Philosophical Society*, 21*st October*, 1885.]

The late Dr. von Hochstetter, basing his expressed opinion upon material supplied him by Mr. Triphook and others, referred all the beds in Scinde Island to the upper part of his Hawke's Bay series.

This Hawke's Bay series of Hochstetter is by him referred to the upper division of tertiary deposits in New Zealand, as determined by him, and called "younger tertiary formations." These embrace a triple series: the Awatere series; the Hawke's Bay series; and the Wanganui series. How these are related to each other we are not distinctly told; but it is evident that the terms are not geographical distinctions for equivalent formations in different districts, and that the Hawke's Bay series was considered intermediate in age between the Awatere and Wanganui series.

In the Geological Reports for the year 1868–69, Captain Hutton recognises the existence of the "Hawke's Bay series," and refers to it the beds forming the Mahia Peninsula, and a large district N.E. and S.W. of Poverty Bay. Dr. von Hochstetter had previously referred the beds forming Mahia Peninsula to the Hawke's Bay series, so that there is no doubt that Captain Hutton meant the Hawke's Bay series of Hochstetter. His estimate on the age of these beds is expressed elsewhere, in a paper on "The Artesian Wells near Napier," in which he describes the rocks forming Scinde Island as belonging to a formation "of late tertiary date."