

## GEOLOGICAL FORMATION OF KUAOTUNU.

The following notes on the geological formation of the Kuaotunu Mining District are by James Park, Esq., F.G.S., Director of the Thames School of Mines :—

"It has often been asserted that the Hauraki Peninsula is a goldfield from one end to the other, and the numerous discoveries of the last few years would certainly seem to justify this conclusion. The wide gaps which at one time existed between the older-established goldfields are being gradually filled up, while the boundaries of all the fields are being continually extended.

"Perhaps the most important find of late years was the discovery of payable gold at Kuaotunu, a little over three years ago. Since that date a large amount of money has been expended in the preliminary work of prospecting and opening the mines, erection of batteries, and other necessary works; and, as a result, this field has now taken its place as a steady gold producer.

"Kuaotunu is situated on the east-coast side of the peninsula, on the neck of the short peninsula lying between Mercury Bay and Whangapoua Harbour. It is connected with Coromandel by a bridle-track, and there is regular communication with Auckland by a steamer-service twice a week. The port suffers the disadvantage of being an open roadstead, and this a difficulty which it will be very costly to remedy. The waterway has, nevertheless, been an inestimable boon to the place, and it is doubtful if without this it would have been able to survive the troubles which beset the early stages of its existence.

"*General Geological Features.*—The geological features of this field differ but little from those of the other goldfields scattered throughout the peninsula. Excluding the recent deposits, the rocks are found to belong to two distinct geological formations, both of which are gold-bearing, although differing greatly in age and physical characters. The younger formation consists of highly decomposed andesitic tuffs, which extend northwards from Mercury Bay till within a mile of the sea at Kuaotunu roadstead.

"Within the drainage-area of the Kuaotunu River and its branches, these tuffs form a high ridge, which seems to stand in an ancient valley in the older Palæozoic rocks. This tuff ridge ends abruptly at the place locally called 'The Junction.' It is bounded on both sides by ridges composed of Palæozoic sandstones and greywackes. The western ridge lies on the west side of the river, and forms low descending scrub- and fern-covered spurs, which reach the sea at the rocky point at the end of the sandhills. The eastern ridge is rugged and forest-clad. It reaches a height of 800ft. in some places, and descends to the sea on the eastern and northern sides of the peninsula, of which it occupies the greater portion. On the coast-line it forms high, precipitous, and inaccessible cliffs.

"*Classification of Formations.*—The general formations may be classified as follows:—1. *Recent*: Sand-dunes, alluvial flats and swamps; 2. *Lower Tertiary*: Andesite tuffs; 3. *Palæozoic*: Sandstones, slaty shales, and breccias.

"*Recent.*—The sand-dunes extend along the coast from Maori Point to the mouth of the Kuaotunu River, a distance of about half a mile. On their inland side they are bounded by a wide extent of low-lying flat and swamp land, which follows the course of the river for over a mile and a quarter, and in places possesses a width of over 25 chains.

"*Lower Tertiary Tuffs.*—These are first seen in ascending the valley, near the junction of the Kuaotunu and its right-hand branch, where they rise as a conspicuous, bare, abruptly-ending spur or ridge, on the lower slopes of which are built the new school-house and schoolmaster's residence. This ridge extends southwards to the head-waters of the Kuaotunu and its branches, where it spreads out into a number of long spurs which descend in the direction of Mercury Bay.

"These tuffs are highly decomposed at every point where I examined them, but in composition and general physical characters they are undoubtedly closely related to the gold-bearing tuffs at Coromandel and the Thames. Their finely-stratified appearance in places would tend to the belief that they were of pyroclastic origin, the materials of which they are composed having probably been derived from great submarine or maritime volcanic eruptions.

"This district affords no evidence as to their age. They rest unconformably on a highly-denuded surface of the Palæozoic sandstones, while no clastic rocks of younger date are found overlying them.

"The scarcity of evidence relating to the age of these tuffs is a noticeable feature of the geology of the Hauraki Peninsula, and this circumstance is solely due to the almost entire absence of members of the numerous fossiliferous formations, which, in other parts of New Zealand render the geological structure so varied, and very frequently so involved and complicated.

"The only evidence bearing directly on the age of these rocks, so far as known at present, is found at Waitete, situate on the coast-line a few miles south of Cabbage Bay. Two years ago, when making a reconnaissance geological survey of that part of the coast, I discovered a small patch of the New Zealand brown coal-measures, occupying an area not many square chains in extent. They consisted of the following strata, reading the section downwards :—

1. Hard shelly limestone;
2. Calcareous and marly sandstones;
3. Ferruginous conglomerates.

"The conglomerates were about 200ft. thick, and rested directly on the basement rocks, which at this point consisted of blue and red-banded slaty shales. The shelly limestone, which was the highest and closing member of the series, dipped away to the north-east, and a few chains back from the beach disappeared below a great accumulation of volcanic tuffs, breccias, and solid lava-flows of an andesitic character. These rocks, so far as could be judged from physical characters and general appearance, were in every respect similar to the gold-bearing tuffs and associated rocks in other parts of the peninsula.