

The Ngatimaru Survey District is part of an elevated plain of marine deposition which merges into the Wanganui coastal plain described by Marshall.* As may be inferred from the remarks already made, dissection of the land has reached a stage of advanced maturity. The streams flow in deeply entrenched meandering courses, and in places, by lateral erosion, have reduced the intervening ridges to very narrow dimensions.

General Geology.

The exposed rocks of the Ngatimaru Survey District belong almost wholly to a single formation, which by its fossils appears to be of Pliocene age, and consists of claystones, sandstones (either calcareous or nearly free from lime), and fine conglomerates, which are in places shelly. These rocks are undoubtedly a portion of E. de C. Clarke's Onairo Series,† which again may be regarded as included in the Wanganui System of Park, Marshall, and other writers. In the valleys small patches of fine gravel and sand, considered to be of Pleistocene age, rest unconformably on the Onairo strata. The only other rocks of the survey district are the Recent sands and clays of the river-flats, together with its subsoils and soils.

The Onairo rocks, as developed in Ngatimaru Survey District, are nearly horizontal, the maximum dips observed being not over 4° in a southerly direction, though in the neighbouring Huiroa Survey District decidedly greater dips may be found. Here also a few small faults have been noted.

The claystones, where unweathered, are of a bluish colour, and usually contain more or less fine sand, much of which is muscovite. As the amount of sand increases they grade into fine sandstones, and these again into coarse sandstones. When freshly exposed the sandstones are bluish in colour, but with weathering gradually assume a greyish or brownish hue. They form the major portions of the various ridges between the stream-valleys. Calcareous sandstones outcrop on the main ridge near Te Wera and on the Akama Road between Huiroa and Huiakama. In places pebbly bands occur in the sandstones and sandy claystones, whilst near Popuanui Trig. Station, south of Taihore Road, and in other localities shelly conglomerates make their appearance.

During the course of the season fossils were collected from a sandstone at Pohokura Saddle (over which the main road to Whangamomona passes), from calcareous sandstone near Te Wera, from an oyster-bed near the village of Strathmore, and from other localities. These were submitted to Mr. H. Suter, of Christchurch, for determination, with the result that out of fifteen species represented only two were found to be extinct. Thus a Pliocene age for at least the upper part of the Onairo Series is indicated.‡ Mr. Suter's determinations are as follow:—

Gasteropoda—

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| 1. <i>Cerithidea bicarinata</i> (Gray) ?§ | 3. <i>Crepidula crepidula</i> (Linné).§ |
| 2. <i>Struthiolaria vermis</i> (Mart.) ?§ | 4. <i>Ancilla bicolor</i> (Gray) ?§ |

Pelecypoda—

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| 5. <i>Anomia</i> sp.—juvenile—very likely §A.
<i>huttoni</i> Sut. | 10. <i>O. tatei</i> Sut.§ |
| 6. <i>Glycymeris laticostata</i> (Q. & G.).§ | 11. <i>Diplodonta ampla</i> (Hutt.). |
| 7. <i>G. modesta</i> (Ang.).§ | 12. <i>Dosinia anus</i> (Phil.).§ |
| 8. <i>Pecten triphooki</i> Zitt. | 13. <i>Cytherea oblonga</i> (Hanley) ?§ |
| 9. <i>Ostrea angasi</i> Sow., juv.§ | 14. <i>Chione mesodesma</i> (Q. & G.).§ |

Brachiopoda—

15. *Magellania lenticularis* (Desh.).§

Economic Geology.

Petroleum Indications.—Since boring for oil has until recently been proceeding in the neighbouring district of Huiroa, search for indications of petroleum has naturally been one of the objects of the geological survey. Those found consist of gas-emanations, and, in one case, of sandstone with a petroliferous odour.

Gaseous emanations occur at several points in the Mangaotuku River, especially in the bend west of Ohura Road (the main road leading from Stratford to Whangamomona and thence northward) between Huiakama Post-office and the public school. The bubbles of gas, however, rise at such long intervals that it is impossible to collect a good sample. A more satisfactory gas-emanation was found issuing from a small slipped mass of sandstone, close to Taihore Road, a few chains from its junction with Ohura Road. After a hole had been made in the sandstone by means of an iron rod, the issuing gas, on being lighted, burnt intermittently with a faintly reddish flame 6 in. or 7 in. in height, whilst the sandstone adhering to the rod smelt distinctly of kerosene for a few seconds. Some time later a second visit for the purpose of collecting a sample of the gas was made to the locality, but on this occasion neither gas nor the smell of petroleum could be detected.

Roadmaking Material.—At two localities on the main or Te Wera Ridge, one east and the other west of Te Wera Railway-station, there are outcrops of calcareous sandstone suitable for roadmaking purposes. From the former of these deposits material for making several miles of the Ohura Road between Te Wera and Ngatimaru railway-stations has been obtained. The calcareous sandstones are sometimes supposed to be limestones suitable for the manufacture of lime, but their general appearance and analyses show that they are too low in calcium carbonate to be of any value for agricultural purposes.

* "Geography of New Zealand," 1905, pp. 110–111.

† N.Z.G.S. Bull. No. 14, 1912, pp. 12, 15–20, &c.

‡ Mr. E. de C. Clarke's list of Onairo fossils as given in Bull. No. 14 (p. 20) contains thirty-four species of Mollusca, of which fifteen are Recent. The localities are not given, but the fossils were undoubtedly collected from several widely separated horizons.

§ Recent species. Nos. 6 and 14 are the only species also appearing in Clarke's list (N.Z.G.S. Bull. No. 14, 1912, p. 20).