then, we have a reason quite sufficient, apparently, to account for the difference between the fossils of the two formations; but we still have to account for the calcareous rocks of Lyndon, Mount Cookson, and Mount Caverhill having been classed with the clays of the Pareora formation, rather than with the calcareous rocks of the Ahuriri formation. Only nineteen species of shells are known from these localities. Of these eight are common to both the Ahuriri and Pareora formations in other localities, nine are found only in the Pareora or Wanganui formations, while two are found only in the Ahuriri formation. We thus see that, while the fossils of these localities are more nearly related to those of the Pareora than to those of the Ahuriri formation, still the percentage of species common to both is above the average. The percentage, however, is nearly the same at Motanau, and even equal to it at Napier, so that this explanation is not altogether satisfactory.

But although neither difference of habitat nor difference of station appear to be quite capable of explaining the great difference between the fossils of the Ahuriri and Pareora formations, I think that the objections that can be urged against them are of little weight in comparison with the almost identical percentage of extinct forms in both, and it will be better to consider both formations as one until decisive proof can be got to the contrary. When the geology of the Wellington district is better known, proof one way or the other will probably be obtained; for the rocks in the Manawatu Gorge and the Upper Wanganui belong probably to the Pareora formation, while those on the East Coast and also at Waitotara belong to the Ahuriri formation.

Dr. Hector, in his recently published Geological Sketch Map of New Zealand, places his Kanieri series with the Hawke Bay series, and in this I think he is right; but he places the Awatere series with the Wanganui series of Shakespeare Cliff, and this I cannot agree to; for the fossils of the Awatere series are closely related to those from Motanau and Kanieri, and only 42½ per cent. of them are recent, while the fossils from Shakespeare Cliff are very distinct, and 75½ per cent. of them are recent.

ART. XCII.—*Descriptions of some new Tertiary Mollusca from Canterbury.*

By Captain F. W. HUTTON, Director of the Otago Museum.

[*Read before the Otago Institute, September 5th, 1876.*]

LAST year Dr. J. von Haast sent a collection of Canterbury tertiary fossils to the Otago Museum, with the request that I would describe the new

species. The collection contained about 68 species from four localities, viz., White Rock River; Mount Harris; Point Hill, Waitaki; and from the green sands at Waiho. Of these 22 are additions to our tertiary fauna. The remainder are species already described as found in our tertiary rocks, and from them I judge that the whole collection belongs to the Pareora formation, I am the more confident of this determination as six of the species here described as new are also found in the Pareora formation at Awamoa and other places in Otago. It is worthy of notice that *Pecten hochstetteri* was in the collection from Waiho, showing that this speciesis not exclusively characteristic of the Oamaru formation.

TYPHIS HEBETATUS, sp. nov.

Plate XVI., Fig 1.

Ovato-fusiform. Whorls, seven, irregular, smooth. Varices four in a whorl, rounded, spines obsolete. Tube for excurrent canal, short, conical. Aperture, oval. Anterior canal, closed, short, flattened. Axis, 1·1. Breadth, ·75.

Locality: Mount Harris.

FUSUS DENTATUS, sp. nov.

Elongato-fusiform. Whorls, eight or nine, sub-carinated, with distant, low, spiral ridges, crossed by low, rounded, transverse ribs, which on the keel are produced into flattened sharp teeth. On the body whorl there are three of the low spiral ridges posterior to the keel, while anterior to the keel the second or third ridge is rather larger than the others, and is followed by about 20 more on the produced canal. Aperture, broadly ovate, suddenly narrowed into the canal, which is much produced, narrow, quite straight, and as long as the spire. Axis, 1·45. Breadth, ·5.

Locality: Mount Harris.

Allied to *F. cumingi*, from China, but much narrower, and without the fold on the inner lip.

FUSUS TEGENS, sp. nov.

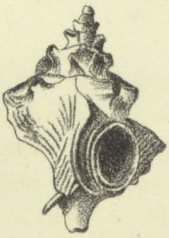
Small, elongato-fusiform. Whorls, seven, carinated, and with a row of tubercles on the keel; about eleven tubercles on the body whorl. Spire whorls and posterior portion of body whorl, smooth, shining, but slightly marked with oblique lines of growth. Anterior portion of body whorl with eight or ten low, rounded, spiral ribs, crossed by about ten sub-obsolete varices. Anterior portion of canal, smooth. Aperture ovate, gradually tapering into the long narrow canal, which inclines to the left and very slightly backward. Axis, ·4. Breadth, ·17.

Locality: White Rock River.

NEPTUNÆA (SIPHO) COSTATUS, sp. nov.

Plate XVI., Fig. 2.

