

SPECIAL REPORTS.

1. KAWHIA SUBDIVISION.

(By J. HENDERSON and L. I. GRANGE.)

INTRODUCTION.

Field-work began in the Kawhia Subdivision in October, 1920, and continued till towards the end of May, 1921. The subdivision as a whole is well roaded, is for the most part cleared of forest, and is largely lowland. These factors, combined with a favourable season, allowed the writers to examine a large extent of country; this included the survey districts of Karioi, Alexandra, Hamilton, Albatross, Kawhia North, Pirongia, and Puniu—in all, an area of 879 square miles.

PHYSIOGRAPHY AND STRUCTURE.

The district is rectangular in shape, with its long sides (thirty-seven miles) extending east and west and its short sides (twenty-five miles) north and south. The western half of this area consists of a broad but much dissected plateau, and the eastern forms part of the lowlands of the Waikato basin. Immediately east of these lowlands is a wide belt of hilly country that southward rises to form the Rangitoto Range. The uplands, east and west, rise abruptly from the lowlands, and in plan are separated from them by straight or gently curved lines. The low country in fact lies between earth-blocks, from which it is separated by zones of fracture.

The plateau-like uplands and the volcanic cones that rise from them have been profoundly modified by erosion. Though much distorted and in part smothered with volcanic débris, the uplifted area has a general westward slope. Hence the greater part is drained by westward-flowing streams, which, though of moderate size only, are deeply incised almost to their sources in the plateau. The eastern side of the uplands is drained by streams that join the Waipa River. This large tributary of the Waikato rises among the eastern uplands and flows through the Kawhia Subdivision along the eastern edge of the central depression. The Waikato crosses the north-eastern corner of the subdivision, but receives little direct drainage from it.

GENERAL GEOLOGY.

Different parts of the subdivision have already been examined by Hochstetter, Cox, McKay, and Park; and in this brief account little can be added to their remarks. The oldest rocks, of Mesozoic age, were folded and eroded before the overlying Tertiary beds were deposited. The volcanic rocks that next succeed belong to three distinct periods of eruption. Gravels, raised-beach deposits, sand-dunes, and estuarine silts are accumulations of still later date.

The Mesozoic rocks range from the Upper Trias (*Pseudomonotis* beds) to strata that are probably of early Cretaceous age. An excellent section of all but the upper portion of the sequence is exposed along the south side of Kawhia Harbour and the adjacent coast west to Albatross Point. From this locality the Mesozoic strata are exposed along the southern boundary of the subdivision—in the western uplands as a narrow irregular strip, and across the depressed area in isolated patches. Mesozoic rocks also appear on the surface over the greater part of the western uplands north of the Kawhia rift-valley.

The Mesozoic rocks were folded, elevated, and the land formed thereby reduced to a surface of low relief by long-continued subaerial denudation before the deposition of the first members of the Tertiary sequence. These younger rocks, though much broken by faulting, usually lie flat or dip at small angles. They occur on or near the flanks of the western uplands as patches on down-warped or down-faulted blocks, although south of Mount Pirongia remnants on the crest of the ridges are still undenuded.

The lowest Tertiary beds consist of grits, sandstones, and mudstones, with coal-seams, and represent the estuarine and littoral deposits of a slowly sinking land. Over large areas these beds are absent—either they did not accumulate or they were removed by the waves as the sea transgressed on the land. The oldest purely marine Tertiary rocks are calcareous sandy claystones that in places reach a thickness of 80 ft., and in some localities are richly foraminiferal. They are overlain concordantly by the thick beds of limestone that form the most characteristic rock of the series.

The coarse-grained andesite that intrudes the Mesozoic strata near Albatross Point is not known to be connected with surface flows or fragmental material. It closely resembles, and is thought to be genetically related to, the rock that forms Moeatoa and Whareorino, twenty miles south of Kawhia Harbour. These mountains are the remains of volcanoes active between the Oamaruan and Wanganui periods.

Pirongia, Karioi, Kakepuku, and the numerous smaller cones are decidedly younger than Moeatoa and Whareorino, having been formed toward the close of the Wanganui. The earth-stresses that produced the block-faulting and differential movements of this period were also in part relieved by the extrusion of igneous rock. The principal centres of eruption, Mounts Pirongia and Karioi, consist for the most part of alternations of fragmental and flow rocks. There are numerous small scoria cones between Raglan and Aotea harbours, which appear to be of slightly later date than Karioi and Pirongia, though they certainly belong to the same volcanic period. On the other hand, Kakepuku and Kawa, small cones in the Waipa lowlands, are thought to be contemporaneous with Pirongia.