

ROTORUA SHOWERS.

The Kaharoa shower, the youngest of the prehistoric Rotorua deposits, has been traced northward as far as Tauranga. At Te Papa, about nine miles south of Tauranga, the profile in this ash is—

- 1 in. dark coarse sand. (Top.)
- 2 in. light-grey coarse sand.
- 6 in. light dirty-brown coarse sand.

On the Kaimai Hills (west of Tauranga and north of Mamaku) the surface shower shows—

- 1½ in. dark sand.
- 4½ in. light-grey sand.

The Kaharoa shower at Kaimai resembles the Taupo shower, but cannot be correlated with it, for the 6 in. boundary of the Taupo pumice lies eighteen miles south of its nearest exposure. The Kaimai soil is probably derived from the fine-grained outskirts of the Kaharoa shower. Possibly some of the grey ash on the Oturoa Road, four miles north of Mamaku, belongs here.

The Kaharoa and Taupo showers are the only deposits known to give rise to "bush sick" soils. Both are geologically recent, coarse in texture, and rhyolitic in composition. On these unhealthy showers the sickness is most acute on the upland areas where the rainfall is heavy and the leaching active.

MAIROA AND EGMONT SHOWERS.

The material called the Mairoa shower forms the soil north and west of the 6 in. boundary of the Taupo pumice in the districts mapped this season. Examination of many road-cuttings and pits, and the separation of heavy mineral residues, have shown that the Mairoa deposit is really composed of several ash-showers, and chemical analyses support this opinion. The writers have not given names to the different ash-showers. Brown ash to a depth of as much as 15 in. below the surface in the Matiere, western Taumarunui, and Kaitieke districts contains, in general, large augite and hornblende crystals, and only a few of hypersthene. The feldspars are well zoned. In all these characteristics the Mairoa shower agrees closely with undoubted Egmont ash occurring at Stratford and Te Wera. The Egmont shower contains about 8 per cent. of iron oxide (slightly more than the Mairoa shower) and between 2 and 2.5 per cent. of lime (more than the Mairoa shower). Comparison with unweathered andesite from Mount Egmont shows that large amounts of lime, magnesia, and soda have been leached from the Egmont ash. The Egmont ash is not always brown in colour. At Waitaanga, eight miles west of Ohura and 1,325 ft. above sea-level, where the rainfall is high and the leaching active, the profile is—

- 2 in. dark sandy loam.
- 2 in. grey sandy loam.
- 5 in. dark-brown sandy loam.

This profile resembles that developed on Taupo and Kaharoa showers, where rainfall is heavy.

In the northern part of the district in the Putaruru and Tirau districts the profile is—

- 3 in. black sandy loam.
- 6 in. loose brown sandy loam containing many lumps of pumice.
- 13 in. loose lighter-brown sandy loam.

The top 9 in. of the soil (3 in. and 6 in. layers) contains hypersthene, augite, and hornblende in about equal amount, whereas the underlying 13 in. layer contains, roughly, 65 per cent. of hypersthene, 25 per cent. of augite, and 10 per cent. of hornblende. From this difference in mineral composition and from the presence of pumice lumps in the upper 9 in. of soil, two showers evidently occur here. Fusion analyses show that both the 3 in. and 6 in. layers are rhyolitic in composition.

In these districts rhyolite soil is healthy for stock. There is, however, one important respect in which this soil differs from those on Taupo and Kaharoa showers, and that is its uniformly high content of phosphoric acid (determined by fusion method).

In the Mairoa, Te Kuiti, and Te Rau-a-moa districts the hypersthene content of the top 9 in. is less than in the Putaruru district. Probably some of the Egmont material reaches these districts. A grey layer was observed on the Te Rau-a-moa upland where the rainfall is high, and Mairoa deficiency disease has been reported.

HAMILTON SHOWER.

The section below the Mairoa ash near Te Awamutu is—

- 15 in. brown loam.
- 10 in. cream sand.
- 10 ft. dark-brown heavy loam.

In several localities the Mairoa ash and the brown loam have been eroded, and the soil is formed from the dark-brown heavy loam derived from volcanic ash, called the Hamilton shower in this account. The heavy loam forms the soil on the low hills at Hamilton and southward to within four miles of Te Awamutu. It is exposed on the steep greywacke hills south of Te Awamutu and on some of the steep slopes on the rolling country in the vicinity of this town. Hornblende is the only ferromagnesian mineral in this shower.

TONGARIRO SHOWER.

On the north and west sides of Tongariro Volcano the Tongariro andesite shower is not the parent material of the soil; it is covered with Ngauruhoe and Taupo deposits. It is, however, a soil-forming deposit to the south-east of Waiouru. Hypersthene forms between 40 and 75 per cent. of the ferromagnesian minerals in the soil, the remainder being principally augite. Hornblende makes up only a few per cent.