Broadly fusiform. Whorls, seven, strongly spirally striated, and with



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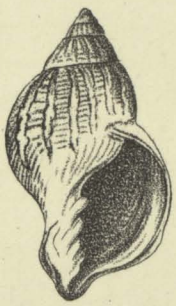

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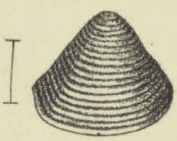

11

TERTIARY SHELLS.

F. W. Hutton, del.

J.B. lith.

rounded transverse ribs. Eleven or twelve ribs on the body whorl. Suture, closed over. Aperture, with a small posterior sinus. Canal, rather long, strongly twisted to the left, and slightly recurved. Axis, 1·2; breadth, ·75.

Localities: Mount Harris and White Rock River.

Closely allied to *Buccinum modificatum*, Reeve, but the canal is more twisted.

DRILLIA FUSIFORMIS, sp. nov.

Plate XVI., Fig. 3.

Elongato-fusiform. Whorls, nine, rounded, with rather oblique transverse ribs on the central portion. There are ten ribs on the body whorl. Anterior portion of the whorls with spiral sub-moniliform striæ. Spire, acute, nearly as long as the body whorl. Aperture, oval, rather suddenly contracted into the canal, which is short and nearly straight. Sinus, broad. Axis, 1·0. Breadth, ·7.

Locality: Mount Harris.

Somewhat approaching *D. flavidula*, Lam., from China and Japan, but the transverse ribs are not knobby, and the spire is much shorter.

BELA (?) ROBUSTA, sp. nov.

Plate XVI., Fig. 4.

Ovato-fusiform. Whorls, seven, concave and finely spirally striated posteriorly, and with low, rather distant, rounded, spiral ribs anteriorly. There are from ten to fifteen of these spiral ribs on the body whorl, and they are crossed by oblique lines of growth. Aperture, elongated. Outer lip slightly angled posteriorly. Columella, smooth, rounded. Canal, short, slightly twisted, and recurved. Axis, 1·45. Breadth, ·7.

Locality: White Rock River.

Similar in form to *B. decussata*, from Britain, but very differently marked.

CLAVATULA HAASTI, sp. nov.

Plate XVI., Fig. 5.

Broadly fusiform. Spire, acute. Whorls, eight, concave and spirally striated posteriorly, sharply keeled, and with rather distant spiral moniliform lines, crossed by oblique lines of growth anteriorly. There are about twenty of these lines on the anterior portion of the body whorl, in front of the keel. Aperture, elongated. Outer lip, angled posteriorly. Columella, with a slight swelling in the middle. Axis, 1·55. Breadth, ·78.

Localities: White Rock River and Mount Harris.

The nearest ally of this very distinct species is *C. mystica*, Reeve, but our shell has no nodules.

DEFRANCHIA EXCAVATA, sp. nov.

Plate XVI., Fig. 6.

Small, fusiform, turreted. Whorls, seven or eight, sharply keeled, and

spirally striated. Striæ rounded, narrower than the grooves. Interstices crossed by oblique lines of growth. Aperture, ovate. Outer lip, simple. Canal, moderate, slightly recurved. Body whorl rather longer than the spire. Axis, ·37. Breadth, ·15.

Locality: White Rock River.

The sharp keel of the spire whorls gives the appearance of the sutures being excavated.

COMINELLA SUBNODOSA, sp. nov.

Plate XVI., Fig. 7.

Ovate, conical. Whorls, five, flattened, distantly spirally ribbed; the intervening grooves much broader than the ribs. Suture, covered. Spire whorls with one, and body whorls with two rows of low, rounded, tubercles, of which there are about twelve in each row on the body whorl. Plait over the suture sub-nodose. Aperture, ovate, with a distinct posterior sinus. Interior of outer lip, grooved. Inner lip with a broad callus. Canal, short, bent strongly to the left, and recurved. Axis, 1·3. Breadth, 1·0.

Locality: White Rock River.

COMINELLA ORDINATIS, sp. nov.

Plate XVI., Fig. 8.

Small, ovate. Whorls, five or six, smooth, finely spirally striated, slightly convex; those of the spire with some obsolete transverse ribs. Aperture, rather narrow, posterior sinus nearly obsolete. Canal, short, broad, recurved, not much bent on one side. Axis, ·5. Breadth, ·27.

Locality: White Rock River.

Like *Buccinum citrinum*, Reeve, in shape.

NASSA (UZITA) COMPTA, sp. nov.

Plate XVI., Fig. 9.

Small, ovate. Whorls, six, rounded, strongly spirally grooved, and crossed by low, rounded, transverse ribs. Aperture, broadly ovate, suddenly contracted to form the short oblique canal. Inner lip, well marked; a tooth near the posterior end. Outer lip, varicated, thick, dentate internally. Canal, short, inclined to the left, and recurved. Axis, ·43. Breadth, ·18.

