

The presence of a soda-lime felspar, together with the preponderance of soda, as shown by the above analysis, will therefore bring this rock under the group of ceratophyres (keratophyr), and I have named it accordingly.

The uppermost horizon of the slates on the Tokatea is occupied by a clastic rock which is evidently derived from the waste of the above or similar rock. Under the microscope it appears as a fine-grained aggregate of quartz and felspar—a true graywacke. The analysis shows as follows:—

Silica (SiO ₂)	...	...	...	...	...	60.42 per cent.
Iron-protioxide (FeO)	...	...	...	...	...	6.36 "
Alumina (Al ₂ O ₃)	...	...	...	...	...	18.40 "
Lime (CaO)	...	...	...	...	...	2.31 "
Magnesia (MgO)	...	...	...	...	...	2.15 "
Potash (K ₂ O)	...	...	...	...	...	2.97 "
Soda (Na ₂ O)	...	...	...	...	...	7.22 "
						99.83

On comparison with the analysis of the ceratophyre it will be seen that in all essential points the two rocks show a marked correspondence.

My analysis also of the underlying black slaty shales corresponds very fairly with both the above, and this somewhat unexpected result would tend to show a common origin for the whole series.

Silica (SiO ₂)	...	...	...	...	...	59.80 per cent.
Iron-protioxide (FeO)	...	...	...	...	...	12.51 "
Alumina (Al ₂ O ₃)	...	...	...	...	...	19.40 "
Lime (CaO)	...	...	...	...	...	2.10 "
Magnesia (MgO)	...	...	...	...	...	1.18 "
Potash (K ₂ O)	...	...	...	...	...	1.18 "
Soda (Na ₂ O)	...	...	...	...	...	4.38 "
						100.55

VII.—LOWER EOCENE STRATA OF CABBAGE BAY.

These beds, though lying some six or seven miles to the north of the Coromandel Goldfield, must yet be included in treating of the geology of the field, since they furnish the best evidence of the age of the auriferous volcanic series, which extends continuously to and beyond Cabbage Bay.

At Torehine, on the coast, the dense bush and scrub prevents the tracing of the junction of the sedimentary and volcanic rocks; and further inland, on the Umangawha Creek, running into Cabbage Bay, the small patches of sedimentary rocks are so much disturbed that it is almost impossible to trace their stratigraphical relations to the volcanic series, so that these volcanic beds must be correlated rather by negative than by direct evidence.* The negative evidence is, however, of its kind, fairly conclusive.

The sequence disclosed along the coast-line from Tawhetarangi to Torehine shows the beds to be dipping north-north-west at low angles. The lowest member of the series is a sandy marl containing numerous dicotyledonous leaf-impressions, and also numerous casts of small lamelli-branchate mollusca.

The marls are, in all probability, estuarine. Synchronous, or possibly overlying, is a thick bed of conglomerate, consisting of water-worn pebbles from the Palæozoic slaty shales. Though the most diligent search was made, no trace of volcanic rock was found in the conglomerate, thus proving, at the least, that the river that brought down the conglomerate did not flow through volcanic deposits. Since at the present day volcanic rocks flank these sedimentary strata on three sides, it is difficult to imagine that, had the volcanic rocks been deposited prior to the conglomerates, the latter would not have contained some pebbles from the former.

Overlying the conglomerate, and dipping north-north-east, are fine sandy clays containing *Ostrea wullerstorfi*. These are generally covered with recent beach-sand, but, under favourable conditions of wind and tide, are occasionally exposed for a distance of 2 to 3 chains. These beds dip at a low angle, and pass imperceptibly into a highly calcareous sandstone containing *Turritella gigantea*; *Fusus sp.*, *Cucullæa sp.*, and *Pentacrinus stellatus*. The next highest member of the series is a foraminiferal limestone, which is exposed on the beach for a distance of 3 chains. This, the highest of the series, is also met with in Anthony's Creek, reaching back from the sea for about a mile in places, forming characteristic limestone outcrops. Everywhere the limestone is composed of foraminifera, interspersed throughout with the column-joints of *Pentacrinus stellatus* and with occasional teeth of *Lamna huttoni*. The total length of exposure along the coast is approximately a mile. At about a mile and a half inland Miocene breccias overlie directly, so far as can be seen, the sedimentary series.

Another sequence of sedimentary rocks is exposed towards the head of the Tawhetarangi Creek, but here the conglomerates are absent, and are replaced by blue sandy marls thickly studded in places with *Ostrea wullerstorfi* and *Cucullæa*. Here also occurs a thin seam of coal together with carbonaceous shales. As exposed the coal-seam is small and of little importance, but the carbonaceous shales contain from 2 to 4 per cent. of heavy hydrocarbon oils and the same quantity of

* Mr. A. McKay, F.G.S., however, informs the author that he has discovered a section at Cabbage Bay which leaves no doubt of the superposition of the volcanic series.