

as Onetapu Desert and in the northern part as Rangipo Desert (?), is 2,500 ft. above sea-level in the south and rises to 3,500 ft. in the central portion, whence it slopes gradually to the north to 1,200 ft. The southern portion is drained by the Wangaehu River, and the northern by the tributaries of the Waikato River. The Onetapu Desert is barren and windswept, with shifting sand-dunes and desert flora. Northward the vegetation gradually increases.

To the west rise the volcanoes Ruapehu, Ngauruhoe, and Tongariro, described in last year's annual report. From the foot of these peaks the country slopes down and merges into the dissected peneplain of the Wanganui.

Lying to the west of Ruapehu is Hauhungatahi, a small cone 4,983 ft. high. Viewed from the Waimarino Plain, it is seen to slope down to a high level flat about a mile wide, from which there is an abrupt drop of 1,000 ft. to the plain below.

Taurewa Mountain, which rises to a height of 3,530 ft. in the north-west corner of the subdivision, is a fault-bounded block of greywacke sloping to the north-west. The fault on the south-east side follows the Otamawairua Stream; that on the west passes along the Whakapapa River and through Raurimu.

A strong fault with downthrow to the west trends north-north-east along the western edge of the Kaimanawas. The spurs are all rounded off, and the valleys on the southern end are now filled with Upper Pliocene beds, not affected by the fault, which is thus of pre-Upper Pliocene age.

Another fault striking slightly east of north with downthrow to the west occurs in Pliocene beds between the Kaimanawa Range and Ruapehu, its scarp forming the east bank of the Wangaehu River in the southerly part of its course in the subdivision. A small fault running north-east and dipping west appears north of the Oturere River. Other faults in the subdivision have already been described in last year's report.

#### GENERAL GEOLOGY.

The table below shows the sequence in downward order and the approximate age of the rocks encountered:—

1. Andesitic ash and scoria from Ngauruhoe, &c. (Recent).
2. White rhyolite pumice from near Lake Taupo (Recent).
3. Dark andesite flows, scorias, and ash from Ruapehu, Tongariro, and Ngauruhoe (Recent and Pleistocene).
4. Grey andesite flows and agglomerates from vents beneath Ruapehu and Tongariro (Pleistocene).
5. Fluvatile gravels and conglomerates (Recent and Pleistocene).  
(*Unconformity.*)
6. Sandstones and mudstones of Nukumaruan age (Upper Pliocene).  
(*Unconformity, not seen.*)
7. Sandstones and mudstones of Taranakian age (Upper Miocene).
8. Sandstones of the Mokau Series (Lower Miocene).  
(*Unconformity.*)
9. Greywacke, argillite, and sandstone (Mesozoic or Palæozoic).

The rocks of the Kaimanawa Range, which are the oldest of the subdivision, form a broad strip along its eastern edge. Their western boundary generally corresponds to the course of the Waikato River—known locally as the Tongariro River until it enters Lake Taupo. At the junction of the Waipa Stream the boundary turns to the north-east and runs out of the subdivision; on the south the Moawhanga River marks the limit of the outcrop of these rocks, which are strongly folded grey and green sandstones, dark argillites, and greywacke, striking north-north-east and dipping 80°. In the western portion, which was examined in detail, the rocks are much crushed, and in places show a schistose structure. The greywacke of Taurewa Mountain is of the same formation.

Greywacke and argillite were found as boulders and small fragments on the north-east slopes of Ruapehu, and as inclusions in lava-flows. From the fact that the argillite boulders show no sign of alteration it may perhaps be concluded that they occur at a shallow depth below the volcanoes.

*Mokau Beds.*—Sandstones and argillaceous sandstones containing greywacke pebbles, and having an easterly strike and a dip of 2° south, outcrop more or less continuously in the steep cliffs bordering the Whakapapa River. Three-quarters of a mile east from the junction of the Papamanuka Stream the beds contain fossils of Mokau age. Beds of similar age outcrop on the upper Wanganui River, and the exposures between this and the Whakapapa River are probably part of the same formation. Small outcrops in the Waimarino and Mahuia Streams, and sandstones and mudstones between the bed of the Mahuia Stream and the 3,750 ft. level in a steep washout on the north-east corner of Hauhungatahi, which were unfossiliferous, may also belong to this series. It is, however, extremely difficult to trace the Tertiary rocks in this part of the district, for beneath the heavy bush lies a thick covering of lava-flows and volcanic ejectamenta, which in many cases filled the stream-beds after considerable erosion of the Tertiary rocks.

*Beds of Taranakian Age.*—A cutting on the railway-line a mile and a half north of Ohakune contains Taranakian fossils. Unfossiliferous blue mudstone 50 ft. thick outcropping in the Toatoa Stream, about two miles east of this cutting, and sandstone, also unfossiliferous, exposed in a small nearby tributary of the Mangawhero River, are probably of this age.

*Nukumaruan Beds.*—Fossiliferous beds of calcareous and soft sandstones, mudstone, and shale, 300 ft. thick, are exposed in the Mangaio River south-west of the Kaimanawa Range, and similar beds outcrop half a mile south-east outside the subdivision. Dr. Marwick, who examined the fossils, reports that they are of Nukumaruan age. The beds contain occasional small greywacke pebbles up to a  $\frac{1}{4}$  in. across, but andesitic material is absent, indicating that Ruapehu and Tongariro were not active when the beds were laid down.

*Pleistocene and Recent.*—Alternating beds of coarse and fine conglomerate of fresh-water origin, the upper of which contain volcanic ash, are exposed for a height of 125 ft. on the east bank of the