Locality: White Rock River.

These shells still retain some of their colour, which was brown. The interior was white with brown lips. The nearest ally of the species is *Nassa striata*, Adams, from Panama.

TURBINELLA BREVIROSTRIS, sp. nov.

Plate XVI., Fig. 10.

Broadly fusiform. Spire, pointed. Whorls, five; those of the spire, flattened, with low, rounded, transverse ribs, of which there are about fifteen on the body whorl. These are crossed by spiral striæ of unequal size. The transverse ribs on the body whorl reach to the anterior portion of the shell.

Aperture, sub-ovate, suddenly narrowed to form the short straight anterior canal. Columella, with three oblique folds on the anterior end. Axis, 1·45. Breadth, .93.

Locality: White Rock River.

LUNATIA SUTURALIS, sp. nov.

Plate XVI., Fig. 11.

Globose, smooth. Whorls, three to five. Suture, excavated. Umbilicus, rather narow, not funiculate, but with a shallow spiral groove running to the anterior end of the inner lip. Aperture, semi-lunar. Inner lip, with a slight callus. Axis, ·65. Breadth, ·6.

Locality: Waiho.

In the young the umbilical groove is more strongly marked, giving the shell the appearance of a *Natica*.

SIGARETUS CARINATUS, sp. nov.

Small, depressed, smooth. Spire, immersed. Whorls, two and a half. Body whorl, sharply keeled, and margined along the keel. Aperture, oblique, very wide. Inner lip, curved posteriorly. Umbilicus, wide, partly covered by the posterior fold of the inner lip. Axis, ·07. Breadth, ·25.

Locality: White Rock River.

Somewhat similar in shape to *S. incisus*, Reeve, but widely umbilicated and keeled.

ACUS (ABRETIA) NITIDA, Hinds.

Plate XVI., Fig. 12.

Hinds, "Pro. Zool. Soc.," 1843.

Locality: White Rock River. Found living in Tasmania and the Marquesas Islands.

EULIMA ACICULATA, Pease.

Pease, "Pro. Zool. Soc.," 1860.

Locality: White Rock River. Found living in the Sandwich Islands.

TURRITELLA HAUSTATOR CONCAVA, sp. nov.

Large. Whorls, concave; the anterior half, finely spirally striated; the posterior half, smooth, or marked with oblique lines of growth only. Suture, closed over. Aperture, sub-quadrate. Axis, 3·5. Breadth, 1·4. Angle of spire, 15°.

Localities: White Rock River, Point Hill.

This species is readily distinguished from *T. gigantea*, by the spiral striæ being fine and numerous, and, in the larger whorls, confined to the anterior half; while in *T. gigantea* the striæ are larger (eight or ten in a whorl), and extend throughout its whole breadth.

CLADOPODA DIRECTA, sp. nov.

Plate XVI., Fig. 13.

Smooth, polished, not much curved; section, circular. Diameter, ·3.

CYCLOSTREMA HELICOIDES, sp. nov.

Small, depressed. Whorls, four; smooth, spirally striated, flattened posteriorly and exteriorly, and with a narrow spiral rib on the anterior part of the flattened exterior. Umbilicus wide. Aperture nearly circular. Peristome continuous (?). Axis, ·05. Breadth, ·15.

Locality: White Rock River.

This species approaches *C. biporcata*, Adams, but the upper keel is obsolete. The only specimen that I have seen has its aperture broken, consequently I am not sure whether the peristome is continuous or not. If it is not continuous, the shell will belong to the genus *Adeorbis*.

CORBULA SULCATA, sp. nov.

Plate XVI., Fig. 14.

Trigonal, gibbous, nearly as high as long. Deeply longitudinally grooved. Very slightly angulated behind, and rounded in front. Height, ·32. Length, ·35.

Locality, Mount Harris.

LEDA SEMITERES, sp. nov.

Rather compressed, rounded in front, and produced to a blunt point behind. Posterior dorsal margin, very slightly concave. Ventral margin, regularly rounded. The whole shell regularly and strongly concentrically striated. There are between 40 and 50 striæ between the umbo and the ventral margin. Height, ·25. Length, ·5. Breadth, ·18.

Locality: Waiho.

Similar in shape to *L. lata*, Hinds, from New Guinea and Borneo, but easily distinguished by the stronger striæ.

ANOMIA TRIGONOPSIS, sp. nov.

Sub-trigonal. Lower valve (?). Upper valve, gibbous, solid, rather smooth. Muscular impressions, three; the upper one the largest, nearly round, but flattened below. Middle impression, immediately below the upper one, trigonal, the apex angular and pointing downward, the angles of the base rounded. Lower impression, placed diagonally below and posterior to the middle one; of the same size and shape as the middle impression, but the apex pointing upward.

Locality: White Rock River.