

In the matter of the classification of the volcanic rocks of the North Island, Hochstetter, who even now must be regarded the chief authority on this subject, distinguishes but two periods of volcanic activity: First, an old Tertiary period, and second, a younger (Recent) period.* With the older group he associated the volcanic rocks of Cape Colville Peninsula, and the bulk of opinion is still in favour of regarding all the igneous rocks of the Peninsula as Tertiary. Recent investigations tend to show that the younger acid rocks are of Pliocene age, and Park believes them to be contemporaneous with those of the Taupo zone.† The writer believes them to be older, though not of a very different date. The oldest group of volcanic rocks in the Peninsula may also belong to the Cretaceous period.

It has been shown that the earliest emanations of volcanic matter from the Taupo zone were of an acidic character, and largely consisted of pumice, great volumes of which were spread over the sea-bottom adjacent, and to very considerable distances from the points of eruption.

MARINE CHARACTER OF THE FIRST ERUPTIONS.

The acidic products of the later eruptions on the Cape Colville Peninsula were poured out on land or deposited in lakes of fresh water, and in point of time preceded the commencement of activity within the Taupo zone. Hochstetter expresses the opinion that the first eruptions were submarine, and both Park and the writer have collected facts that go far to confirm this view; and the depressed state of the North Island at this time (Middle Pliocene) is affirmed or incidentally alluded to by many writers on the geology of New Zealand.

The physical features of the Taupo zone are described by Hochstetter, from whose work on New Zealand‡ the following has been taken: "The name Taupo reminds me of the grandest natural sceneries I have seen. [p. 360.] Hoping to have a view of Tongariro and Ruapehu, which we had approached by this time to within a distance of twenty-five miles, and in order to execute another series of observations, I ascended the Ngariha. . . . At the top we found ourselves amply rewarded for our toil by the view now presented to our eyes. . . . There lay the volcano Tongariro before us, all clear from foot to top. The still active cone, called by the Natives Ngauruhoe, with its regular and conical form, rises majestically from the midst of a circular range shutting it in all round, and open only on the south-west, similar to Vesuvius encircled by the Somma. The funnel-shaped crater at the summit of the cone could be distinctly seen, indeed almost looked into, the west side of the crater being much lower than the east side. Consequently the crater presented itself to us in the form of an ellipse, from which continually dense white steam-clouds arose, which sometimes enshrouded the whole peak, and at other times were driven southward by the wind, which afforded us a view of the blackened edge of the east side of the crater.

Farther north on the slope of the mountain a briskly-steaming solfatara was visible. The Tongariro was entirely of snow. But to the right of Tongariro arose the towering mass of Ruapehu, its summit wrapped in dense clouds, and below the cloud-cap the snow-fields of the peak were seen to reach down as far as an absolute height of 7,800 ft. At the base of these mountain colossi dark forests extended; but in the foreground mountains with sharp edges and deeply fissured-precipices, and at our feet the valleys with their long-stretched terrace-lines. Thus we beheld in one glance the effects of fire and of water on the grandest scale in one and the same landscape. [pp. 353 and 354.] Tuhua mountain is the most prominent point in the whole country north of Tongariro, about 3,400 ft. high, with a broad platform and a steep descent on its south side. At the bend of the river (Mangakahu) I counted no less than eight terraces on both sides. Trachyte rock prevails. Leaving the valley, and following a southerly direction over terraces and woodless hills, the track leads with a steep ascent on to the table-land Pokomotu, 1,386 ft. above the level of the sea, at the western foot of the Tuhua mountain. This plateau is literally covered with pumice-stone. [p. 355.] The distance from Petania to Lake Taupo is estimated a two days' journey. The road, however, is extremely difficult; it leads up and down from valley to valley, from mountain to mountain, across the ridges springing from Tuhua Mountain in a southerly and south-westerly direction, and through dark primeval forests. It traverses the sources of the Wanganui, and ascending higher and higher, it finally reaches the watershed between the Wanganui and Lake Taupo. We were three whole days in passing over this route. On the fourth day, after a most fatiguing passage through deep ravines cut into pumice-stone gravel, we crossed the Takaputiraha Range—1,534 ft. high—and encamped on the left bank of the Pungapunga River. . . . We had now to scale the Puketapu. This mountain is the most remarkable point on the road from Tuhua to Lake Taupo.

The height of the mountain is estimated at 2,073 ft. As the summit was covered only with young underwood, I ordered the same to be cut down, and thus gained an interesting view of the sources of the Wanganui, over a sombre mountain country and wood landscape, in the background of which the Ruapehu loomed up in all its majesty, its peak wrapt in clouds. South of Ruapehu, another volcanic cone 3,000 ft. high was visible; it was pointed out to me as Hauhanga. To the north-west and west the Tuhua Mountain and the Hikurangi cone were the most prominent points. . . . The Puketapu is, moreover, especially remarkable for the circumstance that, in the midst of a landscape, in which everything is covered by volcanic tuffs and pumice-stone, it is composed of clay-slate of exactly the same description as that at the Taupiri on the Waikato." [pp. 357 and 358.]

"After leaving Puketapu . . . at length we came to a small creek flowing in a direction different from that of all the other creeks we had hitherto passed; it was the source of the Kuratao, running in a north-east direction towards Lake Taupo—a sign that we had crossed the watershed. . . . Of the lake, however, the sight of which we had expected . . . there was as yet nothing to be seen; but in its place two beautiful mountain-cones, Kuharua and Kakaramaea, rose before us. We had reached a pumice-stone plateau, called by the Natives Moerangi, and I was greatly surprised at finding the result of my barometrical observations to show a height of 2,188 ft. [p. 358.]

* "New Zealand," by Hochstetter, pp. 66-67.

† James Park, "The Geology and Veins of the Haurak

Goldfields." ‡ "New Zealand," by Hochstetter, English edition.