

The Mairoa greywackes and argillites crop out in the Mangaokewa Stream near Te Kuiti form the Mairoa Hills, and probably underlie the whole district at no great depth. They stand nearly vertical or dip to the west at high angles, and strike generally north by east. The abundant casts of *Pseudomonotis richmondiana* in places show that these beds are a continuation of the Triassic sediments of the Huntly-Kawhia Subdivision.

The Mangaotaki mudstones, shales, and sandstones underlie Tertiary beds to the west of the Mairoa Hills and cover large areas to the west of Mangaotaki Stream. In general, these beds dip west on the east side of the Mangaotaki and to the east westward of that stream. The mudstones and shales contain very numerous casts of *Inoceramus haasti* and other fossils described by C. T. Trechmann, but only a few were found in the overlying massive sandstones. These beds are, therefore, a continuation of the Jurassic deposits exposed on the south side of Kawhia Harbour.

A great unconformity separates the above Mesozoic strata from a series of Tertiary sandstones, limestones, and mudstones. The serpentine boss on the Kohua Road, in Totoro Survey District, probably belongs here, and probably is of Eocene age and coeval with the serpentines of North Auckland. The lowest Tertiary bed, a fissile glauconitic sandstone, correlated with the Whaingaroa clay of the Kawhia district, is absent from the eastern portions of the area, but appears from beneath the overlying Te Kuiti limestone on the flanks of the Mairoa Hills. Conglomerates and thin coal-seams in places form the basal beds of the well-known Te Kuiti limestone, that covers great areas. The Mahoenui claystones and sandy limestones succeed the Te Kuiti limestone, usually in conformable succession, although in places conglomerates indicate unconformity. The southern part of the district is covered by thick beds of massive Mokau sandstone that give rise to characteristic flat-topped hills with cliffs bare of vegetation; Mohakatino and Tongaporutu claystones appear only on the southern edge of the district.

Rhyolitic tuffs, partly subaerial and partly water-sorted, were deposited upon an eroded surface in Pliocene times. These tuffs are contemporaneous with those at Mamaku, in Rotorua district, and once completely covered the whole district. Subsequently they were indurated and eroded, and now form flat caps to many isolated hills. Of Pliocene and Recent sediments that enshroud older rocks, a deposit of brown andesitic ash is of importance, since it forms the soil over many square miles.

ECONOMIC GEOLOGY.

A geological survey, by taking stock of economic resources of a district, draws attention to the presence or absence of mineral substances of intrinsic value, and incidentally tends to counteract land speculation. Minerals of high market value are almost absent from the district examined, and the greatest natural resource is the soil.

When first opened for settlement the district was renowned for its productivity, but by degrees the price of land reached a figure above its present market value, and many farms, overburdened with debt, have been abandoned. The nature of the soil is said to be responsible for this. Great areas are covered by a brown sandy loam derived from an andesitic ash that almost smothers the underlying rocks. Stock do not thrive on considerable areas, and a deficiency of calcium is said to be the cause of their debility. Since adjacent farms, one of which is reputed to be unhealthy and the others healthy, are covered by the same soil, the lithological survey becomes a preliminary measure that must precede a more intensive investigation of the affected areas. In this connection the writers of this report wish to acknowledge the kindly co-operation of Mr. C. M. Wright, Country Chemist, New Zealand Department of Agriculture. In places where the andesitic ash has been removed by erosion or turned under by natural slumping, the underlying rocks give rise to somewhat better soils. Such variations as these will not be discussed here.

Vast quantities of hard though high-grade limestone occur in the district. This rock is pulverized at Te Kuiti and, together with phosphatic and other fertilizing mixtures, is transported by motor-lorries into the backblocks, but high costs prevent many farmers using adequate quantities. In places the rock is comparatively soft, but the amount of soft material cannot be gauged until trial quarries are opened.

Coal occurs in small lenses and in seams in many far-separated localities, several of which were examined by J. Henderson in 1917. These outcrops, being at several horizons in the Tertiary beds, indicate that there is small probability of a workable field existing.

Roadmaking-materials of differing quality are fairly well distributed over the district, and most of the roads are macadamized. Mairoa greywacke (both quarried and as natural river-shingle), Mangaotaki claystones and conglomerate, Te Kuiti limestone, Mamaku rhyolitic tuff and pumice silts are used in making up and surfacing roads. Greater lengths of road are surfaced with limestone than with any of the other rocks. The rhyolitic tuff is easily quarried, and, as it hardens on exposure, it also provides an important reserve of good building-stone.

The absence of mineralized veins indicates that reports as to the presence of precious metals have little import when contrasted with the great agricultural resources of the district.

2. WAIROA SUBDIVISION.

(By M. ONGLEY.)

Each season since November, 1926, a geological survey party has been examining the Wairoa Subdivision—that is, the country to the east of the Huiarau Range between Poverty Bay and Hawke Bay. In the 1926–27 season 200 square miles, in 1927–28 600 square miles, and in 1928–29 season 650 square miles were traversed, examined, and mapped. Two more survey districts—namely, Moanui and Motu—remain to be examined in order to complete the survey of the subdivision.