

a fine loamy soil in most parts, but along the more swampy lands, towards the base of the eastern range, the soil is of a more clayey description. On the west side of the valley the lower flat lands have more the character of a river-flat, covered with a vegetable soil mixed with pumice sand from the neighbouring downs and hills. Under the immediate surface of the greater part of the plain there is a thick stratum of sandstone gravel derived from the older rocks of the district. In the lower Waimana Valley there is a fine soil, composed of the materials of the various rocks present in this part of the watershed, underlain by a stratum of river-shingle derived from the older rocks. Towards the northern end of the low grounds, and on the adjoining lower downs, the soil has in it a greater proportion of pumice sand than at the upper end of the plain. The Ruatahuna Plain has the Whakatane River at its western side flowing in a deep channel between the plain itself and the mountains opposite to the westward. As seen in the terraces on the east bank of the river there is a great depth of sandstone gravel overlain by soils of a varied character, at places stony, at other places dry loamy deposits, or clay lands of a heavier description. The greater part of this area has, however, not been explored, nor the exact character of its soils determined. Intelligent Maoris describe the soils in the lower and eastern part as being of high quality.

The smaller river-flats along the middle and upper parts of the Waimana and Waikari Rivers show a considerably greater percentage of pumice than is to be found on the lower alluvial lands further to the north, probably due to the fact that during freshets and floods there was a lesser area for the deposits of pumice.

Turbary Deposits.—These, such as merit notice here, are confined to the area of swampy land between the lower courses of the Whakatane and Rangitaiki Rivers. They have already been sufficiently described in a previous part of the report.

(b.) *Volcanic Ejectamenta due to Eruption of Tarawera, 1886.*—This covered the northern and central parts of the district with a fine deposit of grey sand to an average depth of 2in. As a geological formation it is of little consequence, but since it, to a considerable degree, stimulated vegetation wherever it fell, some mention should be made of it. Due, probably, to its greater specific gravity it has sunk through the lighter partly-pumiceous soils of the surface, and at many places can be traced as a layer of darker tint 2in. to 4in. below the surface. It does not reach further south than the middle part of the Waimana Valley, its southern boundary following a nearly straight line between Tolago Bay and Fort Galatea.

(c.) *Pumiceous Deposits of Older Date.*—To the east of the lower Whakatane, the hills and downs have their higher parts formed of a deposit of pumice-breccia, and sands that of variable depth reach a measure, in places, of 150ft. The same deposit is to be found over all the high lands of the district away from the immediate action of the larger streams. On the broken hilly country it is of inconsiderable thickness, but where there is any approach to table-lands or flat-topped hills the thickness, even in the far south, may be considerable. On the top of Maungapohatu this deposit in places appears to be about 100ft. thick. Where the erosion of the country has reduced any particular range or ridge of hills to a narrow crest the pumiceous deposit has been carried to lesser elevations, and now lies on the lower slopes of the range, or has been swept into the valleys, or in large part carried away altogether, and, mingling with the other proceeds of denudation, now forms with these the rich soils of the low ground of the coastward region. The higher terraces, downs, and lower hills of the western part of the Whakatane Valley, opposite the Ruatoki Plain, are covered to a considerable depth with pumiceous deposits of this description. A vast thickness of the like and coarser deposits of pumiceous fragments is seen in the sea-cliffs along the shore of the Bay of Plenty between the mouth of the Rangitaiki River and Maketu, and the deposit extends inland in the direction of Mount Edgecombe, apparently without any diminution in its thickness, which, on the sea-coast, is seen at many places to be not less than 500ft. Although readily yielding to the action of rain and running water as denuding agents, from the manner in which these pumice deposits have been sculptured into hills it may be assumed that they are the oldest deposits in the district that can safely be referred to the recent period.

2. Pliocene.

(a.) *Gravel Hills forming Downs on the Lower Part of the Ruatoki Plain.*—These occur only, so far as is known, in the lower part of the Ruatoki Plain, between the Waimana River and the part where the valley becomes narrowed, and the Whakatane washes the foot of the hills on its eastern bank. They form a series of low hills that stand above the general level of the plain, the upper beds in which show a considerable percentage of pumice gravels, but the lower beds are seen to be sandstone gravels of a rusty-brown colour, resembling similar gravels referable to the same period that are found abundantly over the goldfields of the west coast of the South Island and Otago. Though of limited extent their distinctiveness from the other formations, older or younger than themselves, requires their being separately described. As a formation they appear at one time to have filled the valley, from the point where they are found to the upper end of the Ruatoki Plain, and subsequently to have been removed before the gravels and pumiceous deposits of older date were laid down. Near Ruatoki Settlement some gravels are exposed on the east bank of the Whakatane that with propriety might be referred to this period, but they are exposed in section only.

3. Upper Miocene.

(a.) *Trachytic Volcanic Rocks.*—It has been mentioned that such rocks occur on the tops of the mountains surrounding the western sources of the Whakatane River. These, however, have not been actually examined. Rocks of similar appearance and of probably the same age form the higher part of the outer range overlooking the Kaingaroa Plain and the Rangitaiki Valley. At the upper end of the first gorge of the Waimana River rocks of this description are met with striking in a north-east and south-west direction, and dipping at moderate angles to the south-east. They con-