

greyish-green or purple colour, and soon becomes speckled with small, white, rounded particles, which apparently owe their origin to the decomposition and kaolinizing of its feldspars. It then passes into a fairly even or uniform yellowish-brown rock of moderate hardness, which, in its turn, gradually assumes a pale-grey or yellowish-grey colour, due to the abstraction of its iron-oxides. In the latter state it is a very striking and instructive rock, and, to outward appearance, is similar to the "kindly" gold-bearing rocks to be described hereafter. When it contains slaty particles, these stand out, black and undecomposed, in very marked contrast to the bleached and weathered tuff-matrix. This slaty brecciated tuff, in all its different stages of decomposition, is well exposed in the quarry-face a few chains north of Rocky Point.

On the beach near the mouth of Waiohanga Creek, on the smooth water-worn ledges at high-water mark, the tuffs, now free from slaty inclusions, are intersected by a number of small parallel mineral-veins, many of which are filled with a greenish-grey material resembling the matrix of the enclosing rocks. The strike of these veins is north-east to south-west, and they are generally standing vertical. They vary from a mere thread to 6in. in thickness, are often branching and faulted, and in many ways afford an excellent object-lesson in the structure and behaviour of lodes. A few chains further along the beach the tuffs are again similarly intersected by another system of parallel veins of pyritous quartz, while large veins and segregated masses of calcite are plentiful. The calcite veins often possess a comb-structure, and in the centre, the opposite and corresponding layers terminate in beautiful scalenohedrons. In some of these veins I have found bunches of galena and blende associated with iron- and copper-pyrites. The assays of the galenas proved that they were poor in both gold and silver.

Between this point and Tararu Creek the tuffs pass imperceptibly into coarse breccias, consisting of irregular-shaped masses of greenish-grey andesite or tuff, enclosed in an andesitic matrix. In some places they contain large angular fragments of slaty shale, but these become rare as Tararu Creek is approached. From Rocky Point to Tararu the tuffs and breccias exhibit no distinct lines of stratification, and the southerly dip, which they seem to possess, is only indicated by the direction of the layers of the different materials.

Just before Tararu is reached the coarse breccias are followed by a narrow belt of a greenish-grey compact tuff, or partially-decomposed andesitic lava, containing a number of gold-bearing quartz reefs, which pursue a general north-east course, and traverse the City of Dunedin, Norfolk, and Sylvia mining leases in Tararu Valley. This is the lowest horizon of payable metalliferous veins in the Thames district. The metallic sulphides which accompany the gold are galena (often richly argentiferous), blende, copper- and iron-pyrites; while the principal oxides are those of manganese, which are often very abundant in the City of Dunedin and Norfolk Mines, especially in the shallower workings.

From Tararu to Kuranui Creek the rocks consist of greenish-grey and dark-green or purple breccias and tuffs, which up to the present time have not been found to contain a single payable reef. The same or similar breccias form the ranges on the south side of Hape Creek, and in places they contain large masses of silicified wood, which would point to the existence of solfatara action during their formation. In the Kauaeranga Valley they are overlain by an enormous accumulation of trachytic tuffs and agglomerates, which are in many places intruded by dykes of trachyte and augite-andesite. In the higher part of the river-valley the latter are well exposed in the narrow, deep gorges, where they exhibit a beautiful columnar structure of huge hexagonal prisms. In all parts of the valley the tuffs contain veins and segregations of jasper, agate, chalcedony, as well as blocks of wood converted into wood-opal. At the foot of Table Mountain they contain intercalated beds of black and yellow-coloured shales and seams of impure brown coal. The presence of the latter proves the existence of a land-surface in this area during the period of eruption of the trachytic tuffs and lavas.

Gold-bearing Formation.

At the Kuranui or Shotover Stream we pass on to the gold-bearing formation of the Thames Goldfield, which extends without a break as far as Hape Creek on the south, and stretches in a north-easterly direction into the upper valleys of the Tararu, Puru, and Waiomo Streams, whence it extends northwards towards Mercury Bay. It is a noteworthy fact that wherever it is found it contains large, well-defined payable reefs. It consists of alternations of soft or moderately-hard decomposed andesites and bands of solid hornblende and augite-andesite lavas, which pass imperceptibly into indurated tuffs and breccias. The decomposed andesites generally possess a characteristic yellowish-brown or grey colour, and form the "kindly country" of the local miners; while the solid andesites and tuffs possess a greenish or dark-blue or purple colour, and are generally known as "hard country."

These alternating bands of soft and hard rock follow a general north-east course, and from the Kuranui Hill to the Waiokaraka Gully possess a north-west dip, at angles varying from 40° to 70°. From the Queen of Beauty shaft southwards the hard lavas assume an almost vertical position. The main reefs or lodes occur in the soft decomposed andesites, and follow their course and underlie. Of course, it must be clearly understood that the decomposed andesites show no stratification whatever, and the apparent strike and dip which they exhibit are imparted by the narrow hard bands or undecomposed cores, whose line of outcrop follows a north-east course. The reefs in most cases run parallel to the hard bars, and where these are steep, as in Kuranui Hill and between the Waiotahi and Karaka Streams, the reefs are steep; and where they are flat, as between the Moanataiari and Waitotahi Streams, the reefs are correspondingly flat or low-lying.

From the Thames foreshore the country rises to the north-east by a number of long, ascending spurs or ridges, which gradually converge and culminate at the Look-out Rocks situated on the watershed lying between the Karaka and Ohio Streams. The ridges and spurs appear in most cases to be formed by cores of the hard country, while the creeks have excavated their courses and valleys in the softer bands. The streams which diverge from the culminating point just spoken of are the Hape, Karaka, Waiotahi, Moanataiari, Kuranui, Shellback, Tinker's, Ohio, and Otonui.