

ciently so as to indicate for it a direction that would make it continuous with the great fissure south of Tarawera, but rather in the direction of line A C on Plan II. It is below this fissure-line on the eastern flank of the range that bulky terrace-like accumulations of pumice sand have been formed, and if this eruption should ever reach the stage of producing lava, which from other circumstances I think hardly likely, it is from this fissure that I should expect the lava to exude.

### III. THE GREAT FISSURE.

This is the most remarkable and characteristic feature of the late eruption, and the chief origin of the disastrous results which attended it. A good view, but much obscured by steam, was obtained from the hill called Te Hape-o-Toroa—alt., 2,300ft.—by Mr. Park on the 14th, and by myself on the following day. This fissure seems to commence as a narrow rift at the northern end from the great rent which has been formed in the south end of Tarawera Mountain. This rent is a most wonderful feature. It is not a slip from the mountain side, but appears as if a portion of the mountain measuring 2,000ft. by 500ft. and 300ft. deep had been blown out, leaving a ragged, rocky chasm, from which steam was being discharged in rapidly-succeeding puffs. The eastern side of this chasm was brightly tinted, as if by the efflorescent deposit of a mineral substance, probably ferrochlorides.

Sulphur has been mentioned as a deposit from this recent outburst by some who have witnessed it; but this is hardly a possible result of such rapid volcanic developments.

The view I obtained of the extent of this chasm south was much obscured by numerous volumes of steam blowing off from the newly-formed fumaroles that occupied the site of Rotomahana. From the eastern slope of Te Hape-o-Toroa we looked right into the fissure, and, as far as I could see, it appeared to have a nearly straight boundary of undisturbed ground on its eastern side, extending from the Tarawera chasm to within a few chains of Lake Okaro, thus intersecting the Rotomakariri or the cold lake, the Rotomahana Lake, and the valley extending from thence southward. The west side of the fissure, on the other hand, is very irregular in outline, and is continually being altered by the falling-in of its precipitous walls, as the hills are undermined by the action of powerful geysers, seven in number, which at irregular intervals throw up great volumes of boiling water, with stones and mud, to a height of 600ft. to 800ft. from the bottom.

It is only by occasional glimpses during the breaks of the steam that any idea can be formed of the nature of the bottom of this huge fissure; but it seemed as if it was entirely occupied by large circular areas of mud, seething and boiling in such a fashion as to convey the impression of its being in a very liquid state. These mud-pools are separated from one another by comparatively solid ground, and in some cases, especially towards the eastern side of the fissure, what appear to be small pools of water with sedgy margins could even be distinguished; but the difficulty of estimating distances and depths through the steam-clouds rendered the observations made very uncertain.

The largest of these mud geysers appeared to be that rising from the position formerly occupied by the Pink Terrace, but the most interesting is one a mile further south, which, unlike the others, does not spring from the bottom, but from the comparatively high ground on the west side of the fissure, and, owing to the obliquity with which the fragments are thrown out, is gradually building up a conical mound, which already has attained an altitude of several hundred feet (Mount Haszard, on Plan II.). At the southern extremity the fissure is bounded by a bold semi-circular extremity, from the base of which powerful steam-jets are escaping; but there was no evidence that it was prolonged by a crack or fissure, or fault, or other displacement of ground, nor was there any evidence that the fissure had been produced by any inequality of the movement of the ground bounding it, but rather that it was caused simply by the removal of material which formerly occupied its space. Its direction, as far as could be ascertained, is N. 50° E., which is the general line of direction that would connect all the more active geysers between Tongariro and White Island.

### IV. MATTER EJECTED DURING THE ERUPTION.

The quantity of matter which was ejected during the different phases of the eruption was very large. In the first place, stone fragments were scattered from the earlier eruptions of Tarawera over an area of country extending to the eastward as far as Te Teko, and even, some say, to Fort Galatea; while in the opposite direction they are not reported to have fallen at any place farther west than Wairoa, a distance of six miles. None of the fragments which I collected are other than portions of rocks of the district, nor do they present in the slightest degree the character of volcanic bombs or lapilli formed from lava or rock material in a state of fusion. Yet there can be no doubt, if we can accept the evidence of the eye-witnesses, that these rock-fragments must have, in some cases, reached the ground in a partially incandescent state. Next followed the great ejection of pumice-sand, which forms enormous deposits in two localities: the one is on the eastern slope of Tarawera mountain, already described, the nature and origin of which I had no opportunity of ascertaining. The other deposit of this nature is chiefly on the western side of Rotomahana fissure, and was no doubt ejected at the commencement of the second phase of the eruption. Over a district of twenty-four square miles south of Tarawera Lake, and on an almost equal area to the north and east of the lake, the whole surface of the country has been covered with this pumice-sand so thickly as to obliterate in a great measure the natural features, partly filling the gullies and enveloping all the hills as if with a deep mantle of snow, so that not a trace of vegetation can be seen, from the highest peaks, such as Te Hape-o-Toroa, which is 2,300ft. above the sea, down to the level of the lake. The thickness of this deposit could not be ascertained at the time of my visit, as no slips had occurred in it and no sections were to be seen. It consisted of fine-grained and gritty pumice-sand, slightly crusted on the surface by the action of the rain, which also caused it to assume a slightly greyish tinge; but underneath it was a pure white, and at a depth of 12in. to 18in. from the surface had still a high temperature on the sixth day after the eruption.

Lying on the surface of this deposit, especially on the slopes directed towards the fissure, fragments of considerable size of various kinds of rocks were scattered about, and among these were