

boiling or boiled mud, black and brown in colour, with seething pools of steaming water or liquid mud, sometimes cast up into fumaroles ejecting steam, at others vomiting forth stones and mud with a noise like the roar of innumerable steam-engines. From time to time the more active vents along the margin, after a prolonged roar or a sharper detonation like that of a cannon, shoot forth high into the air large bodies of stone, sand, and mud, which generally fall back from whence they came. This is not always so, however, for the surface of the sand- and ash-covered hills around the margin are dotted over with fragments of stone ejected from the crater, whilst other and larger pieces have sunk in, leaving shallow round depressions to mark their sites. The outer edge of the crater differs in height above the bottom according to position, and no general statement could be given as to an average height, but at the west side it is probably about 300ft., the upper part being formed of *débris* thrown out from the crater. To the margin of this ejected matter it is dangerous to approach—it is constantly falling in, and is full of cracks for many yards back. To the east of Te Hape-o-Toroa Hill, in the valley which was formerly occupied by a stream running into Rotomahana, are several points of eruption, some of them throwing up stones and mud at intervals, generally preceded by a loud detonation. The top of this hill, being about two hundred and fifty yards from the margin of the crater, affords an excellent view of the whole series of eruptions (exclusive of the Ruawahia group), and it is easily reached by any one from Rotorua in a ride of eighteen miles, with a walk across the ash-field of about three and a half miles: but, at the same time, the frequent earthquakes tend to engender a feeling of insecurity, and a fear that the steep hill-side might easily fall into the crater. The hill itself is covered deeply with coarse sand, as is the country to the west of Rotomahana, with occasional large stones, which have been ejected. This sand, excepting on the hill itself, is in places very deep, and trying to walk through. As I happened to ride over part of this country about three months ago, I am in a position to judge of the depth to which it has been covered, and can say that in one little valley the sand is certainly 25ft. deep, though doubtless this is too great for an average depth.

*The Black Crater.*—A short distance to the south of Te Hape-o-Toroa is situated the most northerly of the southern group of eruptions. A large body of steam escapes from it, but, as I had not time to inspect it closely, I am only able to say that it is of similar character to the most southerly crater. Next to it on a low hill is a crater which has been named the Black Crater, from the colour of the ejecta, consisting of volumes of steam, sand, and stones. Sketch No. 1 shows this as it constantly appears, in full eruption, vomiting forth large quantities of stones, sand, and mud, the ejecta rising frequently to between 400ft. and 500ft. in the air. Most of the stones, &c., fall back again into the crater, though every now and then a column shoots up in an oblique direction, discharging large quantities of stone on the outside of the cone it is gradually building up with a noise like the rattle of musketry, and leaves them smoking on the surface. The shape of the columns when charged with stones and sand is most elegant, and looks like grand pyramidal geysers, darkened by the sand and mud so as to stand out in relief against the accompanying masses of rising steam. This crater is perhaps more entitled to the name of volcano than the others, for it is building up for itself a true cone with the outward inclined strata of stone, mud, and sand.

*The Southern Crater.*—The next crater is on lower ground, and occupies the site of a former valley; it is very active, but only occasionally discharges stones and sand. The southernmost point of eruption is a crater which has burst through a ridge and built up a small uneven cone for itself; it is about 250 yards long by 100 yards wide at the lip, and about 350ft. deep. There is a smaller crater inside it, now extinct. The bottom is filled with brown water and mud, steaming in places, with a very active boiling spring in the northern corner, from which a large column of steam was rising when we were there. The sides were fast falling in, and great cracks around the margin lead to the belief that it will soon be partially filled up as the activity of the forces decrease. The day following our visit it had become intermittent in its action. Evidently the action in this part is fast decreasing, a fact which is proved not only by its lesser activity, but from the signs of former (recent) activity, as shown by the heaps of stones, some as large as a man's body, which had been thrown out on all sides for a radius of a quarter of a mile or more.

Lake Okaro is unchanged, except that the vegetation is all covered by the ejected ashes. It is stated that on the night of the 11th June a high column of black smoke was seen rising from the southern end of this lake, but the fact requires confirmation: no sign of any eruption was seen by our party two days following that on which the smoke was reported. In the meantime I must assume that the Southern Crater is the most southerly point of eruption.

*Extent of Country covered by Ejecta.*—The extent of country which has been covered by the matter ejected from the different points is very extensive, but complete information on this point is not as yet to hand. The four-mile map accompanying this report shows generally its boundaries. Of course the depth of deposit varies very greatly, being generally deepest nearest the points of eruption, whilst on the extreme edges of the portion coloured on the map it is very slight. The area shown on the map is about 1,850 square miles. A remarkable feature in the ash-deposit around Okaro is the sharp line of demarkation, where the ashes end and the vegetation still remains.

*Nature of Deposit.*—The nature of the deposit also varies in different localities. Immediately round Rotomahana it seems to be composed of coarse and fine sand, mixed with fragments of stone generally of a trachytic nature, and with a large amount of sinter broken up very fine. Close to each point of eruption the stones ejected are of a large size, frequently being as large as a man's body. I looked carefully for any sign of fused rock, but, with one or two doubtful exceptions, the stones appear to be those of the rock of the country broken into fragments, and showing no sign of fusion of recent date. These rocks are the various forms of trachytes common to the country. Immediately to the south of Hape-o-Toroa, and covering about forty-five square miles of country, the deposit is a dirty-white ash, very fine and soft, having the appearance of and feeling in the