From this profile it is seen that a good deal of clay has moved down from the A horizon. Chemical analyses show that although soil processes have been active there is little change in the composition in the clay of the A and B horizons. According to Dr. Dixon's figures, the topsoil is only slightly acid; this is unexpected, for podsols are distinctly acid. The most likely explanation is that the podsol was developed under forest vegetation, which in comparatively recent times gave place to scrub. Owing to the presence of the hard pan and to the downward movement of clay the podsols are badly drained; rushes are common, and pugging in the winter is liable to occur.

Other soils derived from Tertiary sediments are located on steeper country and are not so leached. On blue mudstone between the railway and the coast there are three distinct profiles, depending on topography. On fairly steep country the profile is—

6 in. dark-brown free silt loam;
On compact bright yellowish-brown silt loam or clay loam.

Such soils have a better base status than the podsols and are consequently more fertile. In places there is a combination of steep and easy slopes, as to the south of Wanstead. There the soils on the easy upland surfaces show a slight greying of the subsoil and are not as fertile as those on the steep slopes. On the very steep country the soil, subsoil, and mudstone have slumped considerably, with the result that mudstone fragments occur throughout the profile. These unstable soils, occupying a small area, are, as would be expected, the most fertile of the mudstone soils. A grey mudstone older than the blue mudstone gives a distinct profile:—

6 in. dark-brown to blackish clay loam, with nut and crumb structure;
6 in.–9 in. light yellowish-brown sticky clay, with some mottling;
On mottled sticky clay.

These soils are heavier in texture and of slightly better fertility than those on the blue mudstone. On the gentler slopes the subsoil is heavier and is bleached to a cream colour at 18 in. below the surface. It is more leached than its representative on steeper slopes and carries a fairly open pasture.

(2) *Soils derived from Tertiary Limestones.*—The Tertiary limestone soils differ greatly from others in Hawke's Bay, being usually characterized by a dark-brown or chocolate-brown heavy subsoil which drains readily. The common profile is—

6 in. black sandy loam or clay loam;
On dark-brown or chocolate-brown clay or clay loam.

On the Pakipaki hills south of Hastings the limestone soils are more leached, having a greyish layer between the black topsoil and the brown subsoil. In the world-groups both these soils are most closely related to the rendzinas. A third profile is that on very steep slopes: a black sandy loam topsoil resting on cream sandy loam consisting mainly of fine fragments of limestone. The common limestone soils, according to tests made at the Cawthron Institute, are neutral in reaction, but, although containing more phosphorus than most of the other soils, can be considered deficient in that element. The limestone soils on the steep slopes, occupying a relatively small area, dry out badly during summer, but are moderately well supplied with plant-foods.

(3) *Soils derived from Cretaceous Argillites, Mudstones, and Muddy Sandstones.*—The most widespread soils of this group are those derived from white argillites which form belts of high steep country. The profile, which may be regarded as skeletal, is—

4 in. dark-brown clay loam;
14 in. dull-brown free clay loam containing many fragments of white argillite;
On white argillite.

These soils form an exception to the rule that those on steep slopes are the most fertile. Their infertility is due to the fact that the white argillites themselves contain only small amounts of plant-food. The marine sediments forming the white argillites were derived from well-leached soils on a land of low relief. Owing to the shallowness of the soils, the pastures suffer during a dry spell and maintain an open sward even in the moist seasons. Rusty-coloured hard mudstone and muddy sandstone in the Porangahau district belonging to the Cretaceous period give a profile somewhat like that on the blue mudstone on moderately steep country. Points of difference are (*a*) a powdery topsoil and (*b*) a pinkish-grey, fairly free silt loam or clay loam at 26 in. A shallow phase of this soil lies on very steep country. Another formation in the Cretaceous series in the Porangahau district is a greenish mudstone which gives a profile like that on the Tertiary grey mudstone; the main difference is the greater amount of mottling in the subsoil. Both the rusty and green mudstones are agriculturally inferior to those on the blue mudstone. This may be due to differences in parent material—a point that will be checked by chemical analyses.

(4) *Alluvial Soils.*—The alluvial soils exhibit marked differences in their profiles, and can be divided into two groups according to parent material:—

(*a*) Soils derived from Cretaceous white argillites:
(*b*) Soils derived from greywacke and Tertiary mudstones.

Soils derived from white argillites cover the greater part of the extensive flats west of the road between Wanstead and Porangahau. In most profiles white-argillite gravels lie at 12 in. to 36 in. and more below the surface. This is really a soil complex. Where the gravels are at shallow depth the subsoil is a free light-brown silt loam; where they lie about 36 in. below the surface the subsoil is a compact light-brown silt loam; and where they lie at greater depths the subsoil is a mottled-white