

I. MAMAKU—*concluded*.

Before leaving consideration of the area described under the heading of Mamaku the writer would draw attention to the illustration showing the relation of the soil, subsoil, and underlying rock (Fig. 1). In this quarry at Mamaku the sharp line of demarcation between the hard rhyolitic rock and the soft pumice-gravel subsoil is well shown. The roots of the tree indicated by the remaining stump descended through the subsoil until they rested directly upon the rock, but could not penetrate it. The absence of any parting layer of soil, weathered rock, or organic matter between the rock and the gravel will be noticed. Above the yellow pumice gravel the subsoil passes imperceptibly into the mixture of partially decayed pumice and organic matter forming the soil.

A further collection of analyses of samples from the Mamaku district is given in the accompanying tables, which confirm the statement as to the uniformity of the mechanical composition of each type of soil over a large area. Some additional analyses are given of the "birch" soils, and of the cultivated and grassed soils of the Mamaku Demonstration Farm.

Fig. 2 shows a typical scene on the main Rotorua-Lichfield Road, about four miles distant from the Mamaku Farm, near Steele's old mill. Between these points the country is similar, showing great constancy to type.

## II. ROTORUA BASIN.

The geological history of the lands within the Rotorua crateriform depression is more varied. They may be comprised in the following classes: (1) Lake-terraces overlain by ejected material, including (a) Rotorua pumice shower, (b) 1886 eruption mud; (2) recent lake-terraces; (3) river-terraces.

(1.) A great distinction must be made between the lands on the eastern, or Te Ngae, side of Lake Rotorua (b), which have been covered with calcareous mud deposits since 1886, subsequent to the Rotorua pumice shower, and those lands (a) which have not had the benefit of this top-dressing. This distinction makes a very great difference to the agricultural value of the lands, not only from the lime present in the mud but also from the finer nature of the material.

(2.) Recent lake-terraces are those which have been recently and are still being formed at lake-level by the subsidence of the waters, which is still taking place. In many of these there is evidence of coarse pumice having been left as beaches round the lake. The soils of these lake-level terraces differ from others in the greater water content, which is difficult to demonstrate in analyses of samples. In these almost submerged lands the water is so free and abundant that it runs out of the soil in the process of lifting the latter. It is, however, evident that the lands are often saturated with water. It is on such coarse soils, which are growing a pasture that would be deemed poor by the ordinary farmer, consisting largely of Yorkshire fog and other weeds, that bush-sick stock recover when pastured there.

Gile ("Cause of Lime-induced Chlorosis and Availability of Iron in the Soil," *Journal of Agricultural Research*, October, 1920, vol. 20, p. 34), in experiments with rice, found that, although rice becomes