During December Miss L. M. Cranwell, botanist to the Auckland Museum, spent a week in the field tracing the relationship between the native vegetation and the soil types developed beneath them.

Mr. J. C. Neill, Assistant Director of the Plant Diseases Division, made a mycological analysis of five North Auckland soils. The results showed this to be a promising line of research, and it is hoped to continue it as soon as laboratory facilities are available.

Soils.

The soils over a large part of the area mapped (approximately 270 square miles) are derived from the Whangarei sandstone. Rolling to moderately steep hills carved from this sediment occupy the greater part of Tangihua Survey District and extend into neighbouring districts of Mangakahia, Maungaru, Tokatoka, Matakohe, Ruakaka, and Waipu. A wide range of soils has developed, depending largely on the angle of slope of the surface and the type of forest cover and, to a certain extent, on lithological differences in the sandstone formation itself.

Type A.—Where the sandstone is argillaceous the surface of the ground is slumped and hummocky due largely to mass movements which have taken place beneath the original dicotylous forest cover. The topsoils are dark, grey-brown clay loams and sandy clay loams, and the subsoils brown and grey-flecked clays. Although the land is difficult to plough, on account of the uneven surface, these soils are fairly fertile and are used extensively for dairying and grazing. They respond well to slag and to lime and superphosphate top-dressing.

Type B.—Where the sandstone is more arenaceous the hillsides have not slumped so readily and are consequently smoother in outline and in places steeper than where underlain by the argillaceous sandstone. Most of the land of this type has been covered by a dicotylous-podocarp forest mosaic with taraire dominant in the valleys and rimu and totara on the ridges. Where the bush has been removed slips have developed on the steeper hillsides. The soils are grey-brown clay loams and the subsoils brown and grey-flecked clays and sandy clays. These soils are less fertile than those of type A, but the drainage is better and they have been successfully used for sheep and cattle grazing. Little top-dressing has been practised on this soil type, and much land felled forty to fifty years ago is now reverting to bracken fern and manuka.

Type C.—Over smaller areas covered with kauri forest the topsoil is a grey silt loam and the subsoil a poorly drained, compact, flecked clay. This soil is less fertile than type B, and without top-dressing the pasture readily reverts to manuka.

Type D.—Lower in the scale of natural fertility are the submature and mature podsols which cover the low rolling country. These are gumland soils which formerly supported kauri forests, but now are covered with low manuka scrub, wiwi, and *Drachophyllum*. The topsoils are grey structureless loams and sandy loams; the subsoils grey compact clays with humus and iron pans developed in the more mature phases. As with other gumlands, these soils, where well cultivated and manured with lime and phosphates, can be made to support good pastures, but at present comparatively little of the land covered by this type is being farmed.

Type E.—Areas of easy rolling country covered with sticky grey and grey-brown clays and supporting stunted scrub and fern represent the eroded phases of type D. The loamy grey topsoil has been washed away, leaving the grey clay subsoil exposed to form the parent material of a new soil. This soil type, being both infertile and difficult to work, is little used by farmers. Attempts made to grass it have met with but little success, and ploughed hillsides are in many places channel-eroded.

A similar range of soils derived from argillaceous limestone and calcareous mudstone covers parts of Motatau, Tokatoka, Matakohe, Hukatere, Otamatea, and Waipu survey districts. Where the soils are young the effect of the parent material is evidenced by a fertile soil, but where the residual clay overlying the limestone is thick and the area has been covered with podocarp and conifer forests, the soils are infertile and resemble those derived from less calcareous sediments.

Near Maungaturoto and in other places with an average rainfall of 50 in. or less per annum a fertile lime humus (rendzina) soil forms beneath the dicotylous forest wherever the limestone of the hillsides is close to the surface. A typical profile in such localities is:—

10 in. dark, grey-brown, heavy clay.
2–3 in. grey and brown flecked, heavy clay.
On white argillaceous limestone.

Fragments of limestone occur throughout the whole profile, and in many places pea-like manganese nodules are to be found in the lower half of the profile. These soils have a high natural fertility and are used for sheep and dairy farming. Owing to the heavy texture of the soil, drainage is poor and the soil poaches during wet spells.

Near the Motatau where the rainfall is 70 in. and over, the humus-bearing topsoil is rarely more than 3 in. to 6 in. deep, even where the limestone is close to the surface, and the flecked grey and brown heavy clay occupies a much greater part of the profile.

Other hill soils, such as the brown granular clays derived from dolerite rock and submature podsols developed on siliceous claystones, have been described in previous reports. Where as in parts of Motatau Survey District these submature podsols cover moderately steep hills the land appears to have little, if any, agricultural value.

Meadow Soils.

From Kerekopuni to Ruawai meadow clays have been mapped over 47 square miles of flat land bordering the left bank of the Wairoa River. Upstream from Dargaville these flats are narrow and discontinuous, but downstream they are larger and at Ruawai they are about eight miles long and four miles